Guidelines for a National Fen Survey of Ireland

Survey Manual

Report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland

Prepared by: Dr Peter Foss & Patrick Crushell

e-mail: peter.foss@freenet.de

February 2008

Guidelines for a National Fen Survey of Ireland

Survey Manual

Report for the National Parks and Wildlife Service,
Department of the Environment, Heritage and Local Government, Ireland

Prepared by:

Peter Foss & Patrick Crushell

e-mail: peter.foss@freenet.de

February 2008

Authors: Foss, P.J. & Crushell, P. 2008 Title: **Guidelines for a National Fen Survey of Ireland, Survey Manual**. Report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.

Authors:

Dr Peter Foss
33 Bancroft Park
Tallaght
Dublin 24

Tel. 353-1-4515809

e-mail: peter.foss@freenet.de

Patrick Crushell
Bell Height
Kenmare
Co Kerry

Tel. 353-64-42520

patrick@crushell.com

Acknowledgements

The authors wish to thank the following individuals for their helpful comments and suggestions during the preparation of this survey manual:

Colman O Críodáin (NPWS), Deirdre Lynn (NPWS), Naomi Kingston (NPWS), Shirley Clerkin (Monaghan County Council), Neil Lockhart (NPWS) & Eddie Wymer.

1 Introduction

1.1 The Manual

This manual outlines a methodology and structure for the survey of fens as part of the National Fen Survey (NFS) of Ireland, which is to be carried out on a county by county basis.

The manual outlines the key objectives of the NFS, data recording requirements, and the structure of pre-survey, field survey and post-survey procedures. The manual provides a list of the deliverables expected from a completed NFS county survey. Appendices to the manual are divided into three groups, General Appendices; Survey Appendices (includes sample forms, field recording cards etc) and Results Appendices (includes a range of blank templates to be completed following the NFS).

The manual also includes a list of deliverables and outlines data analyses that will be required on completion of all county surveys, so as to produce a national synthesis of all information collected on the Irish fen resource.

The manual is primarily focused on the procedures to be adopted during the NFS and is not intended as a general habitat survey manual. This manual has drawn extensively on survey guidelines and information published in:

- Anonymous, 2002, **Habitat Survey Guidelines - A Standard Methodology for Habitat Survey and Mapping in Ireland** (Draft), The Heritage Council, Kilkenny.
- Lockhart, N., Madden, B., Wolfe-Murphy, S., Wymer, E. and Wyse Jackson, M., 1993, **National ASI Survey. Guidelines for Ecologists**, Unpublished Report. National Parks and Wildlife Service, Dublin.

It is recommended that surveyors on the NFS familiarise themselves with content of these two reports, which include more extensive texts on key survey themes and issues.

1.2 Aims of National Fen Survey

The National Fen Survey of Ireland (NFS), being undertaken by the National Parks and Wildlife Service (NPWS), Department of the Environment, Heritage and Local Government, Ireland aims to undertake a systematic ecological survey of all known and as yet unsurveyed fen sites in Ireland.

The aim of the NFS is to collect basic site and fen community information on sites in order to:

- assess the distribution, quality, type and quantity of the Irish fen resource;
- provide updated information on sites identified in the past as containing fen communities;
- locate and evaluate sites with a fen interest that have not yet been identified;
- gather data will also be used as a baseline for any future national monitoring programme of fens;
- provide adequate site details in order to compare and evaluate sites for their conservation value on a national scale.

The survey aims to assess sites in the following priority sequence, based on their present conservation designation (or lack thereof):

- Designated or proposed Special Areas of Conservation (SAC's)
- Designated and proposed Natural Heritage Areas (NHA's)
- Sites with a potential fen interest previously reported to NPWS and recommended for survey and conservation assessment, with a view to their

designation as NHA's or SAC's where considered appropriate based on survey findings.

- Additional sites identified during the course of the NFS as potentially containing fen habitat (by either the proposed Geographic Information Systems (GIS) Aerial photographic survey, or ground survey).

1.3 Intended Use of Data, Consistency and Training

The data gathered on fen sites from the National Fen Survey of Ireland will be used to select conservation worthy fen areas, namely Special Areas of Conservation (SAC), Natural Heritage Areas (NHA) and sites of local conservation value. The data will also be used as a baseline for a future national monitoring programme. Therefore, the procedure used to survey, assess and select sites needs to be standardised and consistent.

It is the intention of this manual to provide guidelines for survey and to establish definitions of terms, data collection procedures and data storage formats.

Training is an essential part of the process, ensuring consistency and standardisation of methods. Training will take place at the outset of the survey projects, but it is also most important that checking of survey standards and data recording is undertaken throughout the duration of the survey, to ensure on-going quality control. This will be undertaken by project co-ordinator(s), who will ensure initial training and quality control during the various county field survey.

1.4 Structure of Survey

The fen survey will be conducted on a county by county or regional basis depending on resource availability and priorities to be set by NPWS. The county surveys will be undertaken by a series of survey teams (each consisting of two surveyors). Three stages in the survey are recognised: Pre-survey work; Fen Field Survey and Post-survey work. The aim of the surveyors will be to produce a final fen synoptic report for each site and summary county report.

The individual site reports will allow county, regional and finally a national assessment of fens in Ireland to be undertaken at the end of the respective survey period. It is expected that the survey period will last 3 to 4 years, with a final synthesis of all collected data to be undertaken after the completion of the individual county surveys.

Following the completion of all county surveys, a national synthesis of all information collected on the Irish fen resource will be undertaken. This will include:

- Data consolidation exercise
- Total phytosociological relevé analysis and evaluation of the Irish fen vegetation classification scheme
- An analysis of the hydro-chemical and other environmental characteristics of fens in Ireland based on survey data
- Countrywide site list evaluation and ranking. Re-appraisal of existing ranking of sites and selection of sites for designation as NHA and sites of local conservation importance
- Final selection of new and existing SAC network of sites, based primarily on their fen interest with reference to fen types listed for Ireland in the EU Habitats Directive
- Up-date the conservation status of Habitats Directive Annex 1 fen habitats
- De-designation of severely degraded sites and removal from conservation list
- Preparation of a series of common standards monitoring guidelines for the Irish fen resource.

1.5 Identification of Sites for Survey

The identification of potential fen sites for survey will draw on a number of data sources which are detailed below. Surveyors will assess these various data sources to ensure that as complete a list as possible of the fens, for survey, within each county is assembled.

1.5.1 Sites recorded in the NPWS Fen Survey Database 2007

The National Parks and Wildlife Service (NPWS) Fen Survey database (Foss 2007) contains a list of 808 sites known or believed to contain fen habitats. A breakdown of the number of sites and the area of fen in each county is provided in Table 1.

This site list was compiled during 2006, as part of a data collation exercise undertaken by NPWS to consolidate all known information on fens in Ireland. The database contains sites designated as Special Areas of Conservation (SAC); Natural Heritage Areas (NHA) and site which have been submitted to NPWS for consideration as conservation areas by external and in-house sources, but which have no current conservation designation and usually only limited survey information.

1.5.2 Additional Sites Reported by External Experts

Survey teams will be expected to establish contact with relevant external expert individuals and groups (e.g. BSBI County Recorders; Environment section of Local Authorities etc.) at the start of the survey period, to ascertain whether any sites in addition to those already listed in the NPWS Fen Survey database are recommended for survey within a county.

A further source of potential fen sites will be information held in existing reports, publications and surveys dealing with other non-fen habitats, which may contain valuable references to fens. A preliminary list of possible data sources is provided in General Appendix 1.

1.5.3 Sites Identified from GIS Aerial Photography Survey

The project co-ordinator(s) will provide additional sites for survey based on a GIS Aerial photograph survey of potential fen sites in each county.

1.5.4 Additional Survey Sites

In addition survey teams may identify additional sites considered worthy of survey during the preparation of maps and Aerial photographs to be used on the NFS, or during the actual field survey period.

Table 1: The extent (ha) and number of fen sites recognised in Ireland within each county (after NPWS Fen Study, Foss 2007).

County	Fen area (ha) NPWS Fen Study 2007 Annex 1 fens	Fen area (ha) NPWS Fen Study 2007 All fen types	Total number of sites NPWS Fen Study 2007	Number of new undesignated and recent cNHA sites NPWS Fen Study 2007
Clare	**1,316**	**1,515**	48	10
Cavan	**120**	**394**	12	0
Carlow	**8**	**58**	3	0
Cork	**584**	**2,737**	41	4
Donegal	**761**	**2,373**	84	6
Dublin	**62**	**71**	8	3
Galway	**2,072**	**3,629**	112	22
Kildare	**235**	**254**	18	5
Kilkenny	**128**	**128**	12	3
Kerry	**200**	**2,376**	36	3
Longford	**169**	**238**	13	1
Louth	**65**	**165**	8	4
Leitrim	**223**	**539**	23	8
Laois	**169**	**220**	13	2
Limerick	**582**	**891**	29	15
Meath	**130**	**143**	21	5
Monaghan	**140**	**190**	30	18
Mayo	**1,365**	**4,866**	91	16
Offaly	**1,997**	**2,556**	44	19
Roscommon	**430**	**687**	40	4
Sligo	**276**	**580**	40	12
Tipperary	**1,264**	**1,559**	38	7
Westmeath	**490**	**558**	68	37
Wicklow	**206**	**548**	20	1
Wexford	**69**	**122**	11	2
Waterford	**211**	**286**	20	11
Total Study	**10,307**	**22,180**	808	213

** The NPWS Fen Study (Foss 2007) data presented in this table includes a limited number of sites which cross one or more county boundaries. In such cases the area data and site is duplicated for the occurrence of the site in each of the respective counties in which it occurs, but is not duplicated in the calculation of total areas.*

2 Definitions & Terminology

2.1 Important definitions

In order to establish and maintain standardisation and consistency it is important that definitions of terms are unambiguous in relation to the National Fen Survey (NFS). Some key terms are defined here:

2.1.1 Survey

This consists of site description, description of the types and extent of the vegetation communities present with an emphasis on fen communities. The location of site boundaries, special features, threats and damage are also to be included (for further details of the information to be recorded on sites as part of the NFS see the sample Site Synoptic Report in Results Appendix 1).

2.1.2 NFS Site Form

The site form, to be created for each site identified as meriting survey, holds key information on sites identify as well as the main results of the NFS (see Survey Appendix 1).

2.1.3 NFS Database

A site records database, where the results from the NFS are to be stored in electronic format, for each site surveyed, in a series of results fields. The site database has been designed in such a way as to allow a completed Site Synoptic Report to be produced following survey and subsequent data entry of results (see General Appendix 2 & 3).

2.1.4 The Site

This is the area of fen and associated habitat(s) which is being surveyed. It is defined by a boundary.

2.1.5 Boundary

This is the boundary of the potential conservation area (NHA, SAC etc) to include fen and associated habitats making up a viable conservation unit. In some cases this may involve inclusion of adjacent habitat areas.

At the outset of the survey a pre-survey boundary is to be established by NFS surveyors. This should include the potential fen area of interest and adjacent habitats where these form part of the site's ecological unit. In situations where fens occur in depressions, valleys, or as flushed communities the boundary should include the catchment of the site.

Following field survey it may also be necessary to alter the survey boundary so as to include ecologically sensitive marginal areas, the exclusion of which may affect the long term viability and conservation of the fen communities present on the site.

2.1.6 Fen

Fens are defined as that group of mires which, in contrast to raised bog and blanket bog, receive the major proportion of water and nutrient input from the mineral catchment. The water may be derived from surface (flush) as well as sub-surface (aquifer) sources (e.g. springs).

Fens may have a peat and/or mineral substrate.

Water tables are generally high, often close to the surface, though this may vary seasonally. During winter, sites may be flooded, but in summer water levels may often lie substantially below the surface.

Features which distinguish fens from other peatland types in Ireland are presented in Table 2.

2.1.7 Transitions and Mosaics

Transitions and mosaics within a fen site may be related to the presence of different habitats in addition to fen, the occurrence of different fen vegetation communities or small scale variation within a fen community.

Time restrictions may only allow the sampling of the main communities present within the fen site. However, where transitions and mosaics are an important feature of the site, adequate time should be given to the survey of these mosaics.

2.1.8 Site Size

Within the context of the NFS it is not possible to assign a limit to the size of fen to be surveyed. Spring fens are characteristically small in extent, and applying a lower limit might exclude such sites from the survey.

Conversely on larger sites, the problem is often how to survey an extensive area. In this instance examination of aerial photographs is regarded as essential in helping to pinpoint small sub-compartments within the site to be surveyed for their fen interest.

2.1.9 Whether or Not to Survey

All sites identified as potential fen should be included in the list of sites to be visited, a Site Field pack (see below) should be prepared and a site record created in the NFS Database.

It is recognised that some of the sites will not require detailed survey:

- If the site does not contain any fen vegetation (i.e. previous community classification as fen inaccurate or if provisional identification of fen areas proves to be incorrect)
- If the site no longer contains fen vegetation (i.e. where changes in site management, for example drainage, has resulted in a significant or total loss of fen communities on the site and their replacement by another non-fen community type)
- If the site contains only patchy fen communities that are unlikely to be sustainable in the long term (i.e. degraded, disturbed and/or mostly destroyed sites or small areas of fen within extensive regenerating cutover bog areas).

If in doubt it is better to survey the site and subsequently reject the site when the conservation assessment is undertaken, than to risk missing important information during the survey.

It is essential that where a full site survey is not conducted, and only a brief survey is undertaken, that the reasons for omitting the site survey are explained on the NFS Site Form.

2.1.10 Site Field Pack

A paper based survey pack containing NFS Site Form, maps and aerial photography of the site, together with available background information on the site, as well as results data from the NFS Field survey of the site (i.e. relevé data, hydrochemistry data, conservation assessment and Site Synoptic Report). The site pack will form an integral part of the NPWS data archive on sites of national conservation importance.

2.2 Fen Types

Water-table characteristics have a fundamental influence upon the ecology of fens.

Fen sites may be divided into two major categories based upon water table characteristics.

Topogenous fens experience predominantly vertical water table fluctuations, and occur in shallow depressions, or in transitional zones of vegetation bordering open waters.

In soligenous fens the horizontal water movement is more important than vertical fluctuations. These are formed on sloping terrain where an adequate supply of water provides a continuous through flow of water. Smaller areas of soligenous fen may also occur within bogs or mires associated with routes of flowing surface water.

Table 2. Features which distinguish fens from other peatland types in Ireland

	Raised Bog	**Blanket Bog**	**Fen**
Formed	Lake Basin	Sloping ground / mountain	Lake Basin / sloping ground
Peat Depth	Up to 16m	Up to 6m	3 m
Precipitation (/yr)	>800mm	>1200mm	800-1200mm
pH	<4	<4.5	>4.5
Source of nutrients	Atmosphere / rain	Atmosphere / rain	Ground-water / surface-water
Vegetation	Heather, *Sphagnum* moss	Purple Moor-grass, Heather, *Sphagnum* moss, Sedges	Reeds, Sedges and Brown mosses
Ireland Distribution	Midlands	West and Uplands	Scarce but widespread distribution

2.3 Rich-fen and Poor-fen

Two broad categories of fen types are recognised, poor fen and rich fen, based on water chemistry and the plant species which occur.

Where fens are characterised by alkaline conditions resulting from water draining from limestone and other calcareous soil formations, they are distinguished as "**rich fen**". Water chemistry is alkaline and the vegetation is characterised by calcicole plants such Black Bog-rush (*Schoenus nigricans*) and Saw-sedge (*Cladium mariscus*).

As we have seen from the definition of "fen" above, fens can also occur in sites with much lower mineral inputs (e.g. blanket bog) and a correspondingly higher acidity. Such areas may be described as "**poor fen**" and are commonly characterised by acid relatively nutrient poor water chemistry with extensive development of *Sphagnum* moss carpets.

Along the spectrum from poor to rich fen, transitional types also occur.

2.4 Comparison of Like-with-like

The evaluation of fens as part of the NFS requires a comparison of like-with-like.

Principally this entails the identification of fen communities on sites (i.e. their recording and subsequent classification) which allows full comparisons to be made at county or on a country wide basis.

In addition there must also be information on the extent of fen communities on site, the overall site extent, viability, and management needs, as well the diversity of other habitats, communities and rare or unusual species present.

All these factors together will allow an overall country wide assessment of fens to be made at the end of the NFS period based on rarity, naturalness and representivity, and the selection of the most valuable sites for conservation designation to be undertaken.

2.5 NFS Fen Classification Scheme

The classification scheme used on the NFS is based primarily on the floristics of vegetation types that correspond to certain fen types, as well as certain key habitat features associated with these fen categories.

In summary, within the context of the NFS, six fen categories are recognised, namely:

- Transition mires and quaking bogs;
- Alkaline fens;
- Calcareous fens with *Cladium mariscus;*
- Poor Fens;
- Petrifying springs with tufa formation;
- Non-Calcareous springs.

This classification scheme also takes account of Irelands obligations under the EU Habitats Directive to protect key sites which have been identified for the Annex 1 habitats:

- 7140 Transition mires and quaking bogs
- 7210 * Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae*
- 7220 * Petrifying springs with tufa formation (*Cratoneurion*)
- 7230 Alkaline fens
- Two of these habitats, marked by an *, are priority habitats for conservation under the Habitats Directive.

These fen types are defined in more detail in Table 3 and in the following section below.

General Appendix 4 provides additional descriptive information on the various classification schemes which have been applied to Irish fens and how the communities recognised under these various schemes relate to one another. General Appendix 5 and 6 provide a synoptic table of relevé data from County Monaghan and a tabular phytosociological classification table for Ireland showing the key diagnostic, character and differential species occurring on the various Irish fen communities.

Table 3 Main fen types recognised in Ireland as part of the National Fen Survey, and their relationship to other classification schemes, phytosociological classification, together with details of key species and habitat features.

NFS Fen Classification Scheme	**EU Habitats Directive Habitat;** CORINE Habitat; **Fossitt Habitat Scheme**	**Phytosociological Classification**	**Key Species**	**Habitat Examples**	**Site Examples**
Transition Mire	**7140 Transition mires and quaking bogs;** 545 Transition mires; **PF3 Transition mire and quaking bog**	Scheuchzerietalia palustris to Caricetalia nigrae to Caricetalia davallianae	*Carex limosa, C. diandra, C. lasiocarpa, C. viridula, Eriophorum angustifolium, E. gracile, Agrostis stolonifera, Molinia caerulea, Menyanthes trifoliata, Potentilla palustris, Pedicularis palustris, Sphagnum spp., Calliergon spp., Scorpidium spp.*	Quaking areas on blanket and raised bogs; bog laggs; secondary fen areas of cutover and cutaway bogs	Scragh Bog, Westmeath; Holdenstown Bog, Wicklow; Glenamoy bog complex, Mayo
Alkaline fen	**7230 Alkaline fens;** 542 Rich Fens Caricion davallianae & 5421 Black bog rush fens & 5422 Fens not Schoenus dominated; **PF1 Rich fens and flushes**	Caricetalia davallianae	*Schoenus nigricans, Homalothecium nitens, Carex viridula, C. nigra, C. dioica, C. panicea, Juncus subnodulosus, Molinia caerulea, Hydrocotyle vulgaris, Ranunculus flammula, Mentha aquatica, Galium palustre, Parnassia palustris, Pinguicula vulgaris*	Topogenous fens in valleys or depressions; within transition mire and tall reed beds; calcium rich flush areas in blanket bogs; dune slack areas; wet hollows in machair	Pollardstown fen, Kildare
Calcareous fens with *Cladium mariscus*	**7210 *Calcareous fens with Cladium mariscus and species of the Caricion davallianae;** 533 Fen Sedge Beds; 5331 Fen Cladium Beds; **PF1 Rich fen and flush**	Magnocaricion - Cladietum marisci to Caricetalia davallianae	*Cladium mariscus* and species of Alkaline fens (see above)	Fen beds of the emergent plant zones of lakes; *Cladium* stands in blanket bog flushes and fens	Pollardstown Fen, Kildare; East Burren complex, Clare

Table 3 (cont.) Main fen types recognised in Ireland as part of the National Fen Survey, and relationship to other classification schemes, phytosociological classification, together with details of key species and habitat features.

NFS Fen Classification Scheme	EU Habitats Directive Habitat; CORINE Habitat; Fossitt Habitat Scheme	Phytosociological Classification	Key Species	Habitat Examples	Site Examples
Poor Fen	**Habitats Directive – NA;** 544 Acidic fens; **PF2 Poor fen and flush**	Caricetalia nigrae	*Hammarbya paludosa, Juncus effusus, Carex rostrata, C. nigra, C. curta, Sphagnum recurvum, S. teres, Calliergon stramineum*	Poor fen flushes in blanket bog; soligenous depressions among grassland, cutover bogs and heath	Carrigower Bog, Wicklow; Liffey Head flush, Wicklow
Petrifying Spring with Tufa	**7220 * Petrifying springs with tufa formation (Cratoneurion);** 5412 Hard Water Springs Cratoneurion; **FP1 Calcareous Springs**	Cratoneurion	*Saxifraga aizoides, Carex dioica, C. pulicaris, C. flacca, C. nigra, Pinguicula vulgaris, Equisetum palustre*	Calcium rich spring areas in fens, woodland, sea cliffs, esker ridges, limestone areas, blanket bogs	Pollardstown fen, Kildare; Knocksink Wood, Wicklow; Bellacorick Iron Flush
Non-Calcareous Spring	**Habitats Directive – NA;** 541 Springs Montio-Cardaminetea & 5411 Soft Water springs Montio-Cardaminetea; **FP2 Non-Calcareous Springs**	Montio-Cardaminetea	*Saxifraga hirculus, Sphagnum auriculatum, Calliergon sarmentosum, Polytrichum commune, Juncus bulbosus, Viola palustris, Ranunculus flammula, Hydrocotyle vulgaris*	Cold springs, commonly dominated by bryophytes within blanket bog complexes, clay and rock cliffs poor in lime	Glenamoy Bog Complex, Mayo

Transition mires and quaking bogs

(Habitats Directive – 7140; Fossitt - PF3)

Scheuchzerietalia palustris to Caricetalia nigrae to Caricetalia davallianae communities

Heterogenous fen type, characterised by a scraw of floating or quaking mire vegetation, with medium sized or small sedge communities with *Sphagnum* or brown mosses. Vegetation is rooted in a layer of light, floating fen peat which rises and falls with fluctuating water levels, preventing submergence of the above ground parts of the vegetation.

Water pH:

Source	Community	Water pH Range	Median
Doyle & Ó Críodáin 2003	Calliergo-Caricetum diandrae	5.0-7.5	-
Doyle & Ó Críodáin 2003	Sphagno-Caricetum lasiocarpae	3.8-5.8	-
Doyle & Ó Críodáin 2003	Sphagneto-Juncetum effusi	3.1-6.2	-
MFS Foss & Crushell 2007	Transition mire	5.3-7.8	6.55

Fen vegetation corresponding to this fen category can be found in or association with:

- Floating carpets or quaking mires in larger blanket bog systems
- Floating carpets or quaking mires in raised bog systems
- Secondary fen areas on cutover and cutaway bogs
- Minerotrophic quaking fens outside of larger mire complexes
- Small fens in the transition zone between water (lakes, ponds) and mineral soil

Examples of this fen type:

- Lough Roe, Clara Bog, Offaly
- Scragh Bog, Westmeath
- Holdenstown Bog, Wicklow
- Killyneill Fen, Monaghan
- Fenor Bog, Waterford
- Meenaguse Scragh, Donegal

Alkaline fens

(Habitats Directive – 7230; Fossitt - PF1)

Caricetalia davallianae communities

Small sedge communities and brown mosses, with or without *Schoenus nigricans*, and possible patchy cover of *Phragmites australis*, *Cladium mariscus*, *Typha* spp. or *Carex paniculata*. Vegetation of mineral-rich fens and base-rich fens on calcareous, alkaline peats. Not forming a floating or quaking mire community.

Water pH:

Source	Community	Water pH Range	Median
Doyle & Ó Críodáin 2003	Schoenetum nigricantis	5.5-8.1	-
Doyle & Ó Críodáin 2003	Juncetum subnodulosi	5.6-8.5	-
Doyle & Ó Críodáin 2003	Campylio-Caricetum dioicae	4.6-7.5	-
MFS Foss & Crushell 2007	Alkaline fen	6.6-8.2	7.9

Fen vegetation corresponding to this fen category can be found in or association with:

- Fens outside of larger mire complexes
- With spring communities developing in depressions
- Within tall sedge and reed bed communities
- In association with Cladium fen sedge beds
- Small areas in dune slack systems
- In association with transition mires
- In wet grasslands
- On tufa cones
- Within machair
- Within turloughs

Examples of this fen type:

- Pollardstown Fen, Kildare
- Buckroney-Brittas Dunes & Fen, Wicklow
- Scragh Bog, Westmeath
- Bunduff Lough & Machair, Sligo
- Askeaton Fen Complex, Limerick
- Bellacorick Bog Complex, Mayo
- East Burren Complex, Clare

Calcareous fens with *Cladium mariscus*

(Habitats Directive – *7210; Fossitt - PF1)

Magnocaricion - Cladietum marisci to Caricetalia davallianae communities

Variety of fen types in which *Cladium mariscus* occurs in association with species rich alkaline to poor fen communities, but where *Cladium* is not mono-dominant in character.

Water pH:

Source	Community	Water pH Range	Median
Doyle & Ó Críodáin 2003	Schoenetum nigricantis	5.5-8.1	-
Doyle & Ó Críodáin 2003	Juncetum subnodulosi	5.6-8.5	-
Doyle & Ó Críodáin 2003	Campylio-Caricetum dioicae	4.6-7.5	-
MFS Foss & Crushell 2007	*Cladium mariscus* fen	7.9-8.2	8

Fen vegetation corresponding to this fen category can be found in or association with:

- *Cladium mariscus* beds of the emergent-plant zones of lakes
- Cladium stands in blanket bog flushes
- Cladium stands on regenerating cutaway bog
- Contact areas within calcareous fens (7230)
- Contact areas within acid fens
- Contact areas with reed beds and tall sedge communities
- Extensive wet meadows

Examples of this fen type:

- Pollardstown Fen, Kildare
- East Burren Complex, Clare
- Lough Lurgeen, Galway
- Connemara Bog Complex, Galway
- Askeaton Fen Complex, Limerick

Poor Fens

(Fossitt - PF2)

Caricetalia nigrae to Scheuchzerietalia palustris communities

Medium to small sedge communities with *Sphagnum* present and occasional brown mosses, and possible patchy cover of *Phragmites australis*. Vegetation of swamps, rheotrophic mires, some acid grasslands and drainage channels. Not forming a floating or quaking scraw mire community, usually on firmer peat or *Sphagnum* peat substrate.

Water pH: 3.1-7.5

Source	Community	Water pH Range	Median
Doyle & Ó Críodáin 2003	Carici curtae-Agrostidetum caninae	4.0-5.6	-
Doyle & Ó Críodáin 2003	Caricetum magellanicae	3.0-5.0	-
Doyle & Ó Críodáin 2003	Drepanoclado exannulati-caricetum aquatilis	6.2-6.5	-
Doyle & Ó Críodáin 2003	Sphagneto-Juncetum effusi	3.1-6.2	-
MFS Foss & Crushell 2007	Poor fen	4.5-7.6	5.2

Fen vegetation corresponding to this fen category can be found in or association with:

- Poor fen flushes in blanket and raised bog systems
- Soligenous mires on peat or peaty mineral soils in blanket bog
- Soligenous depressions among grassland
- Flushes in wet heath
- Regenerating communities on cutover bog

Examples of this fen type:

- Bellacorrick Bog Complex, Mayo
- Boleybrack Mountain, Leitrim
- Cloghernagore Bog and Glenveagh National Park, Donegal
- Connemara Bog Complex, Galway
- Ox Mountain Bogs, Sligo
- Wicklow Mountains National Park, Wicklow

Petrifying springs with tufa formation

(Habitats Directive – * 7220; Fossitt - FP1)

Cratoneurion communities

Spring head or seepage areas, fed by meso- to eutrophic water rich in lime, usually dominated by bryophytes in which small vascular plants root. On contact with the atmosphere the lime rich water in the spring often deposits a hard deposit of calcium carbonate known as "tufa".

Water pH: alkaline

Fen vegetation corresponding to this fen category can be found in or association with:

- Forest environments
- Open countryside
- Heathlands
- Contact areas within calcareous fens (7230)
- Calcareous / Machair grasslands
- At base of esker ridges
- Karst / Limestone areas
- Seepage lines on lime rich, inland and sea cliffs

Examples of this fen type:

- Pollardstown Fen, Kildare
- Knocksink Wood, Wicklow
- Benbulbin plateau, Lafargy Bog, Sligo
- Errisbeg, Galway
- Ballyman Glen, Wicklow

Non-Calcareous springs

(Fossitt - FP2)

Montio - Cardaminetea communities

Spring head or seepage areas, fed by oligo- to mesotrophic water, poor in lime, usually dominated by bryophytes in which small vascular plants root.

Water pH: neutral to acid

Fen vegetation corresponding to this fen category can be found in or association with:

- Vegetation of cold springs, commonly dominated by bryophytes
- Warm water springs
- Springs in blanket bog
- Seepage lines on sea cliffs and base of inland clay cliffs, poor in lime

Examples of this fen type:

- Bellacorick, Mayo

3 National Fen Survey Database

The NFS is concerned with the collection of a significant volume of data on potentially 1,000 fen sites nationally. The digital storage of data is essential to allow future evaluation, analysis and collation of survey results to be undertaken in an efficient manner. To this end, all data collected on sites as part of the NFS is to be entered into the NFS Database.

The only exceptions to data storage in the NFS Database, relates to GIS site maps and air photographs which will be stored in separate digital ArcView files, and relevé and hydro chemistry results data which will be stored in a series of Excel spreadsheets (see Results Appendices 10 and 11 for a full list of county and national deliverables).

3.1 Background

As part of the 2006 NPWS Fen Study (see Foss 2007) a database was created to hold a variety of information on the fen sites recorded during the course of this desktop study.

In summary the main NPWS Fen Study database (as it was then known) held information on site provenance, site names, county, SAC and NHA codes, national grid reference, site conservation designations, information on the specific fen vegetation type(s) present and the extent of each (or an estimated area 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 (for a full list of data fields recorded in the NPWS Fen Study database see Appendix 5 in Foss 2007).

Two secondary relational databases (linked to the main database by use of site record number and reference code number), held a list of reports, publications and surveys referring to Irish fens, and a publications / report site records database which listed sites referred to in specific reports. These three databases made up the complete NPWS Fen Study database.

To ensure correct operation of database, it is essential that the entire NFS Database folder is copied to any PC on which the database is to be operated.

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

As part of the Monaghan Fen Survey 2007 the NPWS Fen Study database was modified and new or adjusted data fields were created to hold the field survey information that was obtained (see Foss & Crushell 2007, Appendix 12 for more details).

Following the Monaghan Fen Survey and in light of experience gained and the requirements of the NFS, the site database was renamed the National Fen Survey (NFS) Database. A series of new data layouts and reporting layouts were created to hold and display NFS information including habitat extent data, site descriptions, field survey notes, photographic captions, hydrochemistry data *inter alia* (see General Appendices 2 and 3 for more details).

3.2 Structure

The NFS Database contains a series of layouts which are designed to make the input of data (into data fields) from the NFS as straight forward as possible.

Within the database the data fields are arranged in a series of layouts which contain related survey information.

Layouts which formed part of the original database (see NPWS Fen Study, Foss 2007 for further details) and contain core site information, which will also be used and updated during the course of the NFS, include:

Title layout - opening or title page of database.

Main Layout - includes key site identification details, including site name, site codes, county, designations etc.

Habitats Recorded - includes a list of Fen Habitats present or possibly present (where earlier studies did not allow definitive habitat characterisation) on each site; using the classification system adopted in the NFS together with classification systems used by other workers.

In addition this layout lists all other significant non-fen habitats present on the site, using the Heritage Council, Fossitt 2000 classification scheme.

Fen Habitat Area Information - includes a list of 6 Fen Habitats present or possibly present on each site as adopted by the NFS and the area of each in hectares as derived from previous study information or accurate habitat maps.

Rare & Notable Species Information - includes information on rare or noteworthy Flora and Fauna.

Summary Published Information/Surveys on site - includes date when site was last surveyed, and who undertook the survey; together with a list of publications, reports etc. that include information relevant to the site.

Site Threats (Original format) - includes list of threats and pressures to site with an indication of when and by whom they were previously reported.

Data sources various - includes information on the site from various sources including IPCC; NPWS databases etc.

Additional layouts created within the database to accommodate pre-survey and field survey data from the NFS (see General Appendix 2) include:

NFS Home Page layout – basic introduction and navigation page to the different survey results layouts described below which occur within the database, providing an indication of where data obtained from the field survey is to be stored or updated.

NFS General Survey Results - includes NFS Site details to be obtained for survey sites, including Geology, Quaternary deposits, River Catchment, Townlands, Survey date, and Ground Photographic, Relevé and Water Chemistry sample numbers.

NFS Site Report & Site Notes Section - includes a summary and detailed site description based on the field survey, with particular reference to fen interest on the site. This layout also includes a note section where site observations made at particular locations during the field survey are to be stored. Ground photographic captions are also to be stored here.

NFS Site landuse, impacting activities and threats

This layout includes 4 main sections:

1. Landuse within Site Boundary - includes a list of the main landuse activities within the site boundary, with a scale.

2. Adjacent Landuse - Outside Site Boundary - includes a list of the main landuse activities surrounding the site.

3. Site Impacts and Activities - includes a list of positive and negative impacts and activities presently influencing the sites and a scale for both influence and intensity of these impacts and activities, and an indication of whether they affect the entire site and some or all of the Annex 1 fen habitats present.

4. Site Threats - includes a list of current or planned activities in adjacent areas likely to threaten the site. These threats are to be related to specific Survey Note numbers.

NFS Conservation Recommendation - includes results of conservation evaluation and ranking of site based on the NFS field survey.

NFS Printable Site Report layout - a printable Site Synopsis Report layout which includes all relevant site data collected during the NFS.

3.3 Database Operation & Data Entry

The different layouts in the NFS Database can be accessed by clicking the appropriately named button on the NFS Home Page layout (or subsequent layouts) within the database window.

Within the NFS Database data fields are colour coded as follows:

- **Pale yellow with a red field box**: Data fields, when they first appear, and must be filled or completed as part of the NFS;
- **Pale green**: Data fields, when they first appear, and may be filled should relevant information be available;
- **Pale blue**: Data fields that are repeated in a second or subsequent layout;
- **Pink**: Data fields that are created from calculations; or automatically created when a site record is created etc.

A copy of the NFS Database (Version 2.0a) containing a subset of sites for County Monaghan sites can be found on the CD attached to the inside back cover of this report for information. Survey teams will be supplied with a copy of the NFS Database with a subset of known fen sites in their county/s at the start of the project. It is recommended that a regular backup of this file is made, to avoid unexpected data loss.

Details of data entry required for each site record, under the different layouts in the database, is provided later in this manual and more specifically in General Appendix 3. In addition within the database a series of on screen guideline notes (normally located on the RHS of each layout, in red text) provide additional advice on data entry.

It is suggested that as site information becomes available, on-going data entry to the NFS Database is undertaken. In general data should be entered to the database following completion of milestones attained during the pre-survey; field survey and post-survey period. Suggestions on the timing of data entry are provided in General Appendix 3.

Specifics of the data format for fields are provided in the pre-survey; field survey and post survey chapters which follow, in General Appendix 3 or in on-screen layouts.

4 Pre-Survey Work

This section relates to all work to be carried out prior to field surveys commencing. It includes desktop information research on sites to be surveyed and the preparation of materials (field equipment, maps etc.) necessary to carry out the field survey.

4.1 NFS Geographic Information System

ArcView GIS software package (or some other ESRI compatible GIS software) will be used throughout the NFS for all mapping purposes. On commencement of work, each survey team will be supplied with the following digital GIS datasets of the relevant county:

- 1:50000 OSI Discovery series maps of county to be surveyed
- 1:5000 OSI series maps of county to be surveyed
- 1: 10260 OSI Six Inch map series of entire county
- 2005 OSI Color Orthophotos of entire county
- 1:100000 GSI Bedrock geology map
- Teagasc sub-soils map
- Ordnance Survey river catchments
- Corine land-cover 2000
- NPWS designated sites shape files (NHAs, SACs, SPAs) (as available from mapping section of www.npws.ie)
- NFS Shape file containing points indicating location of known fen sites (template of this file with attribute fields added is included on the CD attached to the inside back cover of this report)
- NFS Shape file containing polygon boundaries of known fen sites (boundaries may not yet exist for many fen sites) (template of this file with attribute fields added is included on the CD attached to the inside back cover of this report)
- NFS Site notes shape file template (included on the CD attached to the inside back cover of this report)
- NFS Habitat shape file templates with attribute fields added (included on the CD attached to the inside back cover of this report)
- NFS ArcGIS style file (.style) which contains the various symbols (i.e. associated with the different habitat types etc) used in producing maps (included on the CD attached to the inside back cover of this report)
- NFS ArcMap (.mxd) files which contain links to each data set (listed above) and includes templates of layouts to be used in producing field maps and site note maps and habitat maps (templates of these files are included on the CD attached to the inside back cover of this report)

Each survey team will be required to update the attributes of NFS shape files as details of existing and additional fen sites emerge. Attributes of shape files that will need to be entered include NFS Site Name, NFS Site Code, Area (ha) (for polygon shape files) and length (m) (for polyline shape files). GIS will be used throughout the survey period in gathering, storing and displaying site information.

As new sites are added, teams will enter the site information into the GIS. It is important to ensure that new sites are added to both the site location (point) shape file and also the site boundary (polygon) shape file. As sites are added, site code and site name should be added to the relevant attribute table. In the case of existing designated sites, those boundaries as drawn by NPWS are to be used, but in the case of new sites, boundaries should be drawn to include all semi-natural habitat adjoining the fen site. Site boundaries should follow existing field boundaries or other physical features that can be recognised on the ground.

The extent of each site should be calculated and recorded in the NFS Site Form. It is vital that all data be synchronised between the NFS Database and the GIS files as new information becomes available such as site area (ha) etc.

4.2 Which Sites to Survey

Information sources which may be used to obtain a complete list of sites to be surveyed within a county, have been discussed in the Introduction, and can be summarised as follows:

1. Sites already listed within the county in the NFS Database
2. Sites obtained from other survey reports, publications or databases
3. Sites provided by expert sources
4. Sites identified as potential fen from GIS aerial photograph survey

A NFS Site Form should be created for each site listed within the NFS Database. Basic site information (see below) to complete the site form can be taken from the NFS Database where a site is already listed. Supplementary information should be filled into the site form as background research on the site is undertaken. This will subsequently be added to the NFS Database.

Where "new" sites are proposed from information sources 2 to 4 above, a NFS Site Form should be completed. When background research has been completed, a new database site record should be created in the NFS Database for these "new" sites (see below). Care should be taken, and grid references carefully checked on the OS discovery map or GIS map, to ensure that site entries are not duplicated. Subsequent survey information obtained can then be added to the site record in the database.

4.3 Site Field Pack Contents

Once the complete list of sites to be surveyed, has been obtained from the NFS Database, a site field pack should be prepared for each site to be surveyed. Details of how to do this are provided below.

In summary the site field pack should contain:

- NFS Site Form (completed to the pre-survey stage)
- NPWS Fossitt Habitat Form (blank; Survey Appendix 8)
- Aerial photograph of each site with provisional survey boundary;
- 1:5000 map of each site with provisional survey boundary;
- Six inch map of each site with provisional survey boundary;
- Aerial photograph overlaid with 1:5000 map and provisional survey boundary;
- Previous site 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;

4.4 Survey Teams – Site Field Pack Preparation

4.4.1 NFS Site Form Completion

A NFS Site Form should be created for each site to be surveyed (see Survey Appendix 1). This should be placed in the site field pack.

A substantial amount of preliminary information may be gathered on sites prior to the field survey. Other information will only become available following the field survey of the site. This information should be entered onto the NFS Site Form for each site and includes:

Section: General Site Details

Site name. If the site is an existing NHA, SAC or listed site (i.e. within database), then the existing name should be used.

For a new site (i.e. one not already listed in the county in the NFS Database) the site should be given its own unique name, related to the Townland name in which the entire or the greater part of the site occurs or to a place name nearby (e.g. lake name). Names should be short and unambiguous.

Site code. Each site should have its own unique code number.

If the site is an existing NHA, SAC or a listed site within the database, then the code number already assigned to the site should be used.

Where the site is new, the site should be given a new number, following the format:

NFS – XX – 000

Where NFS corresponds to National Fen Survey; XX refers to the 2 letter county code; and 000 refers to a number incremented by 1 for each new site located within a given county.

So NFS – MA - 001 would refer to the first "new" fen site listed for County Mayo.

Townland/s Name. All townlands occurring within the survey boundary should be recorded and entered on the NFS Site Form. This information is available from the OS six inch maps.

Detailed Survey Date. To be completed when field survey undertaken, and recorded in day month year format e.g. 24 June 2008.

County /Vice County Codes. Each site should have its county and vice county code recorded on the NFS Site Form. A list of County abbreviations used as part of the NFS and Vice County codes (both in the Republic and Northern Ireland) can be found in Survey Appendix 7. Respective Vice county boundaries can be found on the map included with the Census Catalogue of Ireland (Scannell & Synott 1987).

Where a site occurs across one or more county borders, all counties and vice counties in which the site occurs should be recorded.

National Grid Reference. Record grid references for each site, using both the traditional Grid Reference format:

National Format: H 573 327

and the X (easting) and Y (northing) format:

X co-ord: 257300 Y co-ord: 332700

Discovery Map number (1:50000 series). Enter Discovery map number/s on which site is located.

Surveyor/s. Name of members of the survey team who undertook the fen site survey. Entered as surname and full initials e.g. Foss, P. & Crushell, P.

Survey Type. To be completed when field survey undertaken. If a full site survey was conducted this section can be left blank.

Where only a brief survey was undertaken (i.e. no fen habitat recorded on site, no relevés collected and no mapping of site proposed) then Survey - brief only should be ticked.

In the case where there was insufficient time available to survey the site, where access was denied, etc. the Survey - none box should be ticked.

If only a brief survey or no survey was conducted, an explanation should be provided in the brief description text box as to why.

Site Description Summary. To be completed when field survey undertaken. Complete a short site description max 100 words following the site visit, with reference to the fen interest present on the site and other significant habitats or species recorded.

Section: Site Particulars

Current Conservation Designation. The current protected status of the site:

NHA - Natural Heritage Area with legal protection
cNHA - candidate Natural Heritage Area, no legal protection
pNHA - proposed Natural Heritage Area as advertised in 1995, no legal protection
SAC - Special Area for Conservation with legal protection
cSAC - candidate Special Area for Conservation open to appeal/ transmitted to EU
pcSAC - proposed candidate Special Area for Conservation open to appeal/ not yet transmitted to EU
SPA - Special Protection Area
cSPA - candidate Special Protection Area
Undesignated site - new site proposed by experts/ or during NFS

Additional designations which may be applicable:
NP - National Park with legal protection
WHS - World Heritage Site
NNR - National Nature Reserve with legal protection
BIO - Unesco Biosphere Reserve
RAM - Ramsar Site
ESA - Environmentally Sensitive Area
EDS - Eurodiploma Site
ASI - Area of Scientific Interest
BGR - Berne Convention Biogenetic Reserve
COR - Corine site

Total Site Area (ha). Total extent of the survey area proposed**.** Where site has an existing NHA or SAC boundary this area and boundary should be used.

River Catchment (GIS). The name of the river catchment within which the site occurs should be recorded on the NFS Site Form (this information is available from the GIS, see details below).

Topography. Brief description of the location of fen within the landscape and general comments on relief.

e.g. Fen located in inter-drumlin hollow or basin; river flood plain; lake edge; valley fen; flushed area in blanket bog or on channel on raised bog surface etc.

Solid Geology (GIS). The underlying solid geology of each site should be recorded on the NFS Site Form (this information is available in GIS format, see details below).

Quaternary Deposits (GIS). The underlying quaternary sub-soil deposit type/s of each site should be recorded on the NFS Site Form (this information is available in GIS format, see details below).

Corine Landcover 2000 Category (GIS). The Corine Landcover Category code/s for each category occurring within the site should be recorded on the NFS Site Form (this information is available in GIS format, see details below).

Owner Information. Self-explanatory. Where possible provide information on ownership status of the site.

e.g. Private owner; Unknown; State Body – include organisation / company name if known.

Section: Fen habitat Types Present and Extent (after survey)

It will not be possible to complete this section until the site has been surveyed, although for sites already listed in the NFS Database, potential fen types and extent may already be listed for the site.

The fen type/s found should be specified following survey.

The extent of fen types found should be entered on NFS Site Form following the field survey and subsequent post-survey mapping of habitats using GIS.

Section: Site Landuse/Impacting Activities /Threats

To be completed when field survey has been undertaken.

Landuse Within Site Boundary. Please tick the main landuse within the site boundary.

Then, if possible, indicate whether the landuse types are:
1- Rare (c. <5%); 2 – Occasional (c. 5-20%); 3 – Frequent (c. 21-50%); 4- Dominant (c. >50%).

Adjacent Landuse. Please tick the main landuse adjacent to and /or surrounding the site, and outside the site boundary.

Impacts and Activities Influencing Conservation Status. Please tick the main impacts and activities influencing the conservation status of the site.

Then, if possible, indicate 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

Site Threats. Please tick the types of threats affecting or likely to affect the site and include the Note number (from the site Notes section) after the threat type. Using the same activities list as above.

4.4.2 Site Map Preparation

The following field maps are to be produced prior to survey, samples of which are presented in Results Appendix 1. Site boundaries should be outlined in red.

- 1:5000 Map/s of site with site boundary; together with a master map for larger sites showing the location of individual sub compartment.
- GIS 6" Map/s of site with site boundary.
- GIS Aerial photograph with site boundary; together with a master map for larger sites showing the location of individual survey sub compartment.
- GIS Aerial photograph overlain by transparent 1:5000 map with site boundary.

The 'NFS field-map' layout should be used when creating field maps in ArcMap. Included in this layout is a North arrow, a scale bar, a (100x100m) grid, site code and name. Depending on the extent of the site the scale bar and grid may need to be adjusted. The grid however should never exceed (200x200m). All maps should contain the same geographical area so that quick comparisons between maps can be made. Field maps are to be exported from ArcMap in Adobe Acrobat (.pdf) format.

4.4.3 Background Data Research on Sites

Publications, reports and surveys research:

A number of data sources may exist which contain information on the sites to be surveyed. These should be consulted prior to survey to gather information on the fen types and extent on these sites. Relevant information on sites can be copied and included in the site field pack, in particular where these provide information on fen communities or species of note.

A list of resources that may be of use are listed in General Appendix 1. This list is not exhaustive.

Should additional report, publication be located which contain useful site information, these should be listed in the publications bibliography which forms part of the NFS Site Database.

GIS Based Site Research:

GIS Quaternary Deposit Data

The digital version of the sub-soil map of Ireland produced by Teagasc (Meehan 2004) should be consulted in determining the quaternary sub-soil underlying each site. The underlying subsoil of each site should be entered into the NFS Site Form.

To ascertain the quaternary geology deposits of a site in ArcMap, display the site boundaries shape file over the quaternary deposits map. The site may occur on more than one type of quaternary deposit; in which case each subsoil type should be noted and recorded on the NFS Site Form.

The quaternary deposit information is to be used only as an indication of the likely sub-soil present, and may not always be accurate. The data originates from different sources, the accuracy of which varies between different counties.

GIS Geological Data

The 1:100,000 bedrock geology map of Ireland (Geraghty et al. 1997) should be consulted to determine underlying geology at each site. Data gathered through this exercise should be entered into the NFS Site Form.

To ascertain the quaternary geology deposits of a site in ArcMap, display the site boundaries shape file over the bedrock map. The site may occur on more than one bedrock type; in which case each bedrock type should be noted and recorded on the NFS Site Form.

GIS River Catchment Data

The digital river catchment map of Ireland produced by Ordnance Survey of Ireland should be consulted to determine the river catchment in which each site occurs. Data gathered through this exercise should entered into the NFS Site Form.

To ascertain the river catchment of a site in ArcMap, display the site boundaries shape file over the river catchments map. The site may occur within more than one catchment; in which case each catchment should be noted and recorded on the NFS Site Form.

GIS Corine 2000 Landcover

The digital Corine Landcover 2000 category map of Ireland produced by Ordnance Survey of Ireland should be consulted to determine the Corine Landcover categories occurring within each site. The code number of the landcover category gathered through this exercise should be entered into the NFS Site Form.

To ascertain the Corine landcover category of a site in ArcMap, display the site boundaries shape file over the Corine landcover map. The site may fit into more than one category; in which case each category should be noted and recorded on the NFS Site Form.

The Corine landcover information is to be used only as an indication of the category present, and may not always be accurate. The smallest mapped unit is 25 hectares, and therefore the Corine landcover of smaller sites may often prove to be incorrect.

4.4.4 On-going Data Input to NFS Database

It is suggested that as background site research is completed for the sites to be surveyed, on-going data entry to the NFS Site Database is undertaken.

Details of data entry required for each site record under the various layouts in the database is provided in Chapter 3 above.

4.4.5 NFS Mapping of Site Locations

Prior to the field survey, sites due be surveyed as part of the NFS should be located and marked on the appropriate Ordnance Survey of Ireland Discovery map.

This will assist with location of the site when the field survey visit is being planned and may help group sites into clusters which can be surveyed as part of a single visit to a particular geographic area within the county.

4.4.6 Field Equipment Checklist

A checklist of items that may be useful and are essential for field survey work are included in Survey Appendix 12.

4.4.7 Checklist of Completed Site Survey Pack – Pre-Survey

- NFS Site Form (1 copy) completed to the pre-survey stage
- GIS 1:5000 Map/s of site with site boundary & grid scale (2 copies)
- GIS 6" Map/s of site with site boundary & grid scale (1 copy)
- GIS Aerial photograph/s of site with site boundary & grid scale (2 copies)
- GIS Aerial photograph overlaid with 1:5000 map with grid scale (1 copy)
- Selected photocopies of background reports, publications or previous survey information
- NFS Fossitt Habitat Assignment Form (1 copy)

4.5 Role of Co-ordinator(s)

4.5.1 County GIS Dataset Compilation

A Geographical Information System (GIS) will be compiled for each county prior to commencement of survey work, details of the datasets which will make up the GIS are detailed in section 4.1 above. Each GIS supplied to the survey teams will be of similar layout and contain templates that will ensure consistency of methods and outputs.

4.5.2 GIS County Aerial Photographic Survey

A remote sensing GIS survey of each county will be carried out with the aim of identifying potential fen sites that have not yet been surveyed. Data-sets that will be referred to will include the latest colour aerial photography, Corine landcover maps and subsoil maps. Each county will be systematically surveyed, those areas that have been surveyed in the past (i.e. during NHA survey) will not be included.

Following this desk-top survey, those sites that are deemed most likely to contain fen habitat will be included in the county site list for the survey team to assess. Proposed site boundaries will be drawn and relevant information supplied to survey teams. The survey teams will proceed to complete an NFS Site Form, field pack and carry out other background research as necessary.

4.5.3 Training on GIS Survey Map & Final Habitat Map Preparation

At least one team member is expected to have a basic working knowledge of ArcView GIS (or some other ESRI compatible GIS software). The survey team will be supplied with a file containing all of the relevant GIS datasets and NFS layouts. A training workshop will be held to ensure that each survey team will produce similar and comparable outputs and follow best practice. Topics that will be covered will include:

- Assigning attributes to features
- Calculation fields
- Drawing (use of snapping, splitting etc) and labelling features
- Use of NFS layout templates
- Use of NFS style (.style files)
- Use of habitat shape files
- Production of field maps
- Production of site note maps
- Production of final habitat maps

4.5.4 NFS Project Orientation Workshop

To ensure consistency of approach among survey teams during the course of the NFS a training workshop for surveyors will be held. This will include a field work element. The objectives of this course will be to provide training and guidance on:

- Overall survey objectives
- Health & Safety issues relating to survey work
- Survey preparation (mapping/ background research/ GIS map work)
- NFS Database structure, operation and data input
- Fen habitat identification and classification
- Field survey methods (relevé collection/ survey methodology/ water sampling techniques/ equipment training/ photographic recording etc.)
- Post-survey data preparation, recording and storage (data collation/ database inputs/ final GIS mapping/ data storage format and backup)
- Timetabling of survey work
- Explanation of survey deliverables for each county

4.5.5 Water Chemistry Logistics

The co-ordinator(s) will be responsible for the initial contact with the personnel carrying out the water chemistry analysis. All logistics such as delivery of samples, treatment of samples upon arrival and analysis protocol are to be agreed with the laboratory personnel prior to field surveys commencing.

5 Fen Field Survey

This section relates to all work to be carried out during the field surveys. It includes advice on the methods to be used in describing and photographing the site, collection of relevé data and water samples.

5.1 Survey Teams - Field Survey Methods

5.1.1 General Survey Strategy

Prior to the site visit any previous reports available from the site should be consulted and potential fen areas noted.

On arrival at the site, and in conjunction with the aerial photograph, the site should be examined from a suitable vantage point with binoculars and note taken of areas that might contain fen communities, and access to site should be selected.

Full site survey versus brief site assessment. For some of the sites proposed for survey, the initial binocular survey of site, or a brief site visit, may show that no suitable fen areas occur on the site. Where this is the case, the site should be described in brief, a limited photographic record made and no further survey work need be undertaken.

The brief site description should indicate the main non-fen habitats present and why no detailed fen survey is undertaken. This information should be entered on the NFS Site Form.

5.1.2 Safety Advice

During the NFS surveyors are expected to work in teams of two. As experienced ecologists they will be expected to be aware of, and follow normal safety practices – responsibility rests with surveyors.

Some general safety procedures to be followed:

- **Inform somebody of your anticipated movements each day.**
- **Carry a compass in mountainous areas – weather in such areas can change suddenly.**
- **Carry a portable GPS.**
- **Wear appropriate (to the ground and weather conditions) footwear and clothing.**
- **Carry a first aid box in your survey vehicle.**
- **Make sure the survey vehicle is maintained in a good state of repair.**
- **Keep up to date with tetanus booster injections.**
- **Do not take un-necessary risks.**
- **Follow the Country Code.**
- **Familiarise yourself with the NPWS Health & Safety Statement** (Anonymous 2007)
- **Familiarise yourself with the Safe Operational Procedures for Field Work in National Parks & Wildlife** (O'Grady 2004)

5.1.3 NFS Site Form Completion

During the field survey the following sections of the NFS Site Form should be completed, when a detailed site survey is undertaken:

- Date of Survey
- Surveyor names
- Site description summary
- Fen types present

In addition the following sections dealing with landuse, threats and impacts on the site are to be completed. This can best be done following the site visit and before survey teams leave the area.

Landuse Within Site Boundary. Please tick the main landuse within the site boundary.

Then, if possible, indicate whether the landuse types are:
1- Rare (c. <5%); 2 – Occasional (c. 5-20%); 3 – Frequent (c. 21-50%); 4- Dominant (c. >50%).

Adjacent Landuse. Please tick the main landuse adjacent to and /or surrounding the site.

Impacts and Activities Influencing Conservation Status. Please tick the main impacts and activities influencing the conservation status of the site and its fen communities.

Then, if possible, indicate 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

A full list of impacting activities is provided in General Appendix 7.

Site Threats. Please tick the types of threats affecting the site and subsequently (following completion of site notes report) include the appropriate note number referring to the threat type. Threats differ from impacts as they are likely to continue to impact on the future conservation value of the site and not only relate to impacts that have occurred on the site to date. Use the same activities list as above.

5.1.4 Site Description and Site Survey Notes

Walking the site. The site should be walked to aid site familiarisation; identification of homogenous stands of fen vegetation and to identify features of interest.

Habitat mapping. Note should be taken of the location of different community type/s within the site. These should be mapped onto the aerial photograph of the site during the course of the field survey.

During the survey, note should be taken of drainage features, damage and possible threats to the site. These are to be marked on the 1:5000 map of the site using note numbers. Additional information should be recorded in a field survey notebook with reference to the note numbers.

The boundary of the site, established during the pre-survey work, should be assessed to ascertain whether this makes a suitable conservation boundary for the proposed site. Any alterations required to the boundary should be noted and marked on the 1:5000 map.

Boundary changes made during the field survey will have to be amended on the GIS boundary file following the survey (see post-survey work section), and note of any changes in site area should be made on the NFS Site Form.

Detailed field notes should be made during the course of the survey which will be used in preparing site description and site notes following the site visit.

It is recommended that a detailed site description and site notes should be prepared as soon as possible following the site visit, preferably in the evening following the site visit.

The portable GPS unit should be used throughout the site survey to record co-ordinates of site features including relevés, habitat boundaries, damage, water sample locations etc.

5.1.5 Ground Photographic Survey and Notes

A digital photographic record of each site should be made, to include the appearance of the site in general, areas with fen communities, boundary and drainage features and damage occurring on the site.

Photographic image code numbers from the site visit should be entered on NFS Site Form during the site visit.

Notes on any particular features photographed should be written up in the field survey notebook.

It is recommended that digital imagery is transferred from the camera to a digital storage device or PC following each days field work. This data should be backed up regularly.

It is recommended that images from each site visit are stored in separate folders, labeled with site name and code. Photographer name, date, and a description of the image (i.e. subject, habitat, species) should also be recorded. Images taken during field surveys will become the copyright property of NPWS.

5.1.6 Relevé Recording Scheme

One of the main objectives of the NFS is to record, by means of relevé data, the fen vegetation types occurring on the sites to be surveyed.

Homogenous stands. Fen areas, where present, are to be examined and relevé site/s selected based on areas of homogenous vegetation. The location of relevés should be marked on the 1:5000 map of the site, and GPS co-ordinates taken.

Quadrat size and shape. It is recommended that a relevés size of 2x2 m should be used for the majority of medium or small stature fen vegetation, unless local topographic features restrict the communities to smaller areas. For taller communities, e.g. those with *Phragmites* or *Cladium*, a quadrat size of 4x4 m should be used.

Number of Quadrats. It is recommended that a minimum of two relevés are recorded per site. Where more than one fen community is recorded per site, relevés from each identifiable unit of fen vegetation should be made.

Recording System. Relevés should be recorded on the pre-printed relevé card (see Survey Appendix 2) and cover values assigned, based on Domin cover value system (details of relevé information to be recorded is provided below).

A relevé is a list of all the plant, bryophyte and lichen species recorded within a given quadrat area, to which a percentage cover value is assigned within a series of cover classes. Cover classes used, based on Domin scheme are:

Value	Cover
+	single individual – no measurable cover
1	1-2 individuals – no measurable cover
2	several individuals but less than 1% cover
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
10	91-100% cover

At the relevé locations peat depth should be probed using a 2 meter steel rod, substrate type should be described and the water table depth should be recorded (for details see below).

Where possible a one litre water sample should be collected from within each relevé quadrat. Where this is not possible, a water sample should be taken from an adjacent area, as close as possible to the relevé site (for details see below). In general 2 water samples should be collected from each site, corresponding to the 2 relevé locations selected.

To allow efficient collection of relevé species data, together with related environmental, photographic, soil and hydro chemistry data a relevé field card has been designed for the NFS. A sample of this relevé card, is shown in Survey Appendix 2.

Species identification, where necessary, for vascular plants and bryophytes, are to be made using Webb, Parnell & Doogue (1996), Stace (1997), Watson (1981), Smith (1980), Jermy et al (1982) *inter alia*.

Nomenclature for species should follow the 'Ireland 2008' checklist that has been agreed by the National Biodiversity Data Centre, the National Parks & Wildlife Service and the National Botanic Gardens Glasnevin.

Further information is available at: http://www.npws.ie/en/MapsData/

Species abbreviations used on the relevé card (to maximise on available space) are given in full, in both Latin and English, in Survey Appendix 13.

Any species not identified in the field (in particular bryophytes, but also higher plants) should be collected, clearly labeled and subsequently identified in the laboratory.

Adequate time should be allocated during the course of the field survey to the laboratory identification of unknown species. Noteworthy species finds that are difficult to confirm should be sent to referees for positive identification.

Once identified additional species should be added to appropriate relevé card/s. Only at this stage should relevé data be computerised.

5.1.7 Relevé Card Completion

A completed relevé card should record the following information, using format conventions as already described in the NFS Site Form section (see above):

- **Site name**
- **Site Code**
- **County**
- **Survey Date**
- **National Grid reference (GPS co-ordinates)**
- **Discovery Map Number**
- **Surveyor/s**
- **Photographic Numbers**

In addition the following relevé information should be recorded:

Relevé Code. Use a combination of site code, followed by Rx, where x is the relevé code number incremented by 1 for each new quadrat recorded during the entire course of a county survey, so that each relevé has a unique code assigned to it.

So 1677 R1 would refer to the first relevé from fen site number 1677.

Relevé size (in meters squared). Quadrat size used e.g. 4 meters square for a 2x2 relevé

Altitude (m). Self-explanatory, record in meters from Discovery map or GPS Unit.

Slope. This should be entered in degrees, see Categories of slope in Survey Appendix 4.

Aspect. This should be indicated by using points of the compass (e.g. NW)

Water Sample Code Number. Use a combination of site code, followed by Wx, where x is the water sample code number incremented by 1 for each new sample taken during the entire course of a county survey, so that each water sample has a unique code assigned to it.

So 1677 W1 would refer to the first water sample from fen site number 1677.

Water Table Height (cm). This may be easily assessed where the surface is smooth. If hummocks and hollows occur then the water table height is that present within the hollows. May be a negative or positive value.

Field pH. Water pH recorded within the quadrat (using portable pH meter) should be noted.

Field Electrical Conductivity (µS/cm). Water conductivity recorded within the quadrat (using portable conductivity meter) should be noted.

Substrate type. The relevant category should be ticked. See Survey Appendix 5 for explanation of categories.

Substrate Depth (cm). The depth of peat/soft sediment should be recorded within each quadrat. Specify if different substrate is encountered and if possible at what depth.

Substrate Stability. Assessed by response of fen surface to walking. See Survey Appendix 6 for explanation.

Management in Relevé. This refers to the management of the vegetation unit that has been sampled within the relevé. Indicate the relevant category:

- None: no management apparent
- R. grazing: Rough Grazing
- Burnt: Self-explanatory
- Cut for: indicate whether reed, litter/hay etc.
- Other: should be specified

Surrounding landuse. This refers to the landuse adjacent to the fen vegetation unit that has been sampled in the relevé. Indicate the relevant category:

- Semi-natural habitat: Self-explanatory
- Pasture rough: Self-explanatory
- Pasture semi improved: Self-explanatory
- Improved pasture: Self-explanatory
- Arable: Self-explanatory
- Urban: Self-explanatory
- Forestry: Self-explanatory
- Other: should be specified

Layers Cover (%). The percentage cover of the categories indicated should be given. A zero value indicates absence of the respective layer.

Layers Height (cm). The height of the vegetation canopy should be given. Where vegetation is composed of a number of different layers (e.g. Tree/Shrub/Herb) the average height should be given for each of these 3 layers.

Fen Vegetation Type. Fen type represented by the relevé on the site should be indicated.

Quadrat Description. This is a written description of the quadrat and the vegetation unit which it represents. Reference should be made to any interesting features noted.

The occurrence of other species outside the relevé quadrat, within a 5 m radius, can be added here under an "Additional Species Note:".

5.1.8 Floristic Data Outside Relevés

A general species list of higher plants, mosses, lichens etc. together with noteworthy fauna from the site should be compiled. This information should be written up in a field survey notebook or the relevé cards (see above).

General species information (flora/fauna) should be recorded in the site survey notes section to be prepared following the field survey.

Any rare species information may also be recorded in the Rare Species section of the NFS Database.

5.1.9 Fossitt Habitats present within Site

During the course of the site survey, or as soon as possible following the site visit, a list of all habitats recorded within the site boundary should be recorded on the NPWS Fossitt Habitat Form (Survey Appendix 8) included in the Site Field Pack.

This information will subsequently be recorded in the NFS Database.

5.1.10 Water Sample Collection

Each survey team will be provided with the necessary equipment to; obtain water samples, determine pH and EC, and store the samples until delivery to the lab for further analysis. Where possible, two 1 litre water samples are to be collected (using the polyethylene bottles provided) from each of the sites surveyed in detail during the NFS.

Samples should be taken at or as close as possible to relevé locations. In some situations, due to a low water-table, samples may need to be collected from the nearest area of surface water. Samples are to be labeled as proposed above and the location of water sample locations should be noted on the site map.

Following collection, pH and EC should be determined immediately and noted on the NFS Site Form.

Following this, samples are to be kept in a cool box with ice packs until delivery to the laboratory for analysis. It will be necessary for the survey team to liaise with personnel

from the water chemistry laboratory to ensure delivery of samples to the laboratory within 24 hours of collection.

5.1.11 Checklist of Site Field Pack – Following Field Survey

- NFS Site Form - completed for the field survey stage
- GIS 1:5000 Map/s of site with grid scale – with site note locations, relevé and water sample locations marked, key ground photograph locations marked and final boundary details shown
- GIS 6" Map/s of site with provisional site boundary & grid scale
- GIS Aerial photograph/s of site with grid scale – with fen and other non-fen habitat boundaries shown
- GIS Aerial photograph overlaid with 1:5000 map with grid scale
- Background reports, publications or previous survey information
- NFS Fossitt Habitat Assignment Form – completed for all habitats found on the site
- Completed site description
- Completed site notes from field survey
- Completed ground photographic images folder for site, together with image captions
- Original relevé card/s
- Photocopy of site survey notes recorded in Field Notebook
- Results of at least 2 water samples from the site

5.2 Role of Co-ordinator(s)

5.2.1 Quality control of field survey

It is envisaged that during the course of the NFS, a degree of quality control of survey procedures, species identification and data recording techniques will be undertaken by the NFS project co-ordinator(s).

This will involve a period spent accompanying each survey team, during the field survey period and during the post-survey collation and preparation of site survey data, maps etc.

5.2.2 Quality control of NFS Database inputs

In addition to quality control of survey procedures referred to above, survey teams will also be monitored on their data entry procedures into the NFS Database. This process will ensure consistency of data entry, and may be undertaken during both the pre-survey and field survey phase of the NFS.

5.2.3 Quality control of Habitat Mapping

Co-ordinator(s) will liaise with survey teams to ensure that mapping is carried out satisfactorily and that there is consistency in the methods being used.

5.2.4 Hydro-chemistry Analysis

The co-ordinator(s) are will liaise with laboratory personnel and survey teams to ensure that any issues arising with regard to the methodologies for water chemistry collection, storage and preservation or analysis are resolved.

5.2.5 Ongoing project management

The co-ordinator(s) will liaise with survey personnel and NPWS staff to ensure that the surveys are conducted efficiently. Any un-foreseen logistical issues will be addressed by the survey co-ordinator(s).

6 Post -survey Work

This section relates to all work to be carried out in the post-survey period. It includes advice on the methods to be used in preparing site descriptions and notes from the survey, classification of fen types present, estimation of fen extent, habitat mapping, site conservation assessment and data consolidation within the NFS Database. It also includes a provisional contents for a NFS Summary County Report.

Priority:

- Site Survey Notes, Site Descriptions and Ground Photographic Captions from the survey should be written up as soon as possible after each visit.
- All relevé forms should be checked to ensure that quadrats are numbered consecutively; that there location is plotted and agrees with the site notes map; species identifications are confirmed in the laboratory and that all data recording fields have been completed.
- Water samples should be checked to ensure that they are numbered consecutively.
- Maps/Aerial photographs showing location of site notes, relevé locations, habitat distribution and boundary details should be checked and completed as soon as possible after each visit.
- Conservation Assessment of sites visited should be undertaken as soon as possible after each site visit, preferably on the same day.

6.1 Survey Teams – Post Survey Work

6.1.1 Completion of Site Description and Survey Notes

Detailed and Summary Site Descriptions and Survey Notes should be completed as soon as possible after the site visit.

It is suggested that these are prepared using a MS Word templates provide in Results Appendix 8. Following preparation of text, proof reading and spell-check these text sections can be cut and pasted into the relevant data fields in NFS Database.

Site notes should be given Note numbers incrementing by 1 on each occasion e.g. N1, N2 etc.

In addition note numbers should be classified by addition of one of the following category names:

- Habitat – where note refers to fen or other habitat feature of note on the site
- Damage – where note relates to damage within site
- Boundary – where note refers to a boundary feature or structure
- Relevé – where note relates to the location of a relevé on the site
- Flora – where note relates to species occurrence; or additional species to those found within a relevé
- Fauna - where note relates to faunal species recorded
- Ownership – where note relates to information on owners of all or a portion of the site (this information should be treated in the strictest confidence)
- Photograph – where note relates to a specific feature which has been photographed; include appropriate photographic image code within the note text
- Management – where notes relate to management issues within site
- General – note not covered by one of the categories above

Format for recording a note would therefore be: **N1 Habitat –** the first habitat note from the site, followed by appropriate descriptive text.

6.1.2 Digitising of Site Notes Map

Following site surveys, teams are expected to produce a digital version of the site notes map using ArcView GIS software package (or some other ESRI compatible GIS software). Notes are to be mapped using the site note shape file provided in the GIS. Note number, site code and site name should be added to the associated attributes table. Notes are to be displayed over the black and white 1:5000 map of the site with the site boundary outlined in red, notes are to be labelled according to note number (see example site note map in Results Appendix 1). Maps should be produced using the field map layout as supplied in the GIS and exported in .pdf format.

6.1.3 Completion of Ground Photographic Survey Captions

Photographic images from the survey should be selected and captions prepared. It is suggested that a minimum of 8 to 10 images be included for a site which has been surveyed in detail, which should provide an overview of the site within the landscape; show fen habitats on the site and boundary or damage features of note. The location where photographs were taken should be marked on the 1:5000 notes map, using the numbering convention detailed in the section above.

It is suggested that the captions are prepared using a MS Word template provide in Results Appendix 9. Following preparation of text, proof reading and spell-check, these text sections should be pasted into the relevant data fields in NFS Database.

Digital images selected to illustrate the site and the features present, should be saved in Jpeg format and stored in a PC folder labelled with the site name and site code number, and should include the photographic captions text file.

It is recommended that digital files are backed up regularly to ensure against unforeseen data or equipment loss.

6.1.4 Relevé Data Computerisation

Input of relevé data should be completed as soon as possible after the field survey, and once all species have been confirmed. The field card should be checked to make sure that all relevant data has been recorded and that the location of the relevé is shown on the Notes map.

In most cases some microscopic identification of moss, liverwort and lichen species collected during the field survey will be required to complete the full species list for the relevé. Adequate time should be allocated to the laboratory identification of unknown species. Noteworthy species finds that are difficult to confirm should be sent to referees for positive identification.

Once the full species complement for survey relevés has been completed, species cover values and general relevé data should be entered into a Relevé Results Table. A template for this table, in MS Excel format, is provided in Results Appendix 5.

6.1.5 Fen Type Classification on Sites Surveyed

Based on relevé data and other factors recorded during field visit it should be possible to determine a provisional fen type of each fen area recorded within a site.

Once relevés have been computerised, classification of the fen vegetation types present on the site should be finalised according to the classification scheme defined by the fen vegetation tables provided in General Appendix 4, 5 and 6.

This process will allow relevés to be classified according to the NFS scheme proposed in Chapter 2.

6.1.6 Digitising Site Habitat Maps

Following site surveys, teams are expected to produce habitat maps using ArcView GIS software package (or some other ESRI compatible GIS software). Mapping of sites depends

on the results of field survey. Fen habitats are to be digitised from every site on which they were recorded. On those sites which are deemed to be of high local importance or greater conservation value as evaluated by survey team (see below), all habitats as classified using Fossitt (2000) should be digitised.

The colour coding for habitat mapping should follow the Heritage Council Draft Guidelines (Anonymous 2002) and should include the appropriate Fossitt alphanumeric code (see Results Appendix 12). A style file containing all of the different habitat symbols is supplied with the GIS. A final habitat map (overlain on the 1:5000 OS map) of each site will be produced for inclusion in the site file and the final report. The habitat map layout included in the GIS will be utilised to produce habitat maps. Following habitat mapping, the extent of fen types and habitat types associated with each site will be calculated using the GIS and recorded in the NFS site database. A sample habitat map is presented in Results Appendix 1.

6.1.7 Hydro-chemistry Data Computerisation

Results of field determinations of EC and pH are to be entered into the NFS. Results from the detailed lab analysis are to be recorded into an excel spread sheet which is provided (Results Appendix 6). Within this spreadsheet, details to be recorded relating to each sample will include site code, site name, fen type (or other habitat type) from which sample was taken, water table depth, relevé number (where relevant), substrate type, substrate depth and substrate stability.

6.1.8 Site Evaluation and Ranking

Determining the conservation value of sites is one of the primary aims of the NFS. To assess the potential value of site, sites should be assessed on a range of criteria and scores applied (see below). A Site Conservation Evaluation template (MS Excel file) is provided in Results Appendix 7 for this purpose.

Once scores have been applied sites may then be ranked according to the conservation value of the overall site, based on the ranking system described below.

Site Evaluation

Following completion of the site survey each site surveyed in detail should be evaluated in relation to 15 criteria (see Results Appendix 7). These criteria include 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 are assessed according to the guidelines in that report, while Fen Value and Expert Opinion have been added as additional items on which to score sites as part of the NFS.

A brief definition of the criteria, their meaning in the context of the NFS survey and the scoring system applied are provided here. For full details and further discussion of the selection criteria refer to Lockhart *et al.* (1993).

Naturalness: An assessment of site damage and alteration, disturbance and human interference noted. Scoring: 0 = high degree of disturbance; 5 = no or minimal disturbance.

Non-recreatability: Feasibility of re-creating a given site and/or habitat type. Scoring: 0 = easy to re-create; 5 = difficult to re-create.

Potential value: Whether site value can be improved in a reasonable timescale. Scoring: 0 = no improvement possible on site, or the site close to its maximum potential; 5 = significant improvement possible/ site not at its maximum potential

Typicality: Degree to which a site displays typical habitat features. Scoring: 0 = habitat not representative; 5 = excellent example of habitat.

Educational value: Site suitability for educational use. Scoring: 0 = no educational value; 5 = highly suitable as an educational site.

Size: Relative site size in relation to habitats present and at scale of habitats within County. Scoring: 0 = Site habitat area too small to be viable; 5 = site habitat extent large and viable.

Diversity: Range of habitats and species within site. Scoring: 0 = poor habitat / species diversity; 5 = excellent habitat / species diversity.

Fen value: Quality of fen habitat(s) on the site. Scoring: 0 = no fen habitats present; 5 = good quality and quantity of fen habitat present.

Rarity of species : Rare or notable species present on site. Scoring: 0 = no species of note recorded; 5 = rare species of note confirmed on site.

Rarity of habitats: Rare or notable habitats present on site (in the context of the EU Habitats Directive). Scoring: 0 = no habitats of note recorded; 5 = rare habitat of note confirmed on site.

Viability: Whether interest of site will persist even with protection measures. Scoring: 0 = site unviable; 3 = viable but only with management measures; 5 = site viable in its current state.

Recorded History: Previous research information available on the site. Scoring: 0 = no previous information/research; 5 = extensive site information available.

Management needs: Degree to which management is required on site to adequately conserve the ecological interest. Scoring: 0 = Site requires major management / restoration initiatives; 5 = site requires little or no change in current management regime.

Intrinsic appeal: Scenic and landscape appeal of site. Scoring: 0 = no scenic/landscape appeal; 5 = high scenic/landscape appeal.

Expert opinion: Overall surveyors opinion of site value and conservation potential, based on all habitats present. Scoring: 0 = site has little value for conservation; 5 = site has high value for conservation

Site Ranking

Once the site evaluation scores for each site have been totaled in the Excel file, the site ranking scheme below should then be applied to assess the conservation value of each site (see Table 4).

Table 4. *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

**Note: The score system in Table 4 was developed from results of Monaghan Fen Survey 2007 and is to be considered preliminary and should be used only as a guide. The scoring system is likely to change as more information becomes available from future county surveys.*

Site rating is based on the ecological and site evaluation criteria presented in Table 5 below.

Table 5. Site ranking criteria used on the Monaghan Fen Survey 2007 (modified from NRA (Anonymous 2004).

Ranking	*Qualifying Criteria*
A	**Internationally important** Sites designated (or qualifying for designation) as SAC* or SPA* under the EU Habitats or Birds Directives. Undesignated sites containing good examples of Annex I priority habitats under the EU Habitats Directive. Major salmon river fisheries. Major salmonid (salmon, trout or char) lake fisheries.
B	**Nationally important** Sites or waters designated or proposed as an NHA* or statutory Nature Reserves. Undesignated sites containing good examples of Annex I habitats (under EU Habitats Directive). Undesignated sites containing significant numbers of resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive or species protected under the Wildlife (Amendment) Act 2000. Major trout river fisheries. Water bodies with major amenity fishery value. Commercially important coarse fisheries.
C +	**County value** Sites containing semi-natural habitat types with high biodiversity in a county context and a high degree of naturalness, or significant populations of species which are rare in the county. Small water bodies with known salmonid populations or with good potential salmonid habitat. Sites containing resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
C	**High value, locally important** Sites containing semi-natural habitat types with high biodiversity in a local context and a high degree of naturalness, or significant populations of locally rare species. Small water bodies with known salmonid populations or with good potential salmonid habitat. Sites containing any resident or regularly occurring populations of Annex II species under the EU Habitats Directive or Annex I species under the EU Birds Directive. Large water bodies with some coarse fisheries value.
D	**Moderate value, locally important** Sites containing some semi-natural habitat or locally important for wildlife. Small water bodies with some coarse fisheries value or some potential salmonid habitat. Any water body with unpolluted water (Q-value rating 4-5).
E	**Low value, locally important** Sites containing some remnant semi-natural habitat or locally important for wildlife, but where disturbance has significantly altered habitat and/or continues to threaten future survival of the site.

*SAC = *Special Area of Conservation;* SPA= *Special Protection Area;* NHA= *Natural Heritage Area*

6.1.9 Completion of NFS Database Site Record & Site Synopsis Report

It is suggested that as site information becomes available, on-going data entry to the NFS Site database is undertaken.

At the end of post survey work, it is essential that each site record is checked to ensure that all site data has been correctly recorded in the NFS Database.

On completion of data entry a Site Synopsis Report should be printed from the NFS Database for each site surveyed.

6.1.10 Completion of NPWS Paper Based Site Survey Pack

For each site surveyed, the completed paper based version of the site pack, should include the following elements:

- NFS Site Form
- Copy of field notes (photocopy)
- Copy of original relevé cards
- Site Synoptic Report printed from the NFS Sites Database
- NPWS Fossitt Habitat Assignment sheet
- Final GIS 1:5000 Habitat map/s showing all areas of fen present and where appropriate, other community types on the site
- Final GIS 1:5000 map (with grid scale) of site showing the final site boundary and location of all survey notes etc.
- Final GIS Aerial photograph/s of site (with grid scale) showing the final site boundary
- Background information and previous survey information on site
- Original 1:5000 map of site (with grid scale) showing site note locations, relevé and water sample locations, key ground photograph locations and provisional boundary details shown as well as alterations to same, used during the field survey
- Original GIS 6" Map/s of site (with grid scale) and provisional site boundary marked together with any notes from the field survey
- Original GIS Aerial photograph/s of site (with grid scale) showing provisional site boundary and field notes on the extent of fen and other habitat types, used during the field survey

Additionally, where the site has been ranked as of A or B conservation value (NHA or SAC status) the following completed items should also be included with the site pack:

- NPWS EU Habitats Assignment sheet
- NPWS EU Species Assignment sheet
- NPWS National NHA Survey - Site Card: Ecologists

6.2 Role of Co-ordinator(s)

6.2.1 Quality Control of Survey Teams Post Survey

Co-ordinator(s) will work closely with survey teams to ensure that teams are producing consistent and comparable outputs.

6.2.2 GIS Habitat Map Information and Habitat Area Estimation

Co-ordinator(s) will be responsible for collating all county GIS files and amalgamating into a national NFS Geographical Information System. Following this, total habitat areas will be calculated. Summary habitat maps will be produced displaying total fen habitat extent recorded during surveys.

6.2.3 Hydro-chemistry Data

Hydro-chemistry data collected from each county will be summarized and related to fen types recorded.

6.2.4 NFS Summary County Report

At end of individual county surveys the co-ordinator(s) will draw together all information from the county, and produce a summary report of the findings from each county. The results of the surveys will be summarised in a national context.

This summary county report will include the main elements from each county survey. The contents for the summary report should include:

- Title page
- Acknowledgements
- Executive Summary
- NFS Introduction and Background to the county survey
- NFS Methods
- NFS Results
  - General survey findings
  - Change in fen habitats confirmed by survey
  - Range of fen types which occur within county
  - Map of site distribution within county
  - Extent of fen types within county
  - Environmental conditions on fens within county
  - Site assessment and conservation ranking within county
  - Factors Influencing conservation value of sites within county
  - Provisional up-date on the conservation status of Habitats Directive Annex 1 fen habitats
- Conclusion
- Bibliography
- Appendices
  - list of sites surveyed in detail with fen area and extent;
  - list of sites surveyed in brief
  - list of un-surveyed;
  - site evaluations and ranking;
  - relevé data;
  - hydrochemistry data.

6.2.5 Completed County Survey Deliverables

The co-ordinator(s) will ensure that all items listed in Results Appendix 10, the deliverables from a completed NFS County survey, have been drawn together by the survey teams.

Once this has been achieved, these will be submitted to NPWS.

7 Overall Synthesis of NFS Findings

Following completion of all NFS County Surveys it will be possible to undertake an analysis and evaluation of the entire Irish fen resource based on the fen type and extent information, relevé and hydrochemistry data collected during the course of the NFS. This information will be contained in a final NFS Synthesis Report. A more detailed list of overall deliverables from the completed NFS are provided in Results Appendix 11.

In summary this process and report may include the elements listed here:

Statistical analyses of relevé and hydrochemistry data collected to include:

- a phytosociological analyses of all relevés collected during the entire national survey. This may involve amendments to the current fen classification scheme recognised in Ireland;
- a multivariate analysis of the species and environmental data
- a statistical analysis of the hydro-chemistry data collected in conjunction with the phytosociological classification, to define national parameters and ranges for the physio-chemical environmental variables of the different fen types recognised.

By consolidating the NFS Database, a full appraisal of conservation worthy fens in Ireland will be undertaken to produce:

- list of sites recommended for inclusion in the network of NHA's
- list of sites recommended for inclusion in the network of SAC's
- list of sites recommended for inclusion in any future network of sites of county or local conservation importance
- list of severely degraded sites, which might be deleted from the conservation worthy fen list, assuming restoration options are not no longer feasible

Based on the GIS habitat maps produced from the surveys it will be possible to create:

- accurate maps of the distribution and range of the different fen types nationally and at county level;
- produce accurate information on the area of fen types nationally and at county level.

By consolidating data on fen extent, the production of national fen statistic from the NFS database will include:

- the number of sites in Ireland with a fen interest;
- the area of each fen type nationally and at county level;

Synthesis of data from the NFS will allow updating of the National Parks and Wildlife Service Core site database to reflect results from the National Fen Survey.

In addition a series of common standards monitoring guidelines for the Irish fen resource will be produced.

8 Bibliography

- Anonymous, 2002, Habitat Survey Guidelines - A Standard Methodology for Habitat Survey and Mapping in Ireland (Draft), The Heritage Council, Kilkenny.
- Anonymous, 2007, Safety Statement, Department of the Environment, Heritage & Local Government, Department of the Environment, Heritage & Local Government, Published report. pp. 58
- Anonymous , 2004, Guidelines for Assessment of Ecological Impacts of National Roads Scheme, National Roads Authority, Dublin.
- Corley, M.F.V. & Hill, M.O., 1981, Distribution of Bryophytes in the British Isles. A catalogue of their occurrence in vice-counties, British Bryological Society, Cardiff
- Crushell P., 2000, Irish Fen Inventory - A review of the status of fens in Ireland, Irish Peatland Conservation Council, Dublin, pp. 100.
- Dobson, F., 1981, Lichens - An Illustrated Guide, The Richmond Publishing Co. Ltd., Great Britain.
- Doyle, G.J. & Ó Críodáin, C., 2003, Peatlands - fens and bogs. In: Otte, R. (ed.) Irish Wetlands: Distribution, ecology, uses and economic value, University College Dublin Press.
- Ferguson-Lee, J., Willis, I & Sharrock, J.T.R., 1983, The Shell Guide to the Birds of Britain and Ireland, Michael Joseph Ltd., London
- Foss, P.J., 2007, National Parks & Wildlife Service Study of the Extent and Conservation Status of Springs, Fens and Flushes in Ireland 2007, Internal report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.
- Foss, P.J. & Crushell, P., 2007, Monaghan Fen Survey 2007 (Vols 1-3), Report for Monaghan County Council and the National Parks & Wildlife Service, Dublin.
- Fossitt, J., 2000, A Guide to Habitats in Ireland, The Heritage Council, Ireland.
- Geraghty, M., Farrelly, I., Claringbold, K., Jordan, C., Meehan, R., and Hudson, M., 1997, Geology of Monaghan-Carlingford. A geological description to accompany the Bedrock Geology 1:100,000 Scale Map Series, Sheet 8/9, Monaghan-Carlingford. Geraghty, M. (ed.), Geological Survey of Ireland.
- Hodgeson, J.M., 1974, Soil Survey Handbook, Soil Survey Tech. Monog., No. 5, Harpenden.
- Holyoak, D.T., 2003, The distribution of Bryophytes in Ireland: An annotated review of the occurrence of liverworts and mosses in the Irish Vice-Counties, based mainly on the records of the British Bryological Society, British Bryological Society, Broadleaf Books, U.K.
- Jahns, H.M., 1983, Collins Guide to Ferns Mosses and Lichens of Britain and Northern and Central Europe, Collins, London.
- Jermy, A.C., Chater, A.O. & David, R.W., 1982, Sedges of the British Isles, Botanical Society of the British Isles, London.
- Kelly, D.L. & Iremonger, S.F., 1997, Irish wetland woods: The plant communities and their ecology, Biology and Environment: Proceedings of the Royal Irish Academy, 97B 1 pp. 1-32.
- Lockhart, N., 1991, Phytosociological and Ecological Studies of Lowland Blanket Bog in West Galway and North Mayo. Ph.D. Thesis, National University of Ireland, Galway. pp. 301.
- Lockhart, N., Madden, B., Wolfe-Murphy, S., Wymer, E. and Wyse Jackson, M., 1993, National ASI Survey. Guidelines for ecologists, Unpublished Report. National Parks and Wildlife Service, Dublin.

- Lousley, J.E. & Kent, D.H., 1981, Docks and Knotweeds of the British Isles, Botanical Society of the British Isles, London.
- McCorry, M., 2006, Saltmarsh Monitoring Project 2006, A Report for Research Branch, National Parks & Wildlife Service. pp. 75.
- Meehan, R., 2004, Soils Parent Material Map. Forest Inventory and Planning System – Integrated Forestry Information System (FIPS-IFS), Teagasc, Ireland.
- Meikle, R.D., 1984, Willows and Poplars of Great Britain and Ireland, Botanical Society of the British Isles, London.
- Moore, J.A., 1986, Charophytes of great Britain and Ireland, Botanical Society of the British Isles, London.
- Ó Críodáin, C., 1988, Parvocaricetea in Ireland, Ph.D. Thesis, National University of Ireland.
- Ó Críodáin, C. & Doyle, G.J., 1994, An overview of small-sedge vegetation: syntaxonomy and a key to communities belonging to the Scheuzerio-Caricetum nigrae (Nordh. 1936) Tx 1937, Biology and Environment: Proceedings of the Royal Irish Academy, 94B, pp. 127-144.
- O'Connell, M., Ryan, J.B. & Macgowran, B.A., 1984, Wetland Communities in Ireland: a phytosociological review. In: Moore, P.D. (ed.) European Mires, Academic press, London pp. 303-364.
- O'Grady, C., 2004, Safe Operational Procedures for Field Work in National Parks & Widlife, National Parks & Wildlife Service, Internal Report. pp. 135
- Phillips, R. , 1977, Wild flowers of Britain, Pan Books Ltd., London.
- Phillips, R. , 1980, Grasses, Ferns, Mosses & Lichens of Great Britain and Ireland, Pan Books Ltd., London.
- Preston, C.D., Pearman, D.A. & Dines, T.D., 2002, New Atlas of the British and Irish Flora, Oxford University Press, pp. 910.
- Ratcliffe, J.D., 1977, A nature conservation review, Cambridge University Press, Cambridge.
- Scannell, M.J.P. & Synnott, D.M., 1987, Census catalogue of the flora of Ireland, The Stationery Office, Dublin.
- Sheehy Skeffington, M. & O'Connell C., 1998, Peatlands of Ireland. In: P. Giller (ed.) Studies in Irish Limnology, University College Cork, Cork.
- Smith, A.J.E., 1980, The Moss Flora of Britain and Ireland, Cambridge University Press, Cambridge.
- Stace, C., 1997, New Flora of the British Isles. Second edition. , Cambridge University Press, Cambridge. pp. 1130
- Tutin, T.G., 1980, Umbellifers of the British Isles, Botanical Society of the British Isles, London.
- Watson, E.V., 1981, British Mosses and Liverworts, Cambridge University Press, Cambridge
- Webb D.A., Parnell, J. & Doogue, D., 1996, An Irish Flora, Dundalgan Press Ltd., Dundalk.
- Wheeler, B.D., 1984, British Fens, In: Moore, P.D. (ed.) European Mires, Academic Press, London, pp. 303-364.
- White, J. & Doyle, G.J., 1982, The Vegetation of Ireland. A Catalogue Raisonne. In: White J. (ed.) Studies on Irish Vegetation, Royal Dublin Society, Dublin. pp. 289-368.

9 Glossary

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

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

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

ALTITUDE - Vertical height above sea level.

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

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

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

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

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

AQUATIC ENVIRONMENT – Rivers, streams, lakes, ponds, springs and features that depend on natural waters e.g. marsh, fen, bog and related wetlands.

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

CUTOVER BOG – Areas of bog which have been previously cut, although not down to the marl layer or bedrock. Often using traditional hand-cutting methods. Cutover areas are

normally a mosaic of cut areas, face banks, pools, drainage ditches, uncut areas of peat, scrub, grassland etc.

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

DIVERSITY - see biodiversity.

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

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

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

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

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

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

EPA – Environmental Protection Agency.

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

EPIBIOTA - Surface-dwelling animals and plants.

EPIFAUNA - Surface-dwelling animals.

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

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

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

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

EUTROPHIC - Having high levels of primary productivity or nutrients.

FAUNA - Animal life.

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

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

FLORA - plant life.

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

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

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

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

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

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

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

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

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

HUMMOCK - A small hillock/mound. Often used to describe the surface of active bogs where the ground forms a pattern of mounds, hollows and pools. On bogs hummocks commonly comprise mosses.

HYDROLOGY - The movement of water through a catchment area including freshwater and seawater inputs, water level changes and drainage mechanisms which are all influenced by the underlying geology.

HYPERTROPHIC - Over-enriched with nutrients, polluted.

IMMERSED - Submerged by water.

IPCC - Irish Peatland Conservation Council. Non-governmental organisation established in 1982 to promote the protection of Irish bogs and fens.

LAGG - Fringing wetland area around raised bogs where groundwater mixes with bog water, and where vegetation communities are transitional between bog and fen.

LATITUDE – The angular distance measured in degrees north or south of the equator.

LICHENS – An organism that consists of a fungus growing in close association (symbiosis) with an alga.

LOAM - Friable or crumbly soil comprising sand, silt, clay and organic matter.

MANAGEMENT - a) Controlling processes within a site (this can be actively carrying out work or can be doing nothing), preferably in accordance with a conservation plan.
- b) The practical implementation of the management plan.

- c) Undertaking any task or project identified in the management plan, including the identification of new opportunities.

MARGINAL VEGETATION - At or near the margin or border, often used to describe the vegetation at the edge of a lake or river.

MARL - White calcareous clay or precipitate with a high proportion of soft calcium carbonate, usually found as an alluvial deposit.

MARSH - Wet grassy habitats, with more or less permanent standing water at or near ground level, with little or no peat formation. Generally quite species rich.

MECHANICAL PEAT EXTRACTION - Refers to the use of machinery to cut peat. This includes extrusion cutting such as by sausage machine (e.g. Difco) or any other type of mechanical cutter (e.g. Hopper).

MESOTROPHIC – freshwater lake systems containing moderate concentrations of mineral nutrients, such as phosphorous, calcium and nitrogen. Having moderate levels of primary productivity or nutrients (intermediate between oligotrophic and eutrophic).

MICROTOPOGRAPHY - Very small-scale variations in the height and roughness of the ground surface.

MINEROTROPHIC MIRE - A peatland system that is fed by ground water.

MIRE - A general term applied to peat producing ecosystems. cf. bog, peatland.

MONITORING – A repeat or repeats of a survey using the same methodology. Designed to look for or measure specific changes and the rate or extent of change. Used to check the "health" quantity or quality of a habitat or species.

MONTANE - Of or relating to mountains.

MOOR - Shallow acid peatland with less than 40 cm peat depth, often resting on iron pan and podzol; and dominated by ericaceous vegetation.

MOR HUMUS - Organic soil that is acid and comprises layers of plant litter.

MORAINE - Ridge or mound of unsorted mineral material deposited by glaciers.

MOSAIC - Used to describe habitats that occur together and cannot easily be mapped separately. Complex pattern or patchwork of habitats or species occurring in intimate associations.

MUD - Silt/clay fraction where sediment particles are less than 0.063 mm in diameter

MULTIPLE PRIVATE OWNERSHIP- Lands that are divided into areas which are privately owned. There must be more than one private landowner under this heading (lands in commonage are not described under this heading).

NATIONAL PARKS AND WILDLIFE SERVICE (NPWS) – the section of the Environment Infrastructure and Services division of the Department of Environment, Heritage and Local Government with responsibility for nature conservation and implementation of Government conservation policy as enunciated by the Minister for the Environment, Heritage and Local Government.

NATURA 2000 - A network of sites across the European Community, selected for the purpose of conserving natural habitats and species of plants and animals which are rare,

endangered or vulnerable in the European Community. SACs and SPAs form the Natura 2000 network.

NATURAL HABITAT - Can be aquatic or terrestrial areas distinguished by geographic, abiotic and biotic features, whether entirely natural or semi-natural.

NHAs - Proposed Natural Heritage Areas. These are areas that are important for wildlife conservation. Some of these sites are small, such as roosting areas for rare bats; others can be large such as a blanket bog or a sand dune system.

NNR - National Nature Reserve. Areas set aside for their conservation value by the Minister for the Department of Environment, Heritage and Local Government.

NOTABLE SPECIES - Plants or animals which are worthy of mentioning either because they are particularly typical of a habitat, or because they are rare/ scarce/ atypical.

NPWS - National Parks and Wildlife Service (see above).

OLIGO – Prefix denoting few or little.

OLIGOTROPHIC - Applied to waters that are relatively low in nutrients, as in lakes which are low in dissolved minerals and which can only support limited plant growth. Having low levels of primary productivity or nutrients.

OMBROTROPHIC - Rain-fed, of or relating to vegetation or ecosystems that receive most of their nutrients from precipitation.

OS – Ordnance Survey.

PEAT - Organic soil material saturated by water, composed of the partial decomposed remains of plants and mosses.

PEAT CUTTING BY HAND - See hand cutting of peat.

PEAT CUTTING BY MACHINE - See mechanical peat extraction.

PEBBLE - Sediment particle, or stone, that is between 16-64 mm in diameter.

PERIPHERY - Distant from the centre, on the fringe/edge.

pH - A quantitative expression for the acidity or alkalinity of a solution or soil. The scale ranges from 0-14: pH 7 is neutral, less than 7 is acidic and greater than 7 is alkaline.
PLATEAU - A wide, mainly level area of elevated land.

PHYTOSOCIOLOGY - Study and classification of plant communities based primarily on floristic considerations.

PODZOL - Acid soil with an organic layer over a highly leached mineral layer.

PRECIPITATION - Water moving from the atmosphere to the ground in the form of rain, fog,
mist, snow or hail.

PRIORITY HABITAT - A subset of the habitats listed in Annex I of the EU Habitats Directive. These are habitats which are in danger of disappearance and whose natural range mainly falls within the territory of the European Union. These habitats are of the highest conservation status and require measures to ensure that their favourable conservation status is maintained.

RARE - An ecological term applied to distribution of species when assessed on a national grid reference system. The assessment is made on the basis of the number of occupied 10 km National Grid squares. A species is described as rare if has been recorded in to 3-10, 10 km squares.

RED DATA BOOK – A register of threatened species that includes definitions of degrees of threat.

RED DATA BOOK (lower plants) - This Red Data Book deals with Stoneworts which are recognised as a separate class, Characea, of the Green Algae Chlorophyta). Many of these species are threatened by loss of habitat or pollution.

RED DATA BOOK 1 (vascular plants) This Red Data Book deals with rare and threatened flowering plants and ferns of Ireland with an account of their present distributions and conservation status.

RED DATA BOOK 2 (mammals, birds, amphibians and fish) - identifies those species threatened in Ireland or those species whose populations are considered to be of international importance, though not necessarily threatened in Ireland. It details the current state of Irish vertebrates and provides a concise summary of the various legislation for each species.

RIPARIAN - Of or relating to a river bank.

SACs - Special Areas of Conservation have been selected from the prime examples of wildlife conservation areas in Ireland. Their legal basis from which selection is derived is The Habitats Directive (92/43/EEC of the 21st May 1992). SAC's have also been known as cSAC's which stands for "candidate Special Areas of Conservation", and pcSAC's which stands for "proposed candidate Special Areas of Conservation."

SCIENTIFIC MONITORING - this is carried out by the monitoring section of the NPWS, whose function here is to ensure that the favourable conservation status of the site is maintained and where possible improved.

SEDIMENT - Solid particles that can originate by the weathering and erosion of pre-existing rock, by chemical precipitation from water, or by the breakdown of organisms.

SEDIMENTARY - Formed by the deposition of sediment, i.e. rock particles or chemical precipitate, or pertaining to the process of sedimentation.

SILICEOUS - Of or relating to rocks or sediments that contain silica and are acid.

SILT - Fine sediment particles that are between 0.004-0.063 mm in diameter - component of mud.

SINKHOLE - Steep-sided, enclosed depression linking to underground drainage systems in a limestone region.

SLACK - Wet depression in a sand dune system or, in the case of rivers, a backwater.

SPAs - Special Protection Areas for Birds are areas which have been designated to ensure the conservation of certain categories of birds. Ireland is required to conserve the habitats of two categories of wild birds under the European Birds Directive (Council Directive 79/ 409/ 2nd April 1979). The NPWS is responsible for ensuring that such areas are protected from significant damage.

SPECIES - the lowest unit of classification normally used for plants and animals.

STRATEGY - A course of action or a broad approach towards achieving an objective. It is the general thrust of management towards achieving an objective. It is a description of how the objective is to be achieved.

SUBMERSED - Submerged or covered by water.

SURVEY - a) Study visit to produce an inventory of what is present / recorded at a location.
- b) Establishing a baseline (study).

SUSTAINABLE - The highest rate at which a renewable resource can be used without reducing its supply (without causing damage to the resource).

TILL - Unsorted sediments laid down directly by glacier ice without the intervention of water.

TRANSITION MIRE – Acidophilous vegetation intermediate between poor fen and ombrotrophic (rain-fed) bog.

TROPHIC - Of or relating to nutrient levels or nutrition.

TUFA - Deposit or precipitate of calcium carbonate formed around calcareous springs.

TURBARY – Refers to the right to harvest turf.

VASCULAR PLANTS - Higher plants with specialised conducting tissue, including angiosperms (flowering plants), ferns and club mosses.

VERTEBRATES - Animals with backbones.

VERY RARE - an ecological term which is applied to distribution of species when assessed on a national grid reference system. The assessment is made on the basis of the number of occupied 10 km National Grid squares. Very Rare applies to 1-2, 10 km squares in this context.

WEATHERING - The process by which rocks are broken down and decomposed by the action of wind, rain temperature changes, plants and bacteria. See also chemical and mechanical weathering.

ZONING - The division of a nature conservation site (& neighbouring lands) into a number of subunits. Within each zone the management prescriptions will be reasonably uniform and will differ in type or intensity from the other zones in the plan.

10 NFS List of General Appendices

All files in Microsoft Word Format unless otherwise indicated. General Appendices use GenApp naming convention, on the CD Rom accompanying this report.

General Appendix 1.
Background Data Sources referring to Irish Fens

- **NPWS Natural Heritage Area site files containing previous site survey reports, maps, specialist studies and NHA Site Synopsis. NPWS Headquarters Ely Place, Dublin.**
- **NPWS Official Website including site lists, conservation management plans, summary information and site descriptions on selected NHAs/SACs. www.npws.ie**
- Anonymous, 1981, National Heritage Inventory. Areas of Scientific Interest in Ireland, An Foras Forbartha, Dublin, pp. 166.
- Anonymous, 2005, Westmeath Peatland Study 2005, Internal Report, Natura Environmental Consultants.
- Anonymous, 2006, Irish Peatland Conservation Council - Peatland Site Database, Irish Peatland Conservation Council, Ireland.
- Bassett, J.A. & Curtis, T.G.F. , 1985, The nature and occurrence of Sand Dune Machair in Ireland, Proceedings of the Royal Irish Academy, 85B, 1-20.
- Bruck, P.M., Cooper, C.E., Cooper, M.A., Duggan, K. and Wright, D.J., 1986, The geology and geochemistry of the warm springs in Munster, Ir. J. Earth Sci., 7, pp. 169-194.
- Conaghan, J., 2000, The distribution, ecology and conservation of blanket bog in Ireland, Internal report, National Parks and Wildlife Service, Dublin.
- Crawford, I., Bleasdale, A. & Conaghan, J., 1996, Biomar survey of Irish Machair Sites, Internal report, National Parks and Wildlife Service, Dublin.
- Crushell P., 2000, Irish Fen Inventory - A review of the status of fens in Ireland, Irish Peatland Conservation Council, Dublin, pp. 100.
- Curtis, T & McGough, N., 1981, A Survey of the the Wetlands of the Fergus Catchment and adjoining areas, National Parks & Wildlife Service Internal Report, Dublin.
- Curtis, T.G.F.C. & Sheehy-Skeffington, M.J., 1988, The Salt Marshes of Ireland: An Inventory and Account of their Geographical Variation Biology and Environment, Proc. Roy. Ir. Acad. 98B No. 2, pp. 87-104.
- Derwin, J. (ed.) et al., 2003/04, Survey and evaluation of blanket bogs for proposal as Natural Heritage Areas, Internal Report, National Parks and Wildlife Service, Dublin.
- Derwin, J. et al., 2002, Raised bog Natural Heritage Areas (NHA) Project, Internal Report, National Parks and Wildlife Service, Dublin.
- Douglas, C. & Grogan, H., 1985, Survey to locate raised bogs of Scientific interest in Counties Galway (E) and Roscommon. Part II, Internal Report, Wildlife Service, Dublin.
- Douglas, C. & Grogan, H., 1986, Survey to locate raised bogs of Scientific interest in Counties Longford, Westmeath and East Mayo (also Counties Cavan, Leitrim, Sligo & Roscommon), Internal Report, Wildlife Service, Dublin.
- Douglas, C. & Grogan, H., 1987, Survey to locate raised bogs of Scientific interest in Counties Clare and Kerry, Internal Report, Wildlife Service, Dublin.
- Douglas, C. & Grogan, H., 1987, Survey to locate raised bogs of Scientific interest in Connemara, Counties Galway, Internal Report, Wildlife Service, Dublin.
- Douglas, C. & Mooney, E., 1984, Survey to locate raised bogs of Scientific interest in Counties Galway (east) and Roscommon. Part I, Internal Report, Wildlife Service, Dublin.

- Douglas, C. & Ryan, J. , 1981, Blackwater River proposed arterial drainage scheme. Environmental Impact Assessment, Unpublished report, Forest and Wildlife Service, Dublin.
- Douglas, C., Dunells, D., Scally, L. & Wyse Jackson, M., 1990, A survey to locate lowland blanket bogs of scientific interest in County Donegal and upland blanket bogs in Counties Cavan, Leitrim and Roscommon, Internal report, National Parks and Wildlife Service, Dublin.
- Douglas, C., Garvey, L., Kelly, L. & O'Sullivan, A. , 1989a, A survey to locate blanket bogs of scientific interest in County Kerry and County Sligo, Internal report, National Parks and Wildlife Service, Dublin.
- Douglas, C., Garvey, L., Kelly, L. & O'Sullivan, A. , 1989c, A survey to locate blanket bogs of scientific interest in County Mayo Part II, Internal report, National Parks and Wildlife Service, Dublin.
- Douglas, C., Garvey, L., Kelly, L. & O'Sullivan, A. , 1989b, A survey to locate blanket bogs of scientific interest in County Galway Part II, Internal report, National Parks and Wildlife Service, Dublin.
- Douglas, C., Lockhart, N. & Ryan, J. , 1983, Pre-drainage survey Finn/Lackey Catchment Counties Monaghan & Cavan, Unpublished report, Forest and Wildlife Service, Dublin.
- Duff, K., 2006, County Waterford Wetlands Survey, Final Report November 2006, Internal Report, Natura Environmental Consultants for Waterford County Council.
- Duff, K., 2006, Westmeath Fen Study 2006, Internal Report, Natura Environmental Consultants.
- Emblow, C. , 2003, Development of a baseline ecological data set for selected warm springs in Ireland, Ecoserve Consultancy Services, Dublin.
- Farrell, C., 2006, Fen Communities within Bord na Móna Bog Areas, Internal Report, Bord na Móna.
- Farrell, C. & Doyle, G.J., 2003, Rehabilitation of industrial cutaway Atlantic blanket bog in Co. Mayo, North-West Ireland, Wetlands Ecology & Management, Springer, Netherlands, 11: 1-2 pp. 21-35.
- Fernandez, F., Fanning, M., McCorry, M. & Crowley, W., 2005, Raised bog monitoring project 2004-2005, Unpublished Report. National Parks and Wildlife Service, Dublin.
- Foss, P.J., 1986, The Distribution, Phytosociology, Autecology and Post-glacial History of Erica erigena R. Ross in Ireland, Ph.D. Thesis, National University of Ireland, Dublin.
- Foss, P.J., 2007, National Parks & Wildlife Service Study of the Extent and Conservation Status of Springs, Fens and Flushes in Ireland 2007, Internal report for the National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Ireland.
- Foss, P.J. & Crushell, P., 2007, Monaghan Fen Survey 2007 (Vols 1-3), Report for Monaghan County Council and the National Parks & Wildlife Service, Dublin.
- Foss, P.J. & McGee, E., 1987, A survey to locate blanket bogs of scientific interest in County Mayo, Internal Report, Wildlife Service Dublin.
- Foss, P.J. & O'Connell, C.A. (eds.), 1999, A Survey of Cutover & Cutaway Bog Habitats of the Irish Midlands, Irish Peatland Conservation Council, Dublin, pp. 57.
- Foss, P.J., O'Connell C.A. & Crushell P. (eds.), 2001, Bogs and Fens of Ireland Conservation Plan 2005, Irish Peatland Conservation Council, Dublin, pp. 144.
- Goodwillie, R. , 2003, Vegetation of Turloughs. In: Otte, R. (ed.) Irish Wetlands, University College Dublin, Press.
- Goodwillie, R. & Mooney, E., 1991, Mountain blanket bog survey (draft version), Internal Report, National Parks & Wildlife Service Dublin.
- Goodwillie, R., Heery, S. & Keane, S., 1997, Wetland vegetation on the Gort lowlands. In: An Investigation of the Flooding Problems in the Gort–Ardrahan Area of

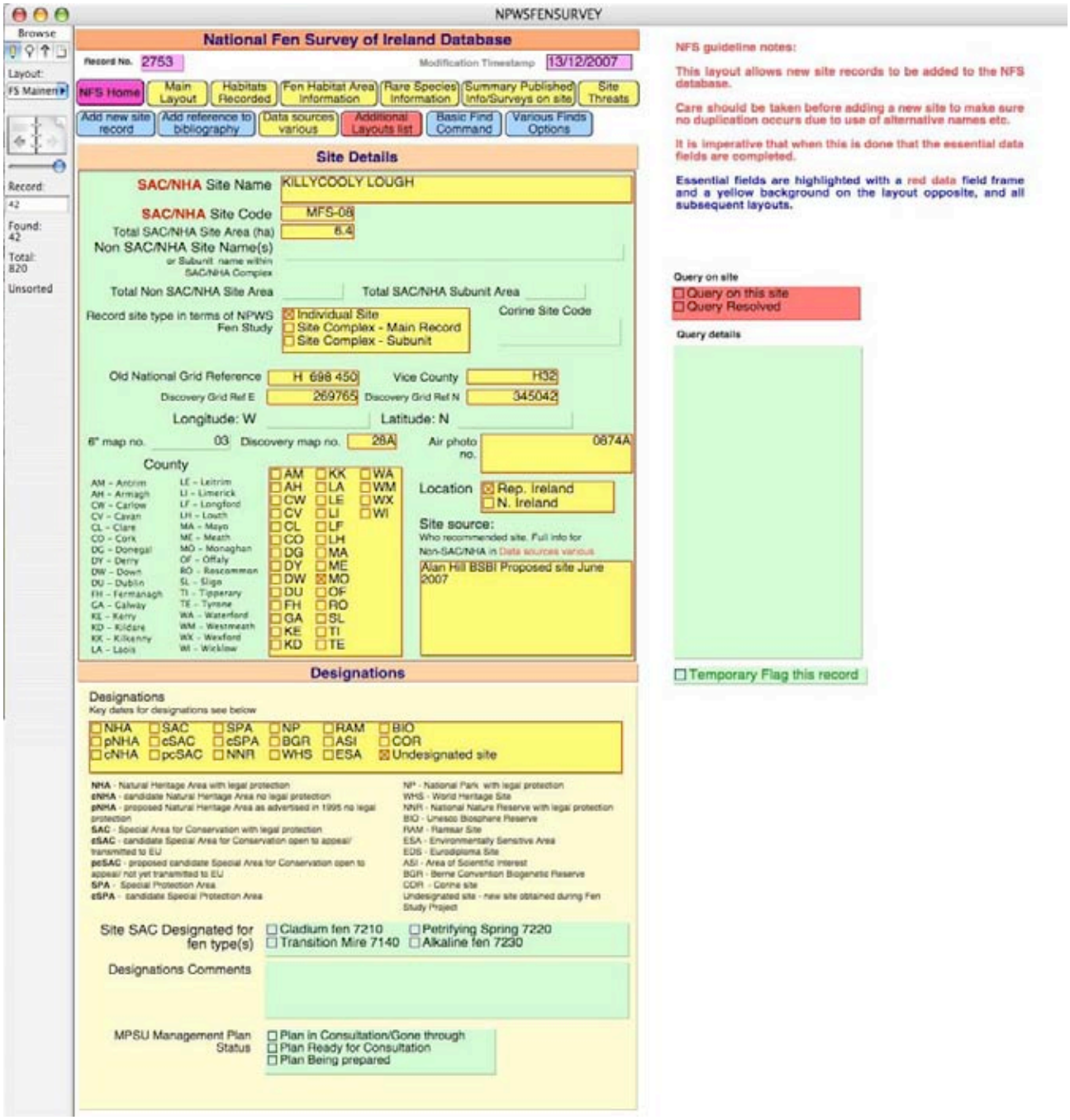
South Galway. Ecology Baseline Study Vol. I (Southern Water Global and Jennings O'Donovan and Partners eds.), The Office of Public Works, Dublin. pp. 1–131.

- Higgins, G.T., Martin, J.R., Perrin P.M., 2004, National Survey of Native Woodland in Ireland. A report submitted to National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Report for National Parks & Wildlife Service, Dublin, pp. 242
- Ivimey-Cook, R.B. & Proctor, M.C.F., 1966, The plant communities of the Burren, Co. Clare, Proceedings of the Royal Irish Academy, B64, pp. 211-301.
- Lockhart, N., 1984, A Report on the wetland vegetation of the Dunkellin and Lavally river catchments (Galway), Internal Report National Parks and Wildlife Service.
- Lockhart, N., 1987b, The occurrence of Homalothecium nitens (Hedw.) Robins in Ireland, Journal of Bryology, 14, pp. 511-517.
- Lockhart, N., 1988, Further records for Homalothecium nitens (Hedw.) Robins in north County Mayo, Ireland, Journal of Bryology, 15, pp. 234-235.
- Lockhart, N., 1991, Phytosociological and Ecological Studies of Lowland Blanket Bog in West Galway and North Mayo. Ph.D. Thesis, National University of Ireland, Galway. pp. 301.
- Mhic Daeid, E.C. , 1979, A phytosociological and ecological study of the vegetation of peatlands and heaths in the Killarney Valley, Ph.D. Thesis, National University of Ireland, Dublin.
- Mooney, E., 1990, A Phytosociological and Palaeoecological Study of the Wetlands of the Lower Corrib Basin, Co. Galway, Ireland. Ph.D. Thesis, National University of Ireland. pp. 141.
- Mooney, E., 1991, Mountain blanket bog survey, Internal report, National Parks and Wildlife Service, Dublin.
- Mooney, E.P. and O'Connell, M., 1990, The phytosociology and ecology of the aquatic and wetland plant communities of the Lower Corrib basin, County Galway, Proceedings of the Royal Irish Academy, 90B, pp. 57-97.
- Ó Críodáin, C., 1988, Parvocaricetea in Ireland, Ph.D. Thesis, National University of Ireland.
- Ó Críodáin, C. & Doyle, G.J., 1997, Schoenetum nigricantis, the Schoenus fen flush vegetation of Ireland, Biology and Environment: Proceedings of the Royal Irish Academy, 97B, 3 pp. 203-218.
- O'Connell, C. & Mooney, E., 1983, Survey to locate midland raised bogs of Scientific Interest, Internal Report, Wildlife Service, Dublin.
- O'Connell, M., 1981, The phytosociology and ecology of Scragh bog, Co. Westmeath, New Phytologist, 87, pp. 139-187.
- Perrin, P.M., Barron, S.J. and Martin, J.R., 2006, National Survey of Native Woodland in Ireland. Second Phase Report, Report for National Parks & Wildlife Service, Dublin.
- Ryle, T., Connolly, K. , Murray, A. & Swann, M., 2007, Coastal Monitoring Project 2004-2006: A report prepared for the National Parks and Wildlife Service, Research Branch Contract Reference D/C/79 , National Parks and Wildlife Service, (Unpublished)
- Wymer, E., 1984, The phytosociology of Irish Saltmarsh vegetation, M.Sc. Thesis. National University of Ireland (UCD).

General Appendix 2.
NFS Database Layouts

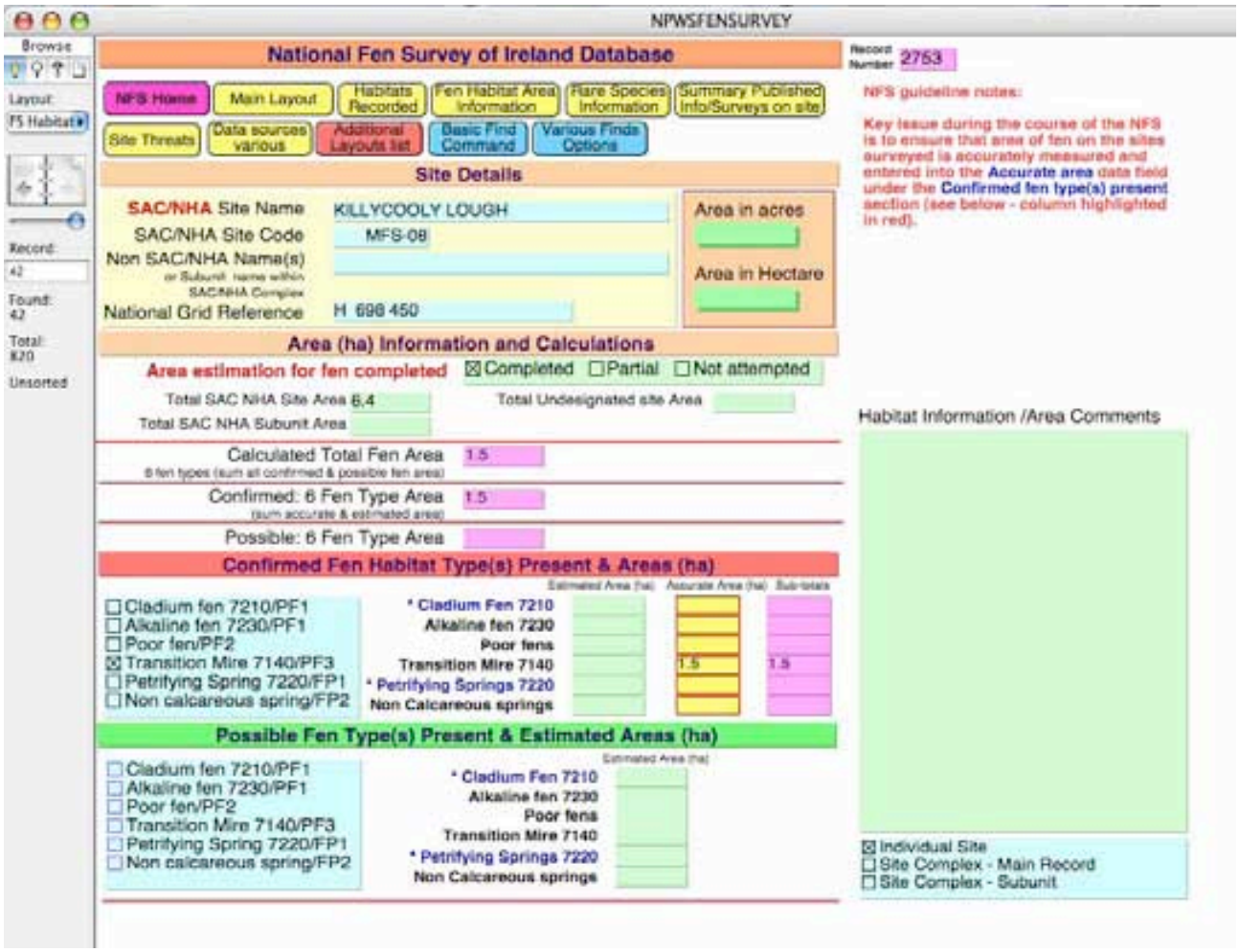
Contents:

Main Layout

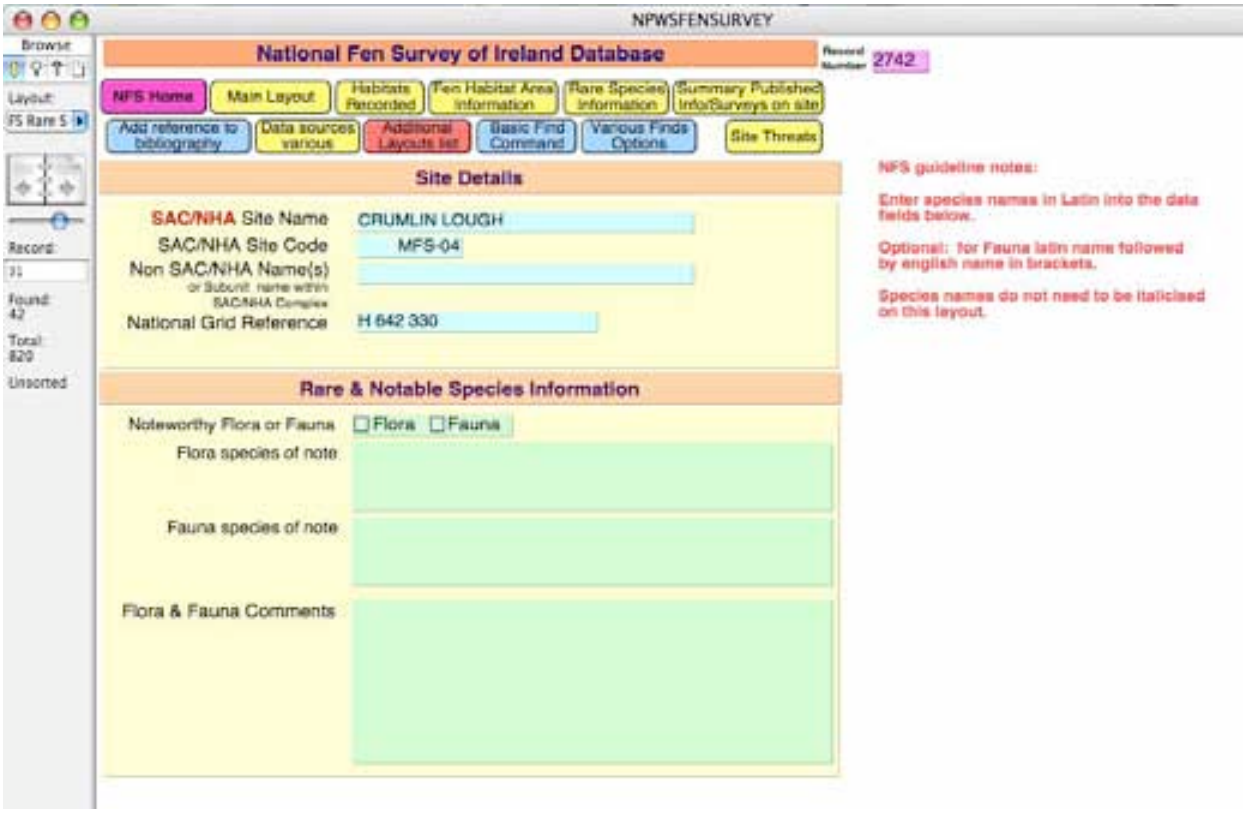

NPWSFENSURVEY
Browse
Layout:
FS Mainen
Record:
42
Found:
42
Total:
820
Unsorted
National Fen Survey of Ireland Database
Record No. 2753
Modification Timestamp 13/12/2007
NFS Home
Main Layout
Habitats Recorded
Fen Habitat Area Information
Rare Species Information
Summary Published Info/Surveys on site
Site Threats
Add new site record
Add reference to bibliography
Data sources various
Additional Layouts list
Basic Find Command
Various Finds Options
Site Details
SAC/NHA Site Name KILLYCOOLY LOUGH
SAC/NHA Site Code MFS-08
Total SAC/NHA Site Area (ha) 6.4
Non SAC/NHA Site Name(s)
or Subunit name within SAC/NHA Complex
Total Non SAC/NHA Site Area
Total SAC/NHA Subunit Area
Record site type in terms of NPWS Fen Study
Individual Site
Site Complex - Main Record
Site Complex - Subunit
Corine Site Code
Old National Grid Reference H 698 450
Vice County H32
Discovery Grid Ref E 269765
Discovery Grid Ref N 345042
Longitude: W
Latitude: N
6" map no. 03
Discovery map no. 28A
Air photo no. 0874A
County
AM – Antrim
AH – Armagh
CW – Carlow
CV – Cavan
CL – Clare
CO – Cork
DG – Donegal
DY – Derry
DW – Down
DU – Dublin
FH – Fermanagh
GA – Galway
KE – Kerry
KD – Kildare
KK – Kilkenny
LA – Laois
LE – Leitrim
LI – Limerick
LF – Longford
LH – Louth
MA – Mayo
ME – Meath
MO – Monaghan
OF – Offaly
RO – Roscommon
SL – Sligo
TI – Tipperary
TE – Tyrone
WA – Waterford
WM – Westmeath
WX – Wexford
WI – Wicklow
Location
Rep. Ireland
N. Ireland
Site source:
Who recommended site. Full info for Non-SAC/NHA in Data sources various
Alan Hill BSBI Proposed site June 2007
Designations
Designations
Key dates for designations see below
NHA pNHA cNHA SAC cSAC pcSAC cSPA NNR BGR WHS ESA RAM ASI BIO COR
Undesignated site
NHA - Natural Heritage Area with legal protection
cNHA - candidate Natural Heritage Area no legal protection
pNHA - proposed Natural Heritage Area as advertised in 1995 no legal protection
SAC - Special Area for Conservation with legal protection
cSAC - candidate Special Area for Conservation open to appeal/ transmitted to EU
pcSAC - proposed candidate Special Area for Conservation open to appeal/ not yet transmitted to EU
SPA - Special Protection Area
cSPA - candidate Special Protection Area
NP - National Park with legal protection
WHS - World Heritage Site
NNR - National Nature Reserve with legal protection
BIO - Unesco Biosphere Reserve
RAM - Ramsar Site
ESA - Environmentally Sensitive Area
EDS - Europdiploma Site
ASI - Area of Scientific Interest
BGR - Berne Convention Biogenetic Reserve
COR - Corine site
Undesignated site - new site obtained during Fen Study Project
Site SAC Designated for fen type(s)
Cladium fen 7210
Transition Mire 7140
Petrifying Spring 7220
Alkaline fen 7230
Designations Comments
MPSU Management Plan Status
Plan in Consultation/Gone through
Plan Ready for Consultation
Plan Being prepared
NFS guideline notes:
This layout allows new site records to be added to the NFS database.
Care should be taken before adding a new site to make sure no duplication occurs due to use of alternative names etc.
It is imperative that when this is done that the essential data fields are completed.
Essential fields are highlighted with a red data field frame and a yellow background on the layout opposite, and all subsequent layouts.
Query on site
Query on this site
Query Resolved
Query details
Temporary Flag this record

Habitats Recorded

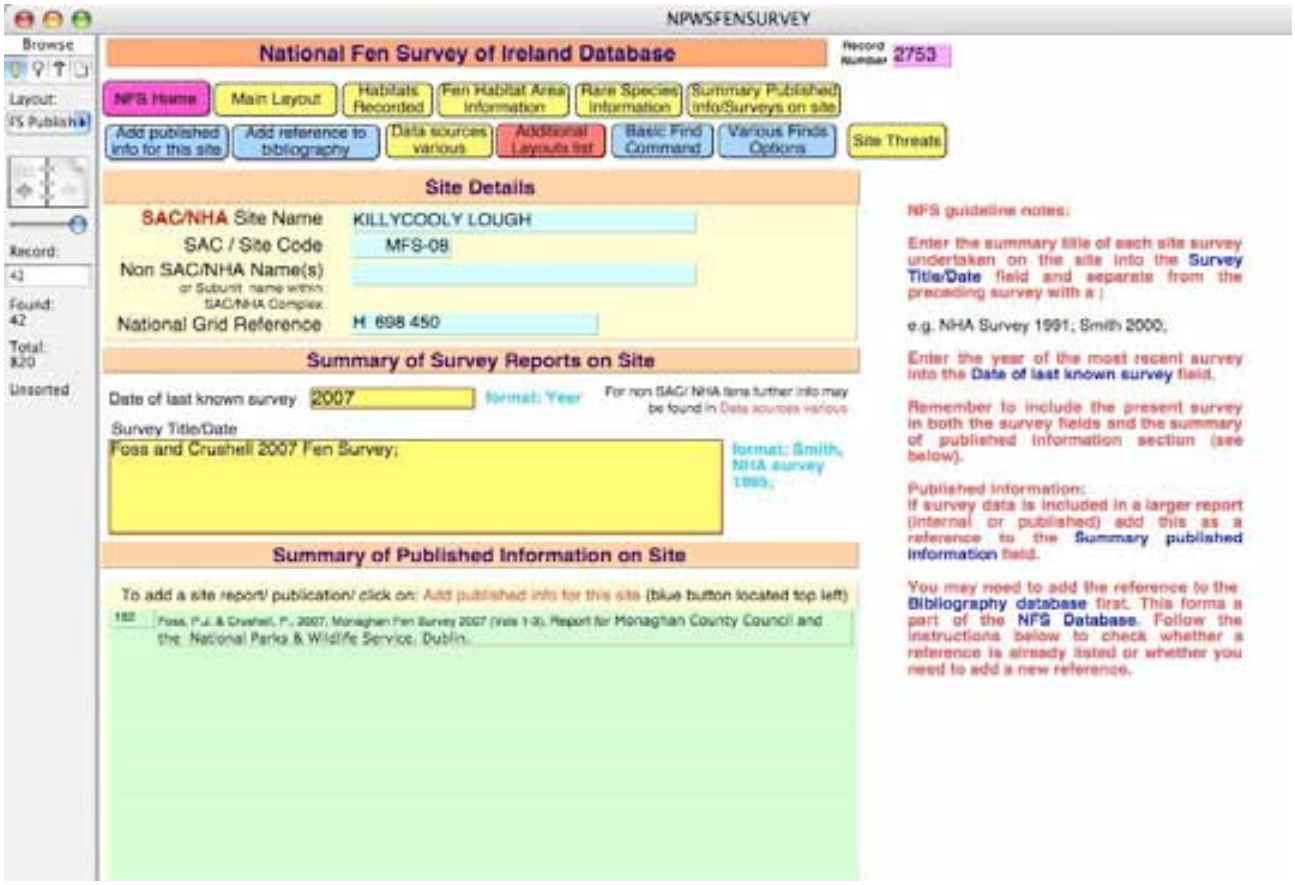
Fen Habitat Area Information



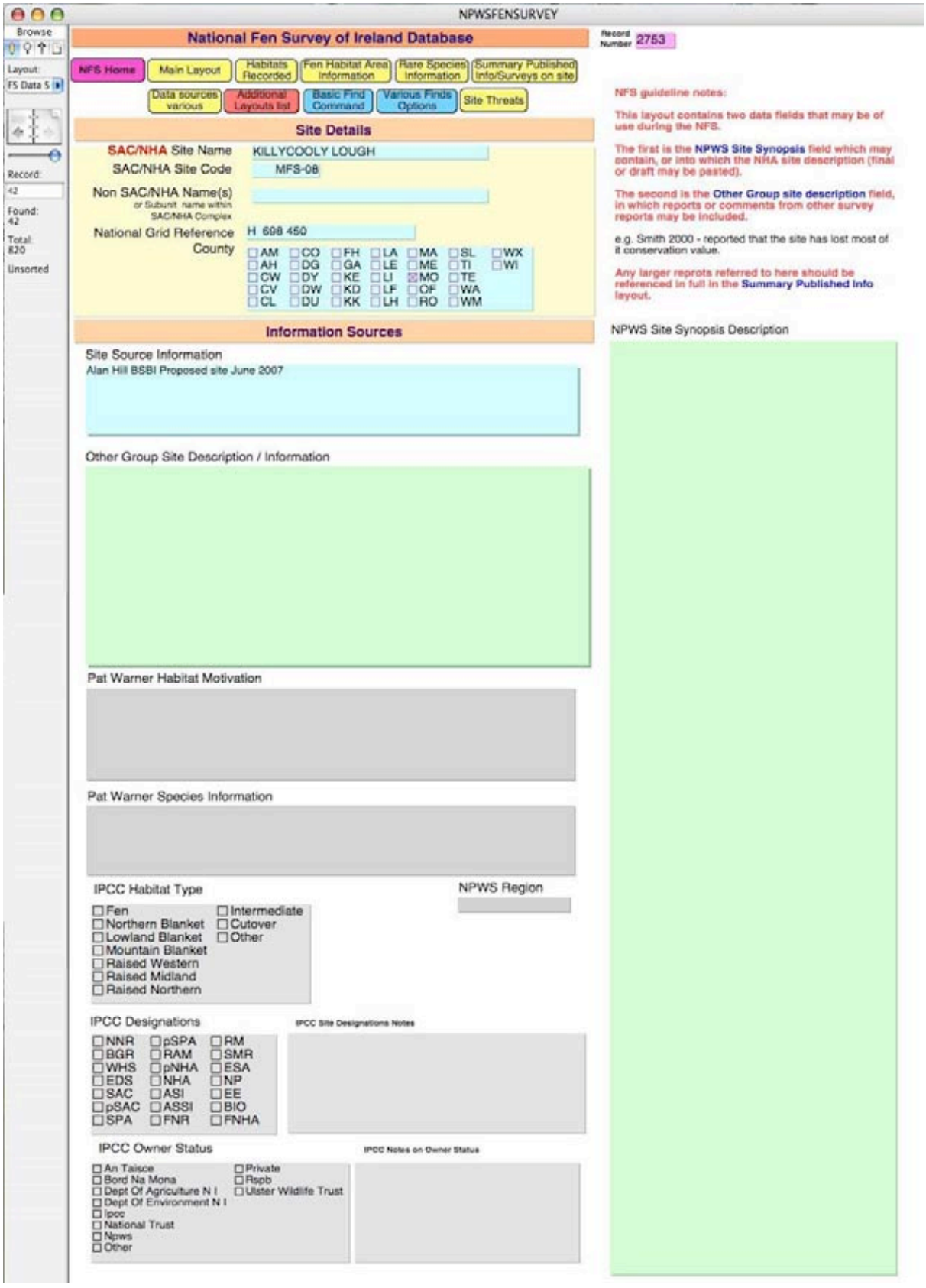
Rare & Notable Species Information



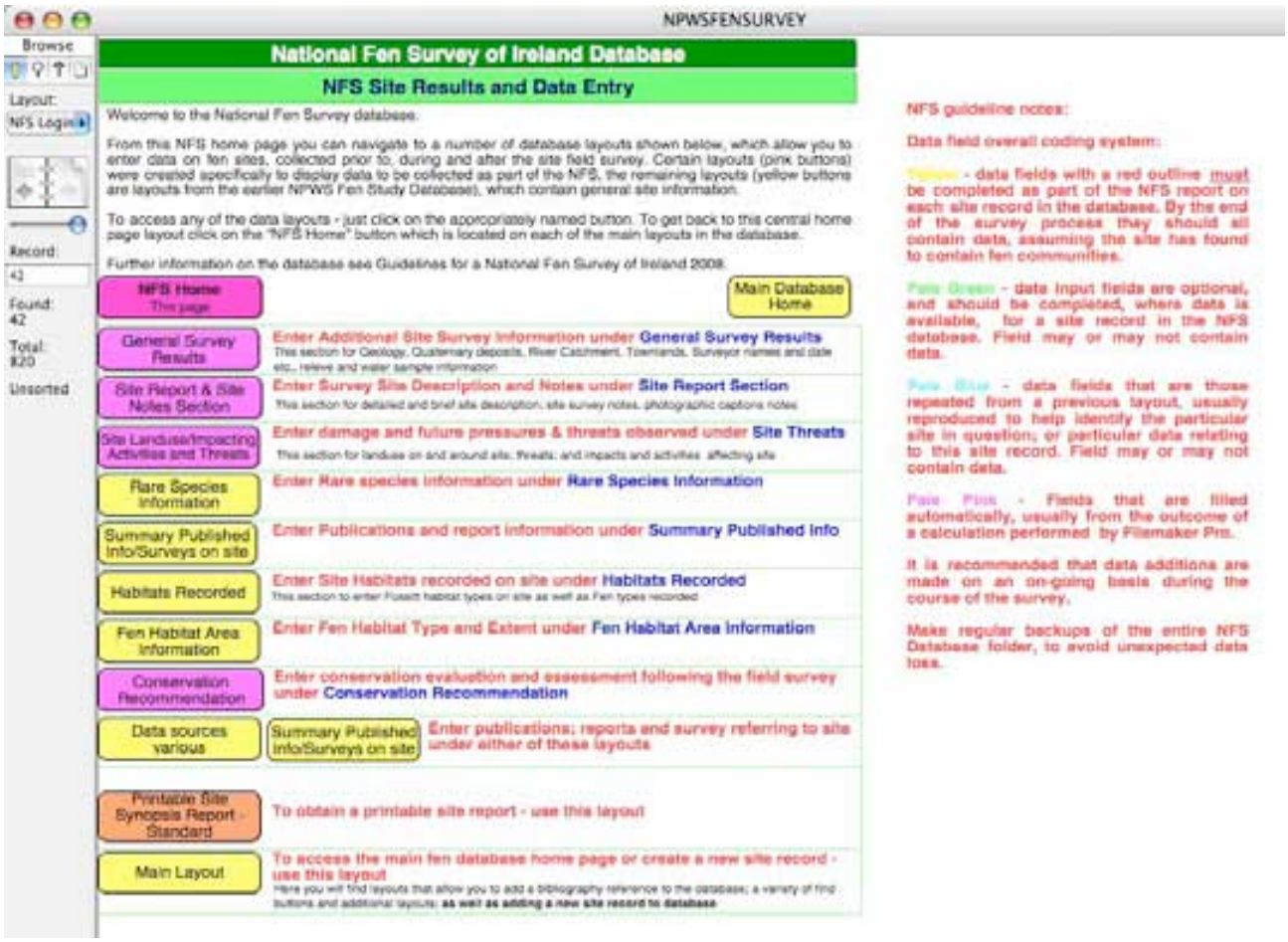
Summary Published Information/Surveys on Sites



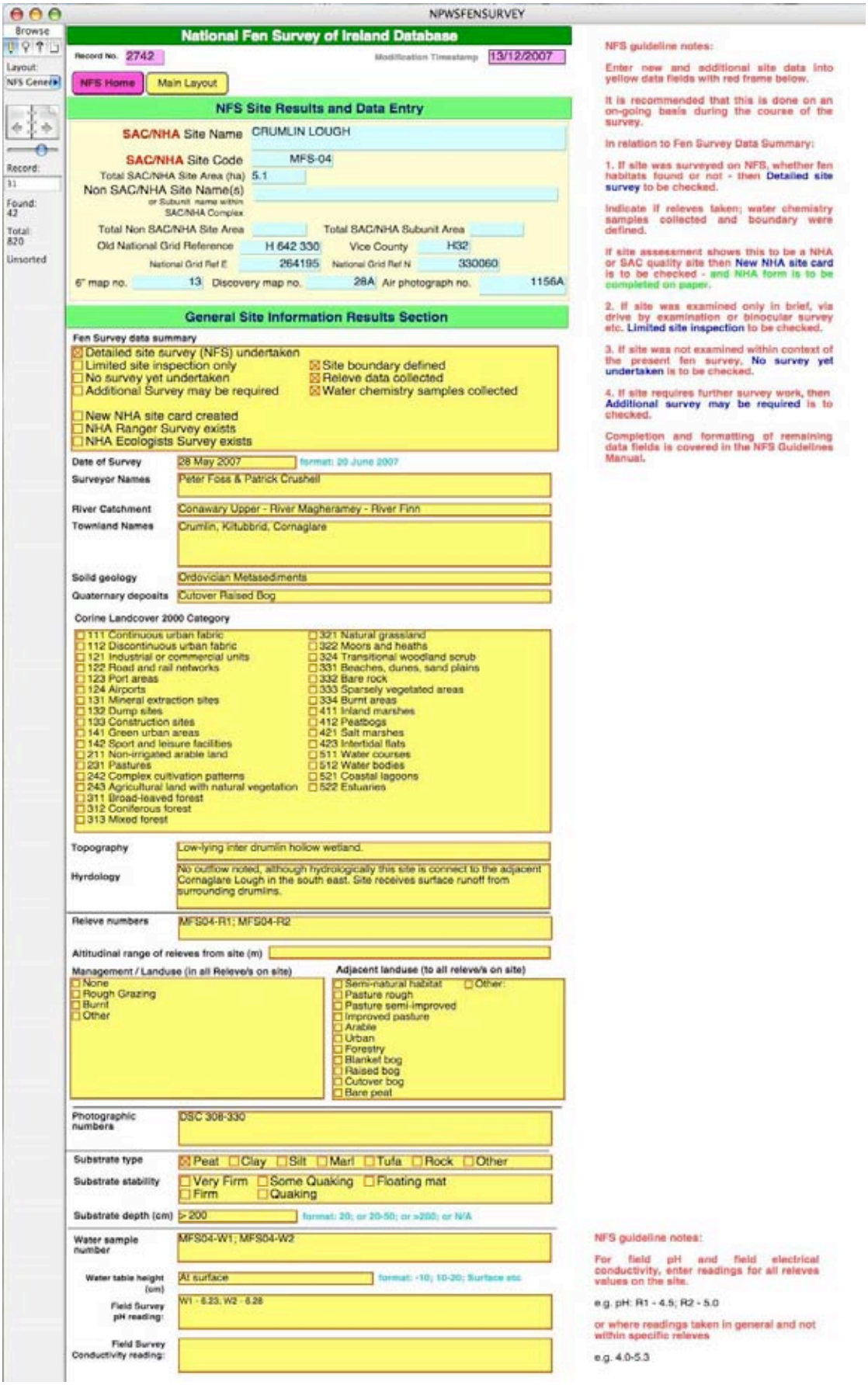
Data Sources various



NFS Home Page



NFS General Survey Results



NPWSFENSURVEY

Browse

Layout: NFS Gener

Record: 31

Found: 42

Total: 820

Unsorted

National Fen Survey of Ireland Database

Record No. 2742 Modification Timestamp 13/12/2007

NFS Home | Main Layout

NFS Site Results and Data Entry

SAC/NHA Site Name: CRUMLIN LOUGH

SAC/NHA Site Code: MFS-04

Total SAC/NHA Site Area (ha): 5.1

Non SAC/NHA Site Name(s) or Subunit name within SAC/NHA Complex:

Total Non SAC/NHA Site Area: Total SAC/NHA Subunit Area:

Old National Grid Reference: H 642 330 Vice County: H32

National Grid Ref E: 264195 National Grid Ref N: 330060

6" map no.: 13 Discovery map no.: 28A Air photograph no.: 1156A

General Site Information Results Section

Fen Survey data summary

- [x] Detailed site survey (NFS) undertaken
- [ ] Limited site inspection only
- [ ] No survey yet undertaken
- [ ] Additional Survey may be required
- [x] Site boundary defined
- [x] Releve data collected
- [x] Water chemistry samples collected
- [ ] New NHA site card created
- [ ] NHA Ranger Survey exists
- [ ] NHA Ecologists Survey exists

Date of Survey: 28 May 2007 format: 20 June 2007

Surveyor Names: Peter Foss & Patrick Crushell

River Catchment: Conawary Upper - River Magheramey - River Finn

Townland Names: Crumlin, Kiltubbrid, Cornaglare

Solid geology: Ordovician Metasediments

Quaternary deposits: Cutover Raised Bog

Corine Landcover 2000 Category

- [ ] 111 Continuous urban fabric
- [ ] 112 Discontinuous urban fabric
- [ ] 121 Industrial or commercial units
- [ ] 122 Road and rail networks
- [ ] 123 Port areas
- [ ] 124 Airports
- [ ] 131 Mineral extraction sites
- [ ] 132 Dump sites
- [ ] 133 Construction sites
- [ ] 141 Green urban areas
- [ ] 142 Sport and leisure facilities
- [ ] 211 Non-irrigated arable land
- [ ] 231 Pastures
- [ ] 242 Complex cultivation patterns
- [ ] 243 Agricultural land with natural vegetation
- [ ] 311 Broad-leaved forest
- [ ] 312 Coniferous forest
- [ ] 313 Mixed forest
- [ ] 321 Natural grassland
- [ ] 322 Moors and heaths
- [ ] 324 Transitional woodland scrub
- [ ] 331 Beaches, dunes, sand plains
- [ ] 332 Bare rock
- [ ] 333 Sparsely vegetated areas
- [ ] 334 Burnt areas
- [ ] 411 Inland marshes
- [ ] 412 Peatbogs
- [ ] 421 Salt marshes
- [ ] 423 Intertidal flats
- [ ] 511 Water courses
- [ ] 512 Water bodies
- [ ] 521 Coastal lagoons
- [ ] 522 Estuaries

Topography: Low-lying inter drumlin hollow wetland.

Hyrdology: No outflow noted, although hydrologically this site is connect to the adjacent Cornaglare Lough in the south east. Site receives surface runoff from surrounding drumlins.

Releve numbers: MFS04-R1; MFS04-R2

Altitudinal range of releves from site (m):

Management / Landuse (in all Releve/s on site)

- [ ] None
- [ ] Rough Grazing
- [ ] Burnt
- [ ] Other

Adjacent landuse (to all releve/s on site)

- [ ] Semi-natural habitat
- [ ] Other:
- [ ] Pasture rough
- [ ] Pasture semi-improved
- [ ] Improved pasture
- [ ] Arable
- [ ] Urban
- [ ] Forestry
- [ ] Blanket bog
- [ ] Raised bog
- [ ] Cutover bog
- [ ] Bare peat

Photographic numbers: DSC 308-330

Substrate type: [x] Peat [ ] Clay [ ] Silt [ ] Marl [ ] Tufa [ ] Rock [ ] Other

Substrate stability: [ ] Very Firm [ ] Some Quaking [ ] Floating mat [ ] Firm [ ] Quaking

Substrate depth (cm): >200 format: 20; or 20-50; or >200; or N/A

Water sample number: MFS04-W1; MFS04-W2

Water table height (cm): At surface format: -10; 10-20; Surface etc

Field Survey pH reading: W1 - 6.23; W2 - 6.28

Field Survey Conductivity reading:

NFS guideline notes:

Enter new and additional site data into yellow data fields with red frame below.

It is recommended that this is done on an on-going basis during the course of the survey.

In relation to Fen Survey Data Summary:

1. If site was surveyed on NFS, whether fen habitats found or not - then **Detailed site survey** to be checked.

Indicate if releves taken; water chemistry samples collected and boundary were defined.

If site assessment shows this to be a NHA or SAC quality site then **New NHA site card** is to be checked - and NHA form is to be completed on paper.

2. If site was examined only in brief, via drive by examination or binocular survey etc. **Limited site inspection** to be checked.

3. If site was not examined within context of the present fen survey, **No survey yet undertaken** is to be checked.

4. If site requires further survey work, then **Additional survey may be required** is to checked.

Completion and formatting of remaining data fields is covered in the NFS Guidelines Manual.

NFS guideline notes:

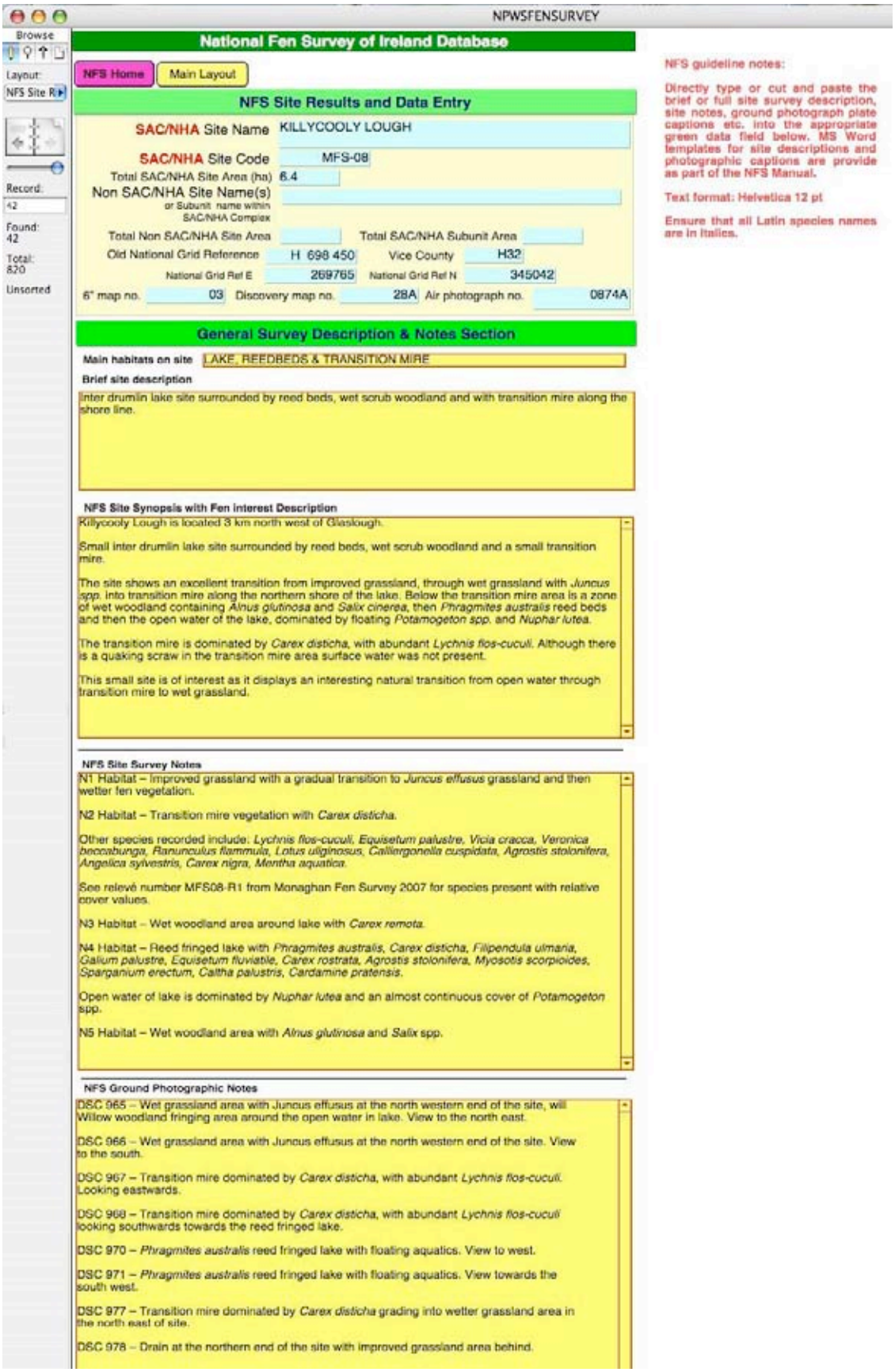
For field pH and field electrical conductivity, enter readings for all releves values on the site.

e.g. pH: R1 - 4.5; R2 - 5.0

or where readings taken in general and not within specific releves

e.g. 4.0-5.3

NFS Site Report, Notes and Ground Photograph Captions Section



NPWSFENSURVEY

Browse

Layout: NFS Site R

Record: 42

Found: 42

Total: 820

Unsorted

National Fen Survey of Ireland Database

NFS Home | Main Layout

NFS Site Results and Data Entry

SAC/NHA Site Name: KILLYCOOLY LOUGH

SAC/NHA Site Code: MFS-08

Total SAC/NHA Site Area (ha): 6.4

Non SAC/NHA Site Name(s) or Subunit name within SAC/NHA Complex:

Total Non SAC/NHA Site Area: | Total SAC/NHA Subunit Area:

Old National Grid Reference: H 698 450 | Vice County: H32

National Grid Ref E: 269765 | National Grid Ref N: 345042

6" map no.: 03 | Discovery map no.: 28A | Air photograph no.: 0874A

General Survey Description & Notes Section

Main habitats on site: LAKE, REEDBEDS & TRANSITION MIRE

Brief site description

Inter drumlin lake site surrounded by reed beds, wet scrub woodland and with transition mire along the shore line.

NFS Site Synopsis with Fen Interest Description

Killycooly Lough is located 3 km north west of Glaslough.

Small inter drumlin lake site surrounded by reed beds, wet scrub woodland and a small transition mire.

The site shows an excellent transition from improved grassland, through wet grassland with *Juncus spp.* into transition mire along the northern shore of the lake. Below the transition mire area is a zone of wet woodland containing *Alnus glutinosa* and *Salix cinerea*, then *Phragmites australis* reed beds and then the open water of the lake, dominated by floating *Potamogeton spp.* and *Nuphar lutea*.

The transition mire is dominated by *Carex disticha*, with abundant *Lychnis flos-cuculi*. Although there is a quaking scraw in the transition mire area surface water was not present.

This small site is of interest as it displays an interesting natural transition from open water through transition mire to wet grassland.

NFS Site Survey Notes

N1 Habitat – Improved grassland with a gradual transition to *Juncus effusus* grassland and then wetter fen vegetation.

N2 Habitat – Transition mire vegetation with *Carex disticha*.

Other species recorded include: *Lychnis flos-cuculi, Equisetum palustre, Vicia cracca, Veronica beccabunga, Ranunculus flammula, Lotus uliginosus, Calliergonella cuspidata, Agrostis stolonifera, Angelica sylvestris, Carex nigra, Mentha aquatica.*

See relevé number MFS08-R1 from Monaghan Fen Survey 2007 for species present with relative cover values.

N3 Habitat – Wet woodland area around lake with *Carex remota.*

N4 Habitat – Reed fringed lake with *Phragmites australis, Carex disticha, Filipendula ulmaria, Galium palustre, Equisetum fluviatile, Carex rostrata, Agrostis stolonifera, Myosotis scorpioides, Sparganium erectum, Caltha palustris, Cardamine pratensis.*

Open water of lake is dominated by *Nuphar lutea* and an almost continuous cover of *Potamogeton* spp.

N5 Habitat – Wet woodland area with *Alnus glutinosa* and *Salix* spp.

NFS Ground Photographic Notes

DSC 965 – Wet grassland area with Juncus effusus at the north western end of the site, will Willow woodland fringing area around the open water in lake. View to the north east.

DSC 966 – Wet grassland area with Juncus effusus at the north western end of the site. View to the south.

DSC 967 – Transition mire dominated by *Carex disticha*, with abundant *Lychnis flos-cuculi*. Looking eastwards.

DSC 968 – Transition mire dominated by *Carex disticha*, with abundant *Lychnis flos-cuculi* looking southwards towards the reed fringed lake.

DSC 970 – *Phragmites australis* reed fringed lake with floating aquatics. View to west.

DSC 971 – *Phragmites australis* reed fringed lake with floating aquatics. View towards the south west.

DSC 977 – Transition mire dominated by *Carex disticha* grading into wetter grassland area in the north east of site.

DSC 978 – Drain at the northern end of the site with improved grassland area behind.

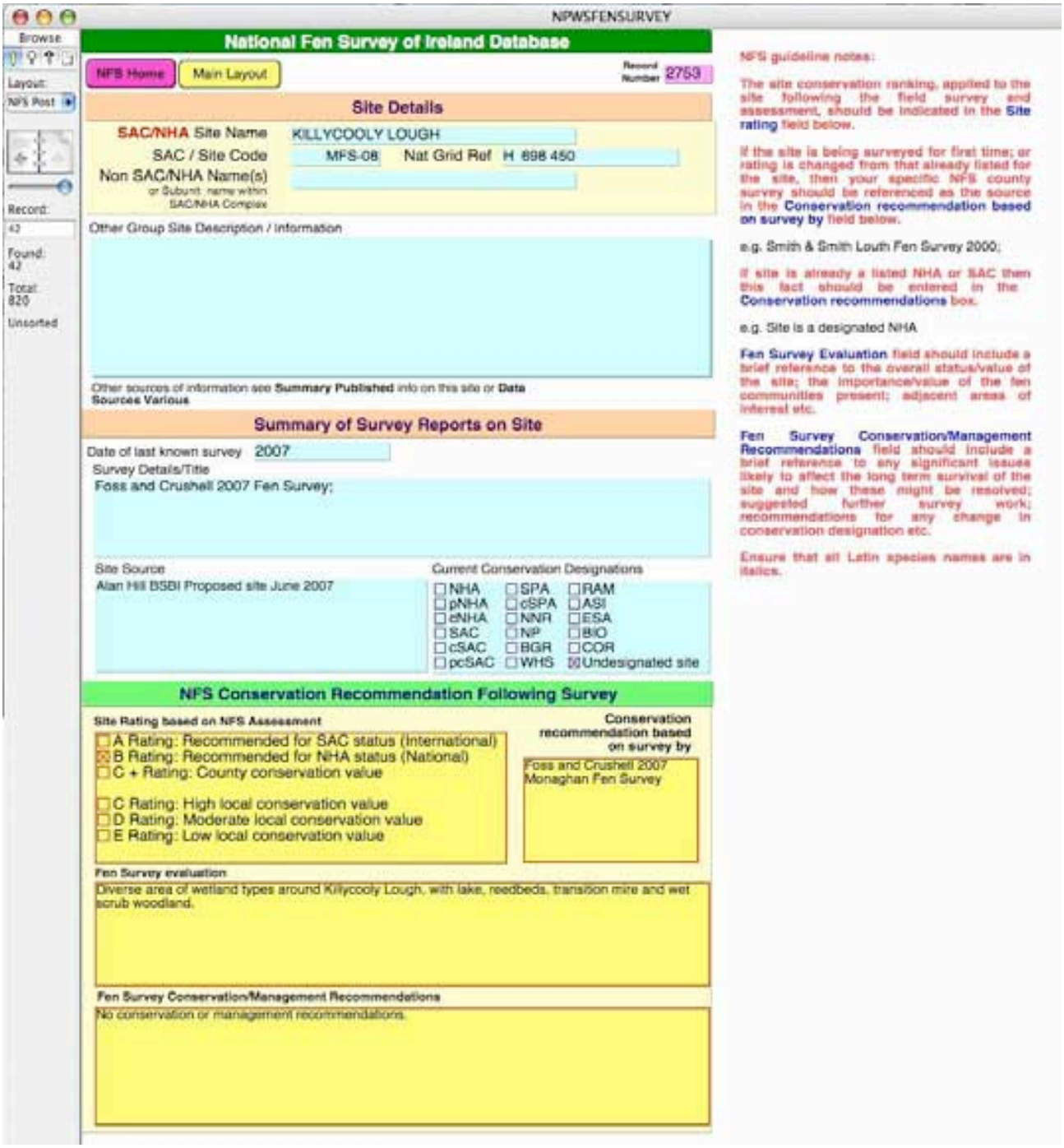
NFS guideline notes:

Directly type or cut and paste the brief or full site survey description, site notes, ground photograph plate captions etc. into the appropriate green data field below. MS Word templates for site descriptions and photographic captions are provide as part of the NFS Manual.

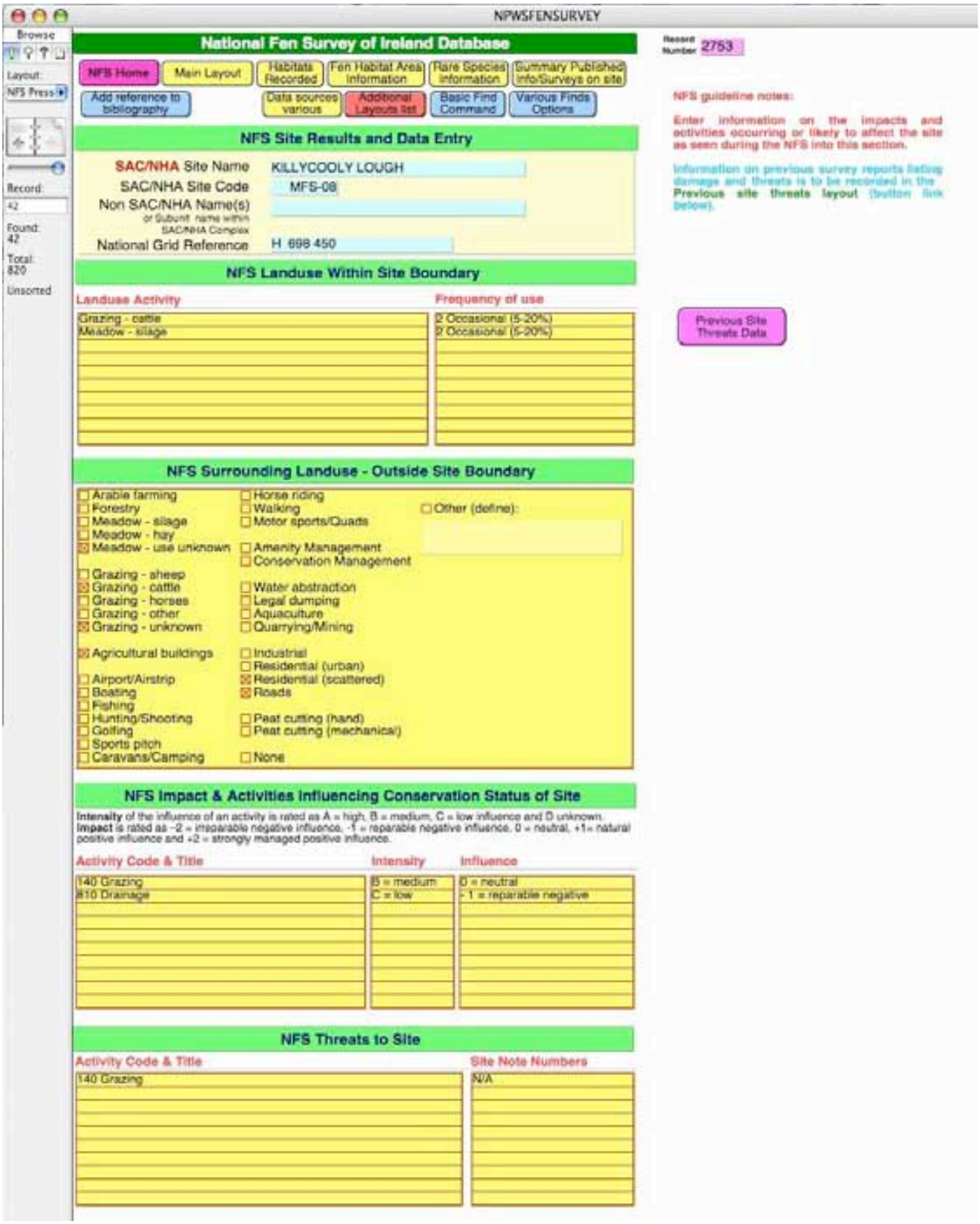
Text format: Helvetica 12 pt

Ensure that all Latin species names are in italics.

NFS Conservation Recommendation



NFS Site Landuse/Impacting Activities and Threats



General Appendix 3.

Data Input to the NFS Database – Explanatory Notes

The site data to be entered (into data fields) on each of the different layouts within the NFS Database are detailed below. The appearance of the different layouts in shown in General Appendix 2.

For each layout described below, suggested timing for data entry and required inputs expected from the NFS are detailed.

Timing. Data collection and acquisition from the NFS survey will occur throughout the project. In general data should be entered to the database following completion of milestones attained during the pre-survey; field survey and post survey period. The timing section below provides suggestions on the timing of data entry.

Essential Data Fields. These fields (i.e. where data must be recorded for each site surveyed as part of the NFS) are described and explained in more detail below. These fields are displayed with a red frame and yellow background colour in the different NFS Database layouts.

Field names used here are similar to the field labels seen in the various NFS Database layouts.

Where information on formats for data fields is provided in the NFS Survey Manual (see Chapters 4, 5 and 6 in this report), no further explanation is provided here. For fields which are unique to the NFS Database, additional explanatory notes on format etc. are provided here after the field name/label, and/or as part of the on-screen help notes within the NFS Database.

Only format information on essential data fields are described in detail here. Format information on optional data fields, i.e. those to be filled, should relevant data be found, are explained in more detail as part of the on-screen help notes within the NFS Database, or in the NPWS Fen Study Report, Foss (2007).

1.1 Main Layout

Timing of data input: Required data inputs, under this layout should be entered during the pre-survey work when the list of sites to be surveyed is being drawn up, or when additional sites are located which are being proposed for survey.

Essential Data Fields:

- **Site Name**
- **Site Code Number**
- **Total Site Area**
- **Site type** – always check "Individual site"
- **County**
- **Vice County**
- **Old National Grid Reference**
- **Discovery Grid Reference (E & N)**
- **Discovery Map Number**
- **Air Photograph Numbers**
- **Location** – select whether site is in Republic of Ireland/ or contains a cross border element with Northern Ireland
- **Site source** – for new sites added to database during the course of the NFS indicate the source (e.g. External expert; GIS Aerial photography survey; specific report etc.)

- **Conservation Designation**

1.2 Habitats Recorded Layout

Timing of data input: It is suggested that this data is entered following the field survey work when the fen and non-fen habitats present on the site have been recorded and confirmed.

Essential Data Fields:

- **Confirmed fen habitat type/s**
- **Other Key Habitat Type/s (Fossitt Scheme)**

Any other fen habitat types listed under the Possible Fen Type Section should be deleted when it has been confirmed that these do not occur on the site.

1.3 Fen Habitat Area Information Layout

Timing of data input: It is suggested that this data is entered following the post-survey work when the area of fen (and non-fen habitats) present on the site have been ascertained from the GIS final habitat mapping process.

Essential Data Fields:

- **Accurate area (ha)** under the Confirmed Habitat Type Section

Any other fen habitats areas listed under Estimated area in either the Confirmed Habitat Type Section or Possible Fen Type Section should be deleted.

1.4 Rare & Notable Species Information Layout

Timing of data input: It is suggested that this data is entered during the pre-survey background research on sites as information is recorded from other data sources, or following of the field survey work where species of note were recorded.

Essential Data Fields:

None

1.5 Summary Published Information/Surveys on site Layout

Timing of data input: It is suggested that this data is entered during the pre-survey background research on sites, as previously published data is recorded, or as publications and reports are discovered that deal with the site.

Essential Data Fields:

- **Date of last known survey** - Enter the year of the most recent survey into the Date of last known survey field.
- **Survey Title/Date** - Enter the summary title of each site survey undertaken on site into the Survey Title/Date field and separate from the last survey title with a ;

e.g. Smith 1992; Malone 2000

- **Summary published information on site** – enter new reports and publications containing information on the site. To do this you must first add reference to Bibliography database; then add the reference code to the published information on site. Follow the on-screen help.

NB Remember to include the present survey in both the Survey title/date fields and the Summary Published information section.

1.6 Site Threats (pre NFS Survey) Layout

Timing of data input: It is suggested that this data is entered following the pre-survey work as threats to the conservation value of sites is obtained from previous reports and surveys.

Essential Data Fields:

None

Data entry under this older Threats and Pressures section is optional and will be dependent on information being recorded in earlier reports. If a pressure or threat is entered, remember to record the source of this information in the Reported by field.

1.7 Data sources various Layout

Timing of data input: It is suggested that this data is entered during the pre-survey background research on sites, as previously published data is recorded.

Essential Data Fields:

None

Data entry under this Data Sources Various section is optional.

1.8 NFS Home Page Layout

Essential Data Fields:

None.

1.9 NFS General Survey Results Layout

Timing of data input: It is suggested that this data is entered during the pre-survey work when the list of sites to be surveyed is being drawn up, and basic background data research on sites is completed, or as the data becomes available during the field survey (i.e. for relevé and water chemistry related data) and post-survey period.

Essential Data Fields:

- **Fen Survey Data Summary** – Check the type of survey undertaken and related information on past and the present survey.
- **Date of Survey**
- **Surveyor Names**
- **River Catchment**
- **Townland Names**
- **Solid Geology**
- **Quaternary Deposits**
- **Corine Landcover 2000 Category**
- **Topography**
- **Hydrology notes**
- **Relevé Number/s**
- **Management/ landuse within Relevé/s** – all management types recorded from within relevé/s from this site

- **Adjacent landuse to Relevé/s** – all adjacent landuse types recorded from areas adjacent to relevé/s from this site
- **Photographic Number/s**
- **Altitude (m)** – as recorded on relevé card; for more than one relevé or on larger sites where a range of altitudes may occur record as range e.g. 150-250
- **Substrate Type** – all types recorded from relevé/s
- **Substrate Stability** – all types recorded from relevé/s
- **Substrate Depth**– all depths recorded from relevé/s as range
- **Water Sample Number/s**
- **Field pH reading**
- **Field Electrical Conductivity reading**
- **Water Table Height (cm)**

1.10 NFS Site Report & Site Notes Section Layout

Timing of data input: It is suggested that this data is entered following of the field survey or post-survey work when site description, field notes and photographic notes have been prepared. Text templates (MS Word format) to aid the preparation of site notes, description and photographic captions are provided as part of the Appendices in this manual. Once text has been prepared it is suggested that this be imported directly into the NFS Database using the cut and paste command.

Essential Data Fields:

- **Main Habitat/s on site** – self-explanatory
- **Brief Site Description**
- **NFS Site Synopsis**
- **NFS Site Survey Notes**
- **NFS Ground Photographic Notes**

1.11 NFS Conservation Recommendation Layout

Timing of data input: It is suggested that this data is entered following of the post-survey period when final conservation assessment and ranking of conservation value of sites has been undertaken.

Essential Data Fields:

- **Site Rating based on NFS Assessment**
- **Conservation recommendation based on survey by** – enter title of your NFS e.g. Foss and Crushell 2007 Monaghan Fen Survey or list current conservation ranking e.g. Site is a listed NHA etc.
- **Fen Survey Evaluation** – enter brief note on fen or lack of fen interest on site, and what conservation actions are proposed.
- **Fen Survey Management Recommendations** – enter brief note on any management recommendation are needed on site; or further surveys that might be required.

1.12 NFS Site Impacts and Activities Layout

Timing of data input: It is suggested that this data is entered following of the field survey work when impacts and activities, landuse and threats to the conservation value of sites have been recorded on the NFS Site Form.

Essential Data Fields:

- **Landuse within Site Boundary**
- **Landuse Outside Site Boundary**
- **Impacts and Activities Affecting Fen Habitats**
- **Threats**

General Appendix 4.

Irish Fen Classification Schemes

Irish Fens have been classified using a number of different schemes based on a variety of ecological factors including the peat type on which they occur, features and composition of their surface vegetation, hydrological conditions and their topographic location.

A number of the most popular fen classification schemes used are reproduced here (after Foss 2007), to demonstrate how the classification systems differ and relate to one another, and introduce the reader to the features and terms used in relation to the classification and description of Irish fens.

1. Fen topography and hydrological classification scheme

Irish Fens may be divided into two major groups based upon the topographic and hydrological conditions prevailing. These are topogenous fens and soligenous fens.

1.1 Topogenous Fens

These are formed where the topography results in a basin-type water collection system with little water movement out of the system and water fluctuations are in a vertical direction, as in shallow depressions, or in transitional zones of vegetation bordering open waters.

There are three main types of topogenous fen recognised in Ireland (Crushell 2000; Sheehy-Skeffington & O'Connell 1998; Ratcliffe 1977):

1 **Open-water transition fens** form on lake edges, where they occur on the landward side of the emergent reed vegetation which occurs further out into deeper water areas. They are one of the most common fen type fund in Ireland. They occur predominantly in the limestone regions of Ireland and can be extensive. An example of such fens would be those around Lough Corrib, Co. Galway.

2 **Flood plain fens** occur on a waterlogged flood-plains adjacent to rivers or streams. They occur in depressions or low lying areas within the floodplain where still-standing water allows development of fen vegetation. This fen type is very rare in Ireland as many sites have disappeared as a result of arterial drainage. An example of such fens would be those alongside the River Shannon and its tributaries.

3 **Basin fens** form in waterlogged basins where there is little through flow of water, and open water may be present. These fens often support a floating raft of vegetation known as a **Schwingmoor**. These fens rare in Ireland as most sites which originally conformed to this fen type have developed into raised bogs as peat continued to accumulate. They mainly occur in the Irish midlands. An example of such a fen would be at Scragh Bog, Co. Westmeath.

1.2 Soligenous Fens

These are formed on sloping terrain where an adequate supply of water provides a continuous through flow of water. Smaller areas of soligenous fen may also occur within bogs or mires associated with routes of moving drainage water.

There are three main types of soligenous fens recognised in Ireland (Crushell 2000; Sheehy-Skeffington & O'Connell 1998; Ratcliffe 1977):

1 **Valley Fens** develop on the floor of shallow valleys. The slope within these fens may be very gentle and water movement may not be immediately apparent. The main source of water would be from springs and seepage from the surrounding valley which is usually calcium rich. Valley fens are rare and occur mainly in the eastern part of the country. The combination of calcium rich water input and low annual rainfall amounts may help explain why these fens have not developed into raised bogs in the eastern part of the country (Sheehy-Skeffington & O'Connell 1998). An example of such a fen would be Pollardstown Fen, County Kildare.

2 **Flush Fens** occur as small areas within other fen and peatland types, such as raised or more typically blanket bogs. Within these areas the localised flow of water supplies more minerals than are found in the surrounding peatland areas which results in the development of floristically and visually identifiable areas of fen vegetation. In certain cases unusual communities of plants are found in these flush fens, more typical of arctic conditions (Lockhart 1991). This fen type is widespread within blanket bog areas of the West of Ireland. An example of such a fen would be at Uggool, Co. Mayo.

3 **Calcareous Spring Fens** develop around permanent freshwater springs or areas of seepage that are especially rich in calcium. The up welling of water is often associated with an interface between permeable and impermeable rock or soil strata. The water feeding these fens wells up from the ground and often deposits a white calcareous crust known as tufa on the above ground vegetation. Spring fen sites are often very limited in extent and often occur within larger fen systems or completely unrelated habitats e.g. woodlands, or exposed rocky terrain. These fens are rare in Ireland. Examples of such spring fens would be those found on Pollardstown Fen, County Kildare; Errisbeg, County Galway; and Ballyman Glen, County Wicklow.

1.3 Rich and Poor Fens

Where fens are characterised by alkaline conditions resulting from water draining from limestone and other calcareous soil formations, they are distinguished as "**rich fen**", though there is often a general understanding that a "fen" will be relatively eutrophic (nutrient rich). A classic plant of rich fen is Saw-sedge (*Cladium mariscus*).

As we have seen from the definition of "fen" above, fens can also occur in sites with much lower mineral inputs (e.g. blanket bog) and a correspondingly higher acidity. Such areas may be described as "**poor fen**" and are commonly characterised by extensive development of *Sphagnum* moss carpets.

This variation and often imprecision of terminology has been examined by Wheeler & Proctor (2000), who make a number of recommendations. In examining a wide range of mire types they find a bimodal distribution of pH that backs up the rather vague existing concepts of "fen" and "bog". They consider fen to be defined by a pH generally above 6.0 and with relatively high levels of calcium and bicarbonate ions. The vegetation of such mires tends to be rich in herbs and 'brown mosses' (they cite *Drepanocladus, Campylium* and *Scorpidium*, and *Cratoneuron* also should be included).

By contrast, bog is defined by a pH generally below 5.0, with low levels of calcium ions, and with chloride and sulphate ions as the main anions. Vegetation includes members of the heather family (*Calluna*, *Erica* etc.), cotton-grasses (*Eriophorum*) and other calcifuge ("calcium-avoiding") members of the sedge family, and often an abundance of *Sphagnum* mosses.

Using this definition, many examples of so-called "poor fen" or "acid fen" are better considered as "bog" and this gives a more satisfactory treatment of phases and micro topography in complex acid mire systems.

Although this is an interesting concept , it is not one adopted in the present study where poor fen is recognised as a fen vegetation type rather than a bog vegetation type.

2. EU Habitats Directive Annex 1 classification scheme

The EU Habitats Directive(92/43/EEC) was transposed into Irish law in the European Union (Natural Habitats) Regulations, 1997. These Regulations have since been amended twice with under Statutory Instrument SI 233/1998 and SI 378/2005. The Directive lists (in Annex I) certain habitats that must be protected within Special Areas of Conservation (SACs). Under the various habitats listed in Annex 1 of the Directive, four fen types are listed which occur in Ireland.

The Habitats Directive interpretation manual of European Union habitats, Version EUR 15 (Rameo 1996) lists the following fen types found in Ireland for which Ireland was to select a representative sample of conservation worthy sites. Habitat type **7210 *Calcareous fens with Cladium mariscus and species of the Caricion davallianae** and **7220 * Petrifying springs with tufa formation (Cratoneurion)** are both listed as priority habitats requiring the highest level of conservation within member states.

The following is an abstracts from EU Habitats Directive Interpretation Manual for the 4 fen types listed in the Directive and occurring in Ireland:

7140 Transition mires and quaking bogs

PAL.CLASS.: 54.5

1) Peat-forming communities developed at the surface of oligotrophic to mesotrophic waters, with characteristics intermediate between soligenous and ombrogenous types. They present a large and diverse range of plant communities. In large peaty systems, the most prominent communities are swaying swards, floating carpets or quaking mires formed by medium-sized or small sedges, associated with sphagnum or brown mosses. They are generally accompanied by aquatic and amphibious communities. In the Boreal region this habitat type includes minerotrophic fens that are not part of a larger mire complex, open swamps and small fens in the transition zone between water (lakes, ponds) and mineral soil.

These mires and bogs belong to the Scheuchzerietalia palustris order (oligotrophic floating carpets among others) and to the Caricetalia fuscae order (quaking communities). Oligotrophic water-land interfaces with Carex rostrata are included.

2) Plants: *Eriophorum gracile*, *Carex chordorrhiza*, *Carex lasiocarpa*, *Carex diandra*, *Carex rostrata*, *Carex limosa*, *Scheuchzeria palustris*, *Hammarbya paludosa*, *Liparis loeselii*, *Rhynchospora alba, R. fusca*, *Menyanthes trifoliata*, *Epilobium palustre*, *Pedicularis palustris, Sphagnum* sp. (*S. papillosum*, *S. angustifolium*, *S. subsecundum*, *S. fimbriatum*, *S. riparium*, *S. cuspidatum*, *Calliergon giganteum*, *Drepanocladus revolvens*, *Scorpidium scorpioides*, *Campylium stellatum*, *Aneura pinguis*.

3) Corresponding categories

United Kingdom classification: "M4 - Carex rostrata-Sphagnum recurvum mire", "M5 - Carex rostrata- Sphagnum squarrosum mire", "M8 - Carex rostrata-Sphagnum warnstofii mire", "M9 Carex rostrata-Calliergon cuspidatum/giganteum", "S27 -Carex rostrata - Potentilla palustris fen".

7210 *Calcareous fens with Cladium mariscus and species of the Caricion davallianae

PAL.CLASS.: 53.3

1) *Cladium mariscus* beds of the emergent-plant zones of lakes, fallow lands or succession stage of extensively farmed wet meadows in contact with the vegetation of the Caricion davallianae or other Phragmition species [Cladietum marisci (Allorge 1922) Zobrist 1935].

2) Plants: *Cladium mariscus, Kostelezkia pentacarpos*.

3) Corresponding categories

United Kingdom classification: "S2 Cladietum marisci", "S24 Peucedano - Phragmitetum australis", "S25 Phragmites australis - Eupatorium cannabinum fen", "M9 Carex rostrata-Calliergon spp. mire", "M13 Schoenus nigricans - Juncus subnodulosus mire", "M14 Schoenus nigricans - Narthecium ossifragum mire", "M24 Molinia caerulea - Cirsium dissectum fen meadow", "SD 14 Salix repens - Campylium stellatum dune slack" and "SD 15 Salix repens - Calliergon cuspidatum dune slack".

4) In contact with calcareous fens (7230), but also with acid fens, extensive wet meadows, other reed beds and tall sedge communities.

7220 * Petrifying springs with tufa formation (*Cratoneurion*)

PAL.CLASS.: 54.12

1) Hard water springs with active formation of travertine or tufa. These formations are found in such diverse environments as forests or open countryside. They are generally small (point or linear formations) and dominated by bryophytes (Cratoneurion commutati).

2) Plants: *Arabis soyeri, Cochlearia pyrenaica* (in sites with heavy metals), *Pinguicula vulgaris, Saxifraga aizoides*. Mosses: *Catoscopium nigritum, Cratoneuron commutatum, C. commutatum* var. *falcatum*, *C. filicinum, Eucladium verticillatum, Gymnostomum recurvirostrum*. In the Boreal region also *Carex appropinquata, Epilobium davuricum, Juncus triglumis, Drepanocladus vernicosus, Philonotis calcarea, Scorpidium revolvens, S.cossoni, Cratoneuron decipiens, Bryum pseudotriquetrum.*

3) Corresponding categories

United Kingdom classification: "M37 Cratoneuron commutatum - Festuca rubra spring community" and "M38 Cratoneuron commutatum-Carex nigra spring community".

4) Can form complexes with transition mires, fens, chasmophytic communities of cold and humid environments and heaths and calcareous grassland (Festuco-Brometalia).

In order to preserve this habitat of very limited expanse in the field, it is essential to preserve its surroundings and the whole hydrological system concerned.

7230 Alkaline fens

PAL.CLASS.: 54.2

1) Wetlands mostly or largely occupied by peat- or tufa-producing small sedge and brown moss communities developed on soils permanently waterlogged, with a soligenous or topogenous base rich, often calcareous water supply, and with the water table at, or slightly above or below, the substratum. Peat formation, when it occurs, is infra-aquatic. Calciphile small sedges and other Cyperaceae usually dominate the mire communities, which belong to the *Caricion davallianae*, characterised by a usually prominent "brown moss" carpet formed by *Campylium stellatum*, *Drepanocladus intermedius*, *D. revolvens*, *Cratoneuron commutatum*, *Acrocladium cuspidatum*, *Ctenidium molluscum*, *Fissidens adianthoides*, *Bryum pseudotriquetrum* and others, a grasslike growth of *Schoenus nigricans*, *S. ferrugineus*, *Eriophorum latifolium*, *Carex davalliana*, *C. flava*, *C. lepidocarpa*, *C. hostiana*, *C. panicea*, *Juncus subnodulosus*, *Scirpus cespitosus*, *Eleocharis quinqueflora*, and a very rich herbaceous flora including *Tofieldia calyculata*, *Dactylorhiza incarnata*, *D. traunsteineri*, *D. traunsteinerioides*, *D. russowii*, *D. majalis* ssp. brevifolia, *D. cruenta*, *Liparis loeselii*, *Herminium monorchis*, *Epipactis palustris*, *Pinguicula vulgaris*, *Pedicularis sceptrum - carolinum*, *Primula farinosa*, *Swertia perennis*.

Wet grasslands (Molinietalia caerulaea, e.g. Juncetum subnodulosi & Cirsietum rivularis, 37), tall sedge beds (Magnocaricion, 53.2), reed formations (Phragmition, 53.1), fen sedge beds (Cladietum mariscae, 53.3), may form part of the fen system, with communities related to transition mires (54.5, 54.6) and amphibious or aquatic vegetation (22.3, 22.4)

or spring communities (54.1) developing in depressions. The sub-units below, which can, alone or in combination, and together with codes selected from the categories just mentioned, describe the composition of the fen, are understood to include the mire communities sensu stricto (Caricion davallianae), their transition to the Molinion, and assemblages that, although they may be phytosociologically referable to alkaline Molinion associations, contain a large representation of the Caricion davallianae species listed, in addition to being integrated in the fen system; this somewhat parallels the definition of an integrated class Molinio - Caricetalia davallianae in Rameau et al., 1989. Outside of rich fen systems, fen communities can occur as small areas in dune slack systems (16.3), in transition mires (54.5), in wet grasslands (37), on tufa cones (54.121) and in a few other situations. The codes below can be used, in conjunction with the relevant principal code, to signal their presence. Rich fens are exceptionally endowed with spectacular, specialised, strictly restricted species. They are among the habitats that have undergone the most serious decline. They are essentially extinct in several regions and gravely endangered in most.

2) Plants: *Schoenus nigricans, S. ferrugineus, Carex* spp*., Eriophorum latifolium, Cinclidium stygium, Tomentypnum nitens*.

3. Heritage Council classification scheme for fens and related wetlands

The Heritage Council Guide to habitats in Ireland (Fossitt 2000) sets out a standard hierarchical scheme for the identification of habitats in Ireland. The guide lists the main fen habitats in Ireland under the category of peatlands and freshwater. The guide is a practical tool to allow identification and recording of habitat types.

The 5 specific descriptions which most closely relate to those being recorded in the present NPWS Fen Study are reproduced for information here, namely:

Level 1 Category: Peatlands (P)

Level 2 Categories: Fens & Flushes (PF)

Level 3 Categories:

Rich fen and flush PF1

Poor fen and flush PF2

Transition mire and quaking bog PF3

Level 1 Category: Freshwater (F)

Level 2 Categories: Springs (FP)

Level 3 Categories:

Calcareous springs FP1

Non-calcareous springs FP2

One category of Fossitt namely Rich fen and flush PF1, corresponds to two of the categories being investigated in this study namely Alkaline fens (7230) and Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae (7210).

In addition to the descriptions of habitats that most closely relate to those of interest to this NPWS Fen Study, descriptions are also provided in this section for a number of related wetland habitats which may often be confused with "fen" vegetation as defined in this study. These habitats are Freshwater Marsh GM1; Wet grassland GS4; Reed and large sedge swamps FS1; Tall-herb swamps FS2.

The descriptions below are taken from Fossitt (2000) with some minor corrections and changes to the text.

Peatlands (P)

Fossitt (2000) describes fens as "peat-forming systems that differ from bogs in that they are fed by groundwater or moving surface waters. They occur in river valleys, poorly drained basins or hollows, and beside open stretches of water (lake margins or river flood plains). Fens may also be associated with the fringes or other parts of acid bogs where there is enrichment of the water supply."

Any areas of fen that have been modified by turf cutting should be considered under **cutover bog - PB4**. Flushes are usually smaller features that are maintained by the movement or seepage of water. They occur on slopes and may or may not be peat-forming. Some flushes feed into fens while others may be associated with a range of different habitat types including bogs, woodlands and grasslands. Flushes in bogs are usually characterised by changes in the vegetation that are brought about by an enhanced supply of nutrients. Note that springs are considered in the **freshwater section (FP1-2)** (see below).

Fens and flushes **(PF)** are divided into 'rich' (basic) and 'poor' (acid) types depending on the origin and nature of the water supply. A third category, **transition mire and quaking**

bog - PF3, is also distinguished because it has vegetation characteristics that are intermediate between rich and poor fen categories.

Rich fen and flush PF1

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

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

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

Poor fen and flush PF2

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

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

Transition mire and quaking bog PF3

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

Links with EU Habitats Directive Annex I: Corresponds to the annexed habitat, 'Transition mires and quaking bogs (7140)'

Springs (FP)

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

Calcareous springs FP1

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

Links with EU Habitats Directive Annex I: Calcareous springs with tufa formation are recognised as the priority habitat, '*Petrifying springs with tufa formation (*Cratoneurion*) (7220)'.

Non-calcareous springs FP2

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

Other wetland habitats that may be found in association with fens

Marsh

Freshwater Marsh GM1

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

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

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

Grassland

Wet grassland GS4

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

Species composition varies considerably. Wet grassland often contains abundant rushes (*Juncus effusus, J. acutiflorus, J. articulatus, J. inflexus*) and/or small sedges (*Carex flacca, C. hirta, C. ovalis*), in addition to grasses such as Yorkshire-fog (*Holcus lanatus*), Creeping Bent (*Agrostis stolonifera*), Marsh Foxtail (*Alopecurus geniculatus*), Rough Meadow-grass (*Poa trivialis*) and Tufted Hair-grass (*Deschampsia caespitosa*). Purple Moor-grass (*Molinia caerulea*) may also be present but should not dominate. The proportion of broad-leaved herbs is often high; those that commonly occur in wet grassland include Creeping Buttercup (*Ranunculus repens*), Marsh Thistle (*Cirsium palustre*), Silverweed (*Potentilla anserina*), Meadow sweet (*Filipendula ulmaria*), Water Mint (*Mentha aquatica*), Common Marsh-bedstraw (*Galium palustre*), Devil's-bit Scabious (*Succisa pratensis*), Lesser Spearwort (*Ranunculus flammula*) and Cuckoo flower (*Cardamine pratensis*). Other common broad-leaved herbs that occur on drier grasslands may also be present, depending on the degree of wetness. Wet grassland may be important for orchids such as

Spotted-orchid (*Dactylorhiza maculata*). Horsetails (*Equisetum* spp.), Yellow Iris (*Iris pseudacorus*), Floating Sweet-grass (*Glyceria fluitans*) and clumps of tall reeds may be locally abundant.

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

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

Swamps

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

Reed and large sedge swamps FS1

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

Tall-herb swamps FS2

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

swamps - FS1 above. Tall-herb swamps may have an under storey element with a range of smaller wetland plants.

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

Woodland and Scrub

Wet willow-alder-ash woodland WN6

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

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

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

Turloughs

Turloughs FL6

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

Turloughs support a range of different plant communities that comprise a mixture of aquatic, amphibious and terrestrial species. Plant communities typically form a concentric pattern around the basin; the different zones reflect differences in the extent and duration of flooding. Wet grassland usually dominates and characteristic species include Creeping

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

Links with EU Habitats Directive Annex I: Corresponds to the priority habitat, '*Turloughs (*3180*)'.

4. Fen floristic and phytosociological classification

Fens can be conveniently classified on floristic grounds (due to chemistry) into rich (basic pH) and poor (acidic pH) fens as mentioned earlier in section 4.1. A summary overview of the phytosociological scheme for the classification of Irish fen vegetation is provided in Table: 4.6.1 (based on the classification scheme of Ó Críodáin & Doyle 1994, and White & Doyle 1982):

Table 4.6.1: Phytosociological classification scheme for Irish Fens

SCHEUCHZERIO-CARICETEA (synonym **PARVOCARICETEA)** (Small sedge vegetation of swamps, rheotrophic mires, calcium-rich fens, drainage channels and some acid wet grasslands) CARICETALIA NIGRAE (Small-sedge communities of **poor fen**) Small-sedge poor-fen vegetation of acid, oligotrophic flushes and soligenous bogs on peat's or peaty mineral soils. **Four associations in Ireland**: Carici curtae-Agrostidetum caninae, Caricetum magellanicae, Sphagneto-Juncetum effusi, Drepanoclado exannulati-Caricetum aquatilis CARICETALIA DAVALLIANAE *(*Small-sedge communities of **rich fen**) Vegetation of rich fens on calcareous, alkaline peats. **Four associations in Ireland**: Carici nigrae-Juncetum articulati, Campylio-Caricetum dioicae, Schoenetum nigricantis, Juncetum subnodulosi SCHEUCHZERIETALIA PALUSTRIS *(*Small-sedge vegetation of **quaking transition fens** between poor and rich) **Sphagno Caricion lasiocarpae** **Two associations in Ireland**: Sphagneto-Caricetum lasiocarpae, Calliergo-Caricetum diandrae
PHRAGMITIO - MAGNOCARICETEA (**Tall reed and herb vegetation** within fens) PHRAGMITALIA *(*Vegetation of **tall emergent aquatics**) MAGNOCARICETALIA *(*Vegetation dominated by **large sedges** often in zones around open water behind reed swamps)
FRANGULETEA (**Shrub-willow vegetation**) SALICETALIA AURITAE *(*Vegetation of hygrophilic shrubs 1-5 m high, usually found on margins of lakes or slow-flowing streams on peat or mineral soil)
ALNETEA GLUTINOSAE (**Fen woodland** dominated by Alnus glutinosa, climax vegetation for many fens) ALNETALIA GLUTINOSAE
MONTIO - CARDAMINETEA (Vegetation of cold springs, commonly dominated by bryophytes) MONTIO - CARDAMINETALIA **Cardamino-Montion** (Vegetation of base-poor, **non-calcareous springs**) **Cratoneurion** (Vegetation of **calcareous springs**)

*Source: White & Doyle 1982; Ó Críodáin & Doyle, 1994; O'Connell, Ryan and Macgowran 1984; Kelly & Iremonger 1997. (Phytosociological classification scheme: **Class** - Caps/bold; **Order** - Caps /plain; **Alliance** - lowercase/ bold; **Association** - lowercase/plain)*

A more detailed account of Irish fen types and their plant communities is provided by White & Doyle (1982); Ó Críodáin 1988; Crushell (2000) and Wheeler (1984) inter alia.

Only outline summaries of the main vegetation types are provided here.

SCHEUCHZERIO-CARICETEA (synonym **PARVOCARICETEA)**

Small sedge vegetation of swamps, rheotrophic mires, calcium-rich fens, drainage channels and some acid wet grasslands.

Character species for Ireland: *Carex demissa, C. nigra, Epilobium palustre, Galium palustre, Hydrocotyle vulgaris, Pedicularis palustris, Potentilla palustris, Ranunculus flammula*

CARICETALIA NIGRAE

Small sedge **communities of poor fen** and bog flushes. Vegetation of swamps, rheotrophic mires, some acid grasslands and drainage channels.

Character species: *Carex echinata, Viola palustris*

Differential species of order and alliance: *Sphagnum palustre*

Carici curtae-Agrostidetum caninae

Poor fen located in slightly enriched areas on acid peat (water pH range 4.0-5.6), on the fringes of bog streams, pools and lakes and in bog hollows in cutover.

Character species: *Agrostis canina, Carex curta, C. echinata*

(also *Carex nigra, C. rostrata, Eriophorum angustifolium, Holcus lanatus, Juncus bulbosus, Molinia caerulea* and *Potentilla erecta*)

Caricetum magellanicae

Poor fen located in impoverished wet bog hollows (water pH range 3.8-5.0).

Character species: *Carex magellanica*

(also *Carex rostrata, Eriophorum angustifolium, Vaccinium oxycoccus, Sphagnum papillosum, S. palustre, Polytrichum commune*)

Sphagneto-Juncetum effusi

Fen vegetation on drainage channels or flushes in acid bogs (water pH range 3.1-6.2). Striking morphology with vegetation reaching 1 m in height, with pronounced Sphagnum carpet.

Character species: *Juncus effusus, Sphagnum recurvum*

Differential species: *Galium saxatile, Polytrichum commune*

Drepanoclado-Caricetum aquatilis

Species rich vegetation in which *Carex aquatilis* is dominant. Occurs in river and lake margin vegetation in north of country.

Character species: *Carex aquatilis*

CARICETALIA DAVALLIANAE

Small sedge **rich fen communities.** Vegetation of mineral-rich fens and base-rich fens on calcareous, alkaline peats.

Character species of order and alliance: *Aneura pinguis, Carex lepidocarpa, Dactylorhiza incarnata, Parnassia palustris, Pinguicula vulgaris, Campylium stellatum, Drepanocladus revolvens, Fissidens adianthoides, Scorpidium scorpioides*

Carici nigrae-Juncetum articulati

Waterlogged habitats in low lying areas in hollows along mesotrophic lake shores, deep drainage channels in blanket bog areas and neglected drainage channels in rough grassland. Also lakes in machair and wet dune hollows (water pH range 5.5-8.3).

Character species: *Carex nigra, Hydrocotyle vulgaris, Juncus articulatus, Ranunculus flammula*

(with other commonly occurring *Galium palustre, Mentha aquatica, Calliergon cuspidatum*)

Differential species against the Plantaginetea majoris: *Caltha palustris, Carex rostrata, Eleocharis palustris, Equisetum fluviatile, Lythrum salicaria, Myosotis laxa, Menyanthes trifoliata, Phragmites australis*

Campylio-Caricetum dioicae

Vegetation typical of grazed calcareous flushes, sometimes surrounded by relatively calcifuge vegetation (water pH range 4.6-7.5).

Character species: *Carex demissa, C. dioica, C. hostiana, Eleocharis quinqueflora*

(with other commonly occurring *Carex nigra, C. echinata, C. panicea, C. pulicaris, Anagallis tenella, Eleocharis multicaulis, Hydrocotyle vulgaris, Juncus bulbosus, Ranunculus flammula* and *Succisa pratensis* with some acid indicators such as *Eriophorum angustifolium, Molinia caerulea* and *Potentilla erecta*)

Differential species within the Caricion davallianae: *Carex echinata, Juncus bulbosus*

Schoenetum nigricantis

Schoenus nigricans dominated base-rich fens and in well established flushes that are ungrazed, where tussock formation is typical (water pH range 5.5-8.1).

Character species: *Schoenus nigricans*

Juncetum subnodulosi

Juncus subnodulosus dominated calcium-rich fen vegetation (water pH range 5.6-8.5), typical of the contact zone between Cladietum marisci and the Schoenetum nigricantis.

Character species: *Juncus subnodulosus*

(with other commonly occurring *Carex lepidocarpa, C. panicea, Galium palustre, Mentha aquatica, Molinia caerulea* and *Ranunculus flammula*)

SCHEUCHZERIETALIA PALUSTRIS

Sphagno Caricion lasiocarpae

Vegetation of wet hollows on bogs. Small-sedge vegetation of quaking transition fens between poor and rich.

Character species: *Carex limosa, Rhynchospora alba, Menyanthes trifoliata, Sphagnum cuspidatum, Sphagnum apiculatum, Sphagnum subsecundum, Cladopodiella fluitans*

Sphagneto-Caricetum lasiocarpae

Floating quaking-bog vegetation, usually confined to the waterlogged marginal areas around areas of acid peat or fens (water pH range 3.8-5.8). *Carex lasiocarpa* prominent species, along with *Carex limosa, Hydrocotyle vulgaris, Menyanthes trifoliata, Molinia caerulea, Myrica gale, Potentilla palustris,* and *Ranunculus flammula.*

Character species: *Carex lasiocarpa*

Differential species: *Myrica gale, Sphagnum auriculatum*

Calliergo gigantei-Caricetum diandrae

Floating or quaking mire vegetation, calcicole in character (water pH range 5.0-7.5), rich in pleurocarpus mosses, found in seepage areas around fens.

Character species: *Carex diandra, Bryum pseudotriquetrum, Calliergon giganteum*

Differential species within the alliance: *Carex lasiocarpa*

(with other commonly occurring *Carex diandra, C. rostrata, C. lasiocarpa, C. nigra, Scorpidium scorpioides, Galium palustre, Hydrocotyle vulgaris, Menyanthes trifoliata, Potentilla palustris, Calliergon cuspidatum*)

PHRAGMITIO - MAGNOCARICETEA

Tall clonal reed and sedge and herb vegetation. Species poor or mono dominant stands with pronounced mosaic structure. Swampy areas near lakes, rivers, streams and within fens

PHRAGMITALIA

Vegetation of tall emergent aquatics, mostly poor in species, often mono dominant, stagnant to slightly running water 0.2 to 3 m deep.

Character species: *Phragmites australis, Typha latifolia, Iris pseudacorus, Sparganium erectum*

MAGNOCARICETALIA

Vegetation dominated by large sedges, eutrophic to mesotrophic water, often in zones around open water behind reed swamps of the alliance Phragmition.

Character species: *Carex vesicaria, C. paniculata, C. acuta, C. aquatilis, Galium palustre, Poa palustris, Cladium mariscus*

FRANGULETEA

Shrub-willow vegetation growing on minerotrophic peat or mineral soil where there is a constant, high water table. Water may be oligotrophic to eutrophic.

SALICETALIA AURITAE

Vegetation of hygrophilic shrubs 1-5 m high, usually found on margins of lakes or slow-flowing streams on peat or mineral soil, poor to moderately rich, continually high water table.

Character species: *Salix aurita, Salix atrocinerea, Frangula alnus, Myrica gale*

ALNETEA GLUTINOSAE

Fen woodland dominated by *Alnus glutinosa*, climax vegetation for many fens.

ALNETALIA GLUTINOSAE

Character species: *Alnus glutinosa, Thelypteris palustris*

MONTIO - CARDAMINETEA

Vegetation of springs fed by water of more or less even temperature, commonly dominated by bryophytes.

MONTIO - CARDAMINETALIA

Diagnostic species of class and order: *Cardamine amara, Saxifraga stellaris, Epilobium alsinifolium, Brachythecium rivulare*

Cardamino - Montion

Spring vegetation fed by **base-poor waters** often in western and mountain areas

Diagnostic species: *Stellaria alsina, Epilobium obscurum, Chiloscyphus polyanthus var. rivularis*

Differential from Cratoneurion: *Pellia epiphylla*

(with other species occurring *Philonotis fontana, Saxifraga stellaris, Montia fontana ssp. rivularis, Montia fontana ssp. fontana, Dicranella palustris, Scapania uliginosa, Chrysosplenium oppositifolium, Mnium punctatum*)

Cratoneurion

Vegetation of calcareous springs fed by **mineral rich water**

Character species: *Cratoneuron filicinum, Philonotis calcarea, Saxifraga aizoides*

Differential from Cardamino-Montion: *Equisetum telmateia*

(with other species occurring *Saxifraga hirculus, Cardamine pratensis, Holcus lanatus, Calliergon cuspidatum, Sagina nodosa, Plagiomnium ellipticum, Galium palustre, Potamogeton polygonifolius, Juncus bulbosus, Aneura pinguis, Caltha palustris* and the rarer species: *Homalothecium nitens, Drepanocladus vernicosus, Drepanocladus exannulatus var. rotae, Sphagnum teres*)

National Fen Survey of Ireland

General Appendix 5: Phytosociological Synoptic Table of County Monaghan Fens Types

Constancy values (species occurence within a group of relevés expressed as a percentage)
I= 1-20%; II=21-40%; III=41-60%; IV=61=80%; V=81-100.
Range of cover abundance in releve in brackets (Br.-Bl. Scale).

		Cladium Fen	Alkaline Fen	Transition Mire (Rich)	Transition Mire (Poor)	Poor Fen
pH*		**6.5 : 8.1**	**6.5 : 8.1**	**6 : 7.1**	**5.5 : 6.8**	**4.2 : 6.8**
Average No. Species per relevé		**20**	**20**	**19**	**15**	**18**
Alkaline Fen - Caricetalia davallianae						
122	Phragmites australis	IV (1-3)	IV (1-3)	I (+-2)	I (1)	I (1-2)
30	Carex panicea	V (+-2)	V (+-2)	I (1-2)		III (1-2)
35	Carex viridula ssp. oedocarpa	III (2)	III (2)	I (+)	I (1)	I (+)
188	Campylium stellatum	III (+-1)	III (+-1)	I (1)	II (+-1)	
43	Cladium mariscus	III (2-3)	III (2-3)			
203	Hylocomium splendens	II (1-2)	II (1-2)			I (1)
32	Carex pulicaris	III (+-1)	III (+-1)			
193	Ctenidium molluscum	III (+-3)	III (+-3)		I (+)	I (+)
098	Luzula multiflora	II (1)	II (1)			I (+)
15	Briza media	II (+-1)	II (+-1)			
42	Cirsium palustre	II (+)	II (+)	I (+)		I (+)
197	Drepanocladus revolvens	III (+-5)	III (+-5)			
120	Pedicularis palustris	II (1-2)	II (1-2)	I (+)		I (2)
25	Carex flacca	III (1-2)	III (1-2)			
Transition mire - Caricetalia davallianae						
21	Carex diandra	III (1-2)	III (1-2)	III (1-4)	I (+)	I (+-2)
73	Filipendula ulmaria	III (+-1)	III (+-1)	III (+-2)		
238	Plagiomnium rostratum	I (+)	I (+)	II (+-2)	I (+)	I (+)
146	Rumex acetosa			II +-2)	I (2)	(1-2)
81	Holcus lanatus	I (+)	I (+)	IV (+-2)	I (+-2)	II (+-1)
099	Lychnis flos-cuculi	I (1)	I (1)	II (1-2)	I (+)	I (1)
63	Equisetum palustre	I (+)	I (+)	II (+-2)		I (+-1)
184	Calliergon giganteum			III (+-2)	I (1)	
Transition mire - Caricetalia nigrae						
20	Carex curta			III (1-3)	III (+-4)	I (1)
185	Calliergon stramineum	I (1)	I (1)	I (+-1)	IV (1-4)	I (2)
141	Ranunculus flammula	I (1)	I (1)	II (+-1)	II (+-2)	II (+-1)
177	Veronica scutellata	I (+)	I (+)	I (+-1)	II (+)	
92	Lemna minor			I (+)	II (1-4)	
Transition mire - General Species						
186	Calliergonella cuspidata	V (1-5)	V (1-5)	V (2-5)	II (1-3)	II (1-3)
82	Hydrocotyle vulgaris	III (+-2)	III (+-2)	IV (+-3)	III (+-2)	I (2)
74	Galium palustre	III (+-2)	III (+-2)	V (+-2)	IV (+-3)	I (+)
2	Agrostis stolonifera	III (1-2)	III (1-2)	IV (+-4)	III (+-3)	I (1)
33	Carex rostrata	III (+-3)	III (+-3)	V (+-3)	V (+-4)	III (+-3)
167	Typha latifolia	I (1)	I (1)	II (+-2)	II (+-1)	I (1)
103	Mentha aquatica	III (1-2)	III (1-2)	II (+-2)	I (1)	
18	Caltha palustris	I (1)	I (1)	III (+-1)	II (+-2)	
59	Epilobium palustre			II (+-1)	II (+)	
150	Salix cinerea ssp oleifolia	II (+)	II (+)	II (+-1)	I (+)	
Poor Fen - Caricetalia nigrae to Scheuchzerietalia						
221	Sphagnum fallax				I (4)	III (2-5)
105	Molinia caerulea	II (2-3)	II (2-3)	I (+-3)		III (+-2)
139	Potentilla erecta	II (+-1)	II (+-1)			III (+-1)
008	Anthoxanthum odoratum	I (+)	I (+)	I (+-1)	I (1)	III (+-3)
228	Sphagnum subsecundum				I (1)	II (+-4)
222	Sphagnum palustre	I (1)	I (1)			III (1-5)
130	Polytrichum commune	I (+)	I (+)		I (+)	III (1)
24	Carex echinata			I (1)	I (1)	III (1)
260	Crepis paludosa	I (2)	I (2)			II (+-2)

127	Polygala serpyllifolia					I (+)
28	Carex limosa	I (+)	I (+)			II (1-2)
090	Juncus effusus			II (+)	I (2)	II (+-4)
226	Sphagnum squarrosum			I (2)		II (+-1)
241	Sphagnum capillifolium					I (1-5)
227	Sphagnum subnitens					I (+-2)
181	Aulacomnium palustre				I (+)	III (+-2)
219	Sphagnum cuspidatum					I (+-3)
Companion Species						
62	Equisetum fluviatile	II (1-2)	II (1-2)	V (+-3)	V (1-3)	III (+-2)
140	Potentilla palustris	I (1)	I (1)	V (1-3)	IV (1-3)	III (1-2)
19	Cardamine pratensis	III (+-1)	III (+-1)	V (+-2)	III (+-2)	II (+-1)
104	Menyanthes trifoliata	III (+-2)	III (+-2)	IV (+-3)	III (1-4)	III (+-4)
088	Juncus articulatus	I (1)	I (1)	III +-2)	II (1-3)	III (+-3)
007	Angelica sylvestris	IV (+)	IV (+)	III (+-2)	I (+-1)	I (+-1)
066	Eriophorum angustifolium	III (+-1)	III (+-1)	II (+-3)	III (+-2)	III (+-3)
29	Carex nigra	III (1-2)	III (1-2)	II (1-3)	II (+-4)	III (+-3)
163	Succisa pratensis	III (+-2)	III (+-2)	II (+-1)	I (2)	IV(+-2)
182	Brachythecium rivulare			II (+-1)	II (+-1)	I (+)
213	Rhytidiadelphus squarrosus	I (2)	I (2)	II (+-1)	I (2)	II (1-3)
40	Cicuta virosa	II (+)	II (+)	II (+-1)	I (1)	
179	Viola palustris				II (+-1)	II (+-2)
211	Scleropodium purum	I (2)	I (2)	I (1)	I (+)	II (+-3)
149	Salix aurita	I (+)	I (+)	I (+)		I (2)
212	Rhizomnium punctatum			I (+-1)		
45	Dactylorhiza maculata			I (+)		I (1)
54	Eleocharis palustris			I (+)	I (+-2)	
58	Epilobium obscurum			I (+)	I (+)	I (1)
72	Festuca rubra			I (+-1)		
106	Myosotis laxa			I (1)	I (+-2)	
137	Potamogeton polygonifolius			I (+)	I (+)	I (1)
138	Potamogeton natans				II (+-1)	
239	Dactylorhiza spp.	I (+)	I (+)	I (+)		I (+)
183	Bryum pseudotriquetrum			I (1)	I (+)	
199	Eurhynchium praelongum			I (+)		I (+)
12	Betula pubescens	I (+)	I (+)	I (+)		
23	Carex disticha			I (1-2)		
41	Cirsium dissectum	II (+-1)	II (+-1)	I (+)		
49	Drosera rotundifolia					I (+-1)
57	Epilobium hirsutum	I (1)	I (1)	I (1)		
65	Erica tetralix					I (+-1)
096	Lotus uliginosus			I (+)	I (+)	
097	Luzula campestris					I (+-1)
100	Lycopus europaeus			I (+)	I (1)	
142	Ranunculus lingua			I (+)	I (2)	
162	Stellaria uliginosa			I (+)	I (+)	
170	Utricularia minor				I (+-2)	
234	Chara spp				I (3-5)	
235	Juncus conglomeratus			I (+)	I (+)	
262	Pleurozium schreberi	I (1)	I (1)			
263	Ranunculus repens				I (+)	I (1)
264	Lophocolea bidentata	I (+)	I (+)			I (+)
265	Cephaloziella spp.	I (+)	I (+)			I (+)
180	Aneura pinguis	I (+)	I (+)			
191	Climacium dendroides			I (+)		
216	Scorpidium scorpioides			I (2)	I (+)	
217	Sphagnum fimbriatum					I (+)
223	Sphagnum papillosum					I (1)
1	Agrostis canina				I (+-2)	
3	Alisma plantago aquatica				I (+)	
4	Alnus glutinosa	II (+)	II (+)			
009	Apium inundatum				I (+)	
17	Calluna vulgaris					I (+)
34	Carex viridula ssp. brachyrhyncha	I (1)	I (1)			
37	Centaurea nigra			I (1)		
46	Dactylorhiza majalis	III (+)	III (+)			

069	Eriophorum vaginatum					I (1)
83	Hypericum elodes			I (1)		
84	Hypericum tetrapterum			I (+)		
087	Juncus acutiflorus					I (4)
089	Juncus bulbosus					I (1)
101	Lysimachia nemorum					I (+)
107	Myosotis scorpioides					I (+)
112	Narthecium ossifragum					I (+)
118	Osmunda regalis				I (+)	
119	Parnassia palustris	I (1)	I (1)			
121	Phalaris arundinacea				I (1)	
123	Pinguicula vulgaris	I (1)	I (1)			
124	Plantago lanceolata	I (+)	I (+)			
126	Poa trivialis			I (1)		
131	Potamogeton berchtoldii				I (+)	
157	Senecio aquaticus				I (+)	
172	Vaccinium oxycoccus					I (2)
178	Vicia cracca	I (+)	I (+)			
233	Algae				I (2)	
240	Geranium robertianum					I (+)
236	Hypnum cupressiforme var. resupinatum				I (+)	
252	Ranunculus acris					I (1)
257	Marchantia polymorpha			I (1)		
258	Mylia anomala			I (+)		
237	Solidago virgaurea			I (1)		
261	Riccardia pinguis					I (+)
266	Drepanocladus uncinatus				I (2)	
267	Myosotis secunda				I (+)	
268	Potentilla anserine			I (1)		
269	Trifolium repens			I (+)		
208	Philonotis calcarea	II (+)	II (+)			
31	Carex paniculata	I (+)	I (+)			
48	Deschampsia caespitosa					
173	Valeriana officinalis	I (+)	I (+)			
246	Arrhenatherum elatius					
247	Carex acutiformis					
248	Lathyrus montanus					
259	Scapania undulata				I (+)	

National Fen Survey of Ireland

General Appendix 6. Phytosociological Classification Scheme Irish Fens

Chara Sp = Characteristic Species; Diff Sp = Differentail Species

Fen type: PF=Poor Fen; AF=Alkaline fen; TM=Transition Mire; NCS=Non-Calcaeous Spring; PS=Petrifying Spring

Fen Type	**PF**	**PF**	**PF**	**TM**	**PF**	**PF**	**PF**	**AF**	**AF**	**AF**	**AF**	**AF**	**AF**	**PF**	**NCS**	**PF**
	Class	**Order**	**Association**	**Association**	**Association**	**Association**	**Association**	**Order**	**Association**	**Association**	**Association**	**Association**	**Association**	**Order**	Alliance	Alliance
Phytosociological Classification	**Scheuchzerio-Caricetea nigrae: Class Character Species**	**Caricetalia nigrae: Order and Caricion curto-nigrae: Alliance**	**Sphagneto-Juncetum effusi**	**Sphagno Caricetum lasiocarpae**	**Carici curtae-Agrostidetum caninae**	**Caricetum magellanicae**	**Drepanocladoexannulati-Caricetum aquatilis**	**Caricetalia davallianae: Order and Alliance Spp**	**Schoenetum nigricantis**	**Juncetum subnodulosi**	**Campylio-Caricetum dioicae**	**Calliergo-Caricetum diandrae**	**Carici nigrae-Juncetum articulati**	**Scheuchzerietalia palustris**	Cardamino - Montion	Cratoneurion
	Fen and flush vegetation	**Poor fens**	Flushes on acid peat	Transition Mire/ quaking mire in acid peat areas	Poor fen on enriched acid peats	Upland bog hollows	Species rich poor fen on permanently waterlogged areas	**Rich fens**	Schoenus nigricans dominated fens	Juncus subnodulosus calcium rich fens	Grazed base rich flushes	Transition mire/quaking mire that is calcicole	Waterlogged lake edge, drain and channel communities	Wet hollows on bogs	Non Calc Spring	Petrifying Spring
Species Name																
Carex nigra	Chara Sp												Chara Sp			
Hydrocotyle vulgaris	Chara Sp												Chara Sp			
Ranunculus flammula	Chara Sp												Chara Sp			
Carex viridula ssp. oedocarpa	Chara Sp										Chara Sp					
Epilobium palustre	Chara Sp															
Galium palustre	Chara Sp															
Pedicularis palustris	Chara Sp															
Potentilla palustris	Chara Sp															
Viola palustris		Chara Sp														
Carex echinata		Chara Sp			Chara Sp											
Sphagnum palustre		Diff Sp														
Juncus effusus			Chara Sp													
Sphagnum recurvum			Chara Sp													
Galium saxatile			Diff Sp													
Polytrichum commune			Diff Sp													
Carex lasiocarpa				Chara Sp								Diff Sp				
Myrica gale				Diff Sp												
Sphagnum denticulatum				Diff Sp												
Agrostis canina					Chara Sp											
Carex curta					Chara Sp											
Carex magellanica						Chara Sp										
Carex aquatilis							Chara Sp									
Carex viridula ssp. brachyrhyncha								Chara Sp								
Dactylorhiza incarnata								Chara Sp								
Parnassia palustris								Chara Sp								
Pinguicula vulgaris								Chara Sp								
Aneura pinguis								Chara Sp								
Campylium stellatum								Chara Sp								
Drepanocladus revolvens								Chara Sp								
Fissidens adianthoides								Chara Sp								
Scorpidium scorpioides								Chara Sp								
Schoenus nigricans									Chara Sp							
Juncus subnodulosus										Chara Sp						
Carex dioica											Chara Sp					
Carex hostiana											Chara Sp					
Eleocharis quinqueflora											Chara Sp					
Carex diandra												Chara Sp				
Bryum pseudotriquetrum												Chara Sp				
Calliergon giganteum												Chara Sp				
Juncus articulatus													Chara Sp			
Carex limosa														Chara Sp		
Cladopodiella fluitans														Chara Sp		
Menyanthes trifoliata														Chara Sp		
Sphagnum cuspidatum														Chara Sp		
Sphagnum fallax														Chara Sp		
Sphagnum subsecundum														Chara Sp		
Epilobium obscurum															Diagnostic	
Pellia epiphylla															Diff Sp	

National Fen Survey of Ireland

General Appendix 6. Phytosociological Classification Scheme Irish Fens

Chara Sp = Characteristic Species; Diff Sp = Differentail Species

Fen type: PF=Poor Fen; AF=Alkaline fen; TM=Transition Mire; NCS=Non-Calcaeous Spring; PS=Petrifying Spring

Fen Type	**PF**	**PF**	**PF**	**TM**	**PF**	**PF**	**PF**	**AF**	**AF**	**AF**	**AF**	**AF**	**AF**	**PF**	**NCS**	**PF**
	Class	**Order**	**Association**	**Association**	**Association**	**Association**	**Association**	**Order**	**Association**	**Association**	**Association**	**Association**	**Association**	**Order**	Alliance	Alliance
Phytosociological Classification	**Scheuchzerio-Caricetea nigrae: Class Character Species**	**Caricetalia nigrae: Order and Caricion curto-nigrae: Alliance**	**Sphagneto-Juncetum effusi**	**Sphagno Caricetum lasiocarpae**	**Carici curtae-Agrostidetum caninae**	**Caricetum magellanicae**	**Drepanocladoexannulati-Caricetum aquatilis**	**Caricetalia davallianae: Order and Alliance Spp**	**Schoenetum nigricantis**	**Juncetum subnodulosi**	**Campylio-Caricetum dioicae**	**Calliergo-Caricetum diandrae**	**Carici nigrae-Juncetum articulati**	**Scheuchzerietalia palustris**	Cardamino - Montion	Cratoneurion
Species Name	Fen and flush vegetation	**Poor fens**	Flushes on acid peat	Transition Mire/ quaking mire in acid peat areas	Poor fen on enriched acid peats	Upland bog hollows	Species rich poor fen on permanently waterlogged areas	**Rich fens**	Schoenus nigricans dominated fens	Juncus subnodulosus calcium rich fens	Grazed base rich flushes	Transition mire/quaking mire that is calcicole	Waterlogged lake edge, drain and channel communities	Wet hollows on bogs	Non Calc Spring	Petrifying Spring
Chiloscyphus polyanthus var. rivularis															Diagnostic	
Stellaria alsina															Diagnostic	
Saxifraga stellaris															Diagnostic	Diagnostic
Cardamine amara															Diagnostic	Diagnostic
Brachythecium rivulare															Diagnostic	Diagnostic
Epilobium alsinifolium															Diagnostic	Diagnostic
Equisetum telmateia																Diff Sp
Cratoneuron filicinum																Chara Sp
Philonotis calcarea																Chara Sp
Saxifraga aizoides																Chara Sp

General Appendix 7.

NFS Impacts and Activities List

NFS Impacts and Activities influencing the conservation status of the site (adapted from Natura 2000 form).

The original list supplied from Brussels has been modified slightly for our use, with the recent addition of certain categories (in italics).

Source: D. Lynn, NPWS November 2007.

CODE	CATEGORY
	Agriculture, Forestry
100	Cultivation
101	modification of cultivation practices
102	mowing/cutting
103	*agricultural improvement*
104	*removal of limestone pavement*
110	Use of pesticides
120	Fertilisation
130	Irrigation
140	Grazing
141	abandonment of pastoral systems
142	*overgrazing by sheep*
143	*overgrazing by cattle*
144	*overgrazing by deer*
145	*overgrazing by goats*
146	*overgrazing by hares, rabbits, small mammals*
147	*overgrazing by geese*
148	*overgrazing, general*
149	*undergrazing*
150	Restructuring agricultural land holding
151	removal of hedges and copses
152	*removal of scrub*
160	General Forestry management
161	forestry planting
162	artificial planting
163	forestry replanting
164	forestry clearance
165	removal of undergrowth
166	removal of dead and dying trees
167	exploitation without replanting
168	*felling of native or mixed woodland*
170	Animal breeding
171	stock feeding
180	Burning
190	Agriculture and forestry activities not referred to above
	Fishing, hunting and collecting
200	Fish and Shellfish Aquaculture
210	Professional fishing
211	fixed location fishing
212	trawling

213 drift-net fishing
220 Leisure fishing
221 bait digging
230 Hunting
240 Taking/Removal of fauna, general
241 collection (insects, reptiles, amphibians.....)
242 taking from nest (falcons)
243 trapping, poisoning, poaching
244 other forms of taking fauna
250 Taking/Removal of flora, general
251 pillaging of floristic stations
290 Hunting, fishing or collecting activities not referred to above

Mining and Extraction of Minerals

300 Sand and gravel extraction
301 quarries
302 removal of beach materials
310 Peat Extraction
311 hand-cutting of peat
312 mechanical removal of peat
320 Exploration and extraction of oil or gas
330 Mines
331 open cast mining
332 underground mining
340 Salt Works
390 Mining and extraction activities not referred to above

Urbanisation, industrialisation and similar activities

400 Urbanised areas, human habitation
401 continuous urbanisation
402 discontinuous urbanisation
403 dispersed habitation
409 other patterns of habitation
410 Industrial or commercial areas
411 factory
412 industrial stockage
419 other industrial/commercial areas
420 Discharges
421 disposal of household waste
422 disposal of industrial waste
423 disposal of inert materials
424 other discharges
430 Agricultural structures
440 Storage of materials
490 Other urbanisation, industrial and similar activities

Transportation and communication

500 Communication networks
501 paths, tracks, cycling tracks
502 routes, autoroutes
503 railway lines, TGV
504 port areas

505 airport
506 aerodrome, heliport
507 bridge, viaduct
508 tunnel
509 other communications networks
510 Energy transport
511 electricity lines
512 pipe lines
513 other forms of energy transport
520 Shipping
530 Improved access to site
590 Other forms of transportation and communication

Leisure and Tourism
(some included under different headings)

600 Sport and leisure structures
601 golf course
602 skiing complex
603 stadium
604 circuit, track
605 hippodrome
606 attraction park
607 sports pitch
608 camping and caravans
609 other sport/leisure complexes
610 Interpretative centres
620 Outdoor sports and leisure activities
621 nautical sports
622 walking, horse riding and non-motorised vehicles
623 motorised vehicles
624 mountaineering, rock climbing, spieleology
625 gliding, delta plane, paragliding, ballooning
626 skiing, off-piste
629 other outdoor sports and leisure activities
690 Other leisure and tourism impacts not referred to above

Pollution and other human impacts/activities

700 Pollution
701 water pollution
702 air pollution
703 soil pollution
709 other forms or mixed forms of pollution
710 Noise nuisance
720 Trampling, overuse
730 Military Manoeuvres
740 Vandalism
790 Other pollution or human impacts/activities

Human induced changes in hydraulic conditions
(wetlands and marine environments)

800 Landfill, land reclamation and drying out, general
801 polderisation

802 reclamation of land from the sea, estuary or marsh
803 infilling of ditches, dykes, ponds, pools, marshes or pits
810 Drainage
811 management of aquatic and bank vegetation for drainage purposes
820 Removal of sediments (mud ...)
830 Canalisation
840 Flooding
850 Modification of hydrographic functioning, general
851 modification of marine currents
852 modifying structures of inland water course
853 management of water levels
860 Dumping, depositing of dredged deposits
870 Dykes, embankments, artificial beaches, general
871 sea defence or coastal protection works
890 Other human induced changes in hydraulic conditions

Natural processes (biotic and abiotic)

900 Erosion
910 Silting up
920 Drying out
930 Submersion
940 Natural catastrophes
941 inundation
942 avalanche
943 collapse of terrain, landslide
944 storm, cyclone
945 volcanic activity
946 earthquake
947 tidal wave
948 fire (natural)
949 other natural catastrophes
950 Biocœnotic evolution
951 accumulation of organic material
952 eutrophication
953 acidification
954 invasion by a species
960 Interspecific faunal relations
961 competition (example: gull/tern)
962 parasitism
963 introduction of disease
964 genetic pollution
965 predation
966 antagonism arising from introduction of species
967 antagonism with domestic animals
969 other forms of mixed forms of interspecific faunal competition
970 Interspecific floral relations
971 competition
972 parasitism
973 introduction of disease
974 genetic pollution
975 lack of pollinating agents
976 damage by game species
979 other forms or mixed forms of interspecific floral competition
990 Other natural processes

11 NFS List of Survey Appendices

Survey Document and Form Templates use SurDoc naming convention, on the CD Rom accompanying this report.

National Fen Survey of Ireland
NFS Site Form

Site Name		**National Grid Ref**	
Site Code		**X Y Grid Ref**	
County/ Vice County		**Surveyor(s)**	
Townland(s)		**Discovery Map No.**	
Detailed Survey date:		**Survey – none** ☐ **Survey – brief** ☐	Include reasons why no survey or only brief survey undertaken in Site Description Summary below

Site Description Summary

Site Particulars

Current Conservation Status:	☐ **SAC** ☐ **NHA** ☐ **Undesignated** ☐ **Other:**
Total Site Area (ha):	
River Catchment (GIS):	
Topography:	
Solid Geology (GIS):	
Quaternary deposits (GIS):	
Corine Landcover 2000 Category codes (GIS):	
Site Hydrology:	
Owner Information:	

Fen Habitat Types Present & Extent (after survey)

Fen Habitat	Potential Fen type pre-survey (tick)	Potential Area pre-survey (ha)	NFS Confirmed Fen type (tick)	Confirmed Area (ha)
7140 Transition Mire				
7210 Cladium fen				
7220 Petrifying springs				
7230 Alkaline fen				
Poor fen				
Non-calcareous springs				

Landuse - Within Site Boundary

Please tick the main landuse within the site boundary.

Then, if possible, indicate whether the landuse types are:
1 – Rare (c. <5%); 2 – Occasional (c. 5-20%); 3 – Frequent (c. 21-50%); 4 – Dominant (c. >50%).

✓	2	**Landuse activity**			
		Arable farming			Amenity Management
		Forestry			Conservation Management
		Meadow - silage			
		Meadow - hay			Water abstraction
		Meadow - use unknown			Legal dumping
					Aquaculture
		Grazing - sheep			Quarrying/Mining
		Grazing - cattle			
		Grazing - horses			Industrial
		Grazing - other			Residential (urban)
		Grazing - unknown			Residential (scattered)
					Roads
		Agricultural buildings			
					Peat cutting (hand)
		Airport/Airstrip			Peat cutting (mechanical)
		Boating			
		Fishing			None
		Hunting/Shooting			
		Golfing			Other:
		Sports pitch			
		Caravans/Camping			
		Horse riding			
		Walking			
		Motor sports/Quads			

Surrounding Landuse - Outside Site Boundary

Please tick the main landuse adjacent to and /or surrounding the site.

✓	**Example adjacent landuse**		Golfing		Industrial
	Arable farming		Sports pitch		Residential (urban)
	Forestry		Caravans/Camping		Residential (scattered)
	Meadow - silage		Horse riding		Roads
	Meadow - hay		Walking		
	Meadow - use unknown		Motor sports/Quads		Other:
	Grazing - sheep		Sports pitch		
	Grazing - cattle		Amenity Management		
	Grazing - horses		Conservation Management		
	Grazing - other		Water abstraction		
	Grazing - unknown		Legal dumping		
	Agricultural buildings		Aquaculture		
	Airport/Airstrip		Quarrying/Mining		
	Boating		Peat cutting (hand)		
	Fishing		Peat cutting (mechanical)		
	Hunting/Shooting				

Note: Remember to complete Fossitt habitat assignment sheet for habitats present within site boundary.

Note: For additional sub-categories of Impacts and Activities Influencing site (below) see General Appendix 7

Impacts and Activities Influencing Conservation Status of Site

Please tick the main impacts and activities influencing the conservation status of the site. Then, if possible, indicate:

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

✓	Site impacts or activities	Int	Inf	✓	Site impacts or activities	Int	Inf
✓	**Example**	**A**	**-2**		312 Peat Extraction: mechanical removal of peat		
	100 Cultivation				320 Exploration & extraction of oil or gas		
	101 Cultivation: modification of cultivation practices				**330 Mines**		
	102 Cultivation: mowing/cutting				331 Mines: open cast mining		
	103 Cultivation: agricultural improvement				332 Mines: underground mining		
	104 Cultivation: removal of limestone pavement				340 Salt Works		
	110 Use of pesticides				390 Mining & extraction activities not listed above		
	120 Fertilisation				**400 Urbanised areas, human habitation**		
	130 Irrigation				401 continuous urbanisation		
	140 Grazing				402 discontinuous urbanisation		
	141 abandonment of pastoral systems				403 dispersed habitation		
	142 overgrazing by sheep				409 other patterns of habitation		
	143 overgrazing by cattle				**410 Industrial or commercial areas**		
	144 overgrazing by deer				411 factory		
	145 overgrazing by goats				412 industrial stockage		
	146 overgrazing by hares, rabbits, small mammals				419 other industrial/commercial areas		
	147 overgrazing by geese				**420 Discharges**		
	148 overgrazing, general				421 Discharges: disposal of household waste		
	149 undergrazing				422 Discharges: disposal of industrial waste		
	150 Restructuring agricultural land holding				423 Discharges: disposal of inert materials		
	151 removal of hedges & copses				424 Discharges: other discharges		
	152 removal of scrub				430 Agricultural structures		
	160 General Forestry management				440 Storage of materials		
	161 forestry planting				490 Other urbanisation, industrial & similar activities		
	162 artificial planting				**500 Communication networks**		
	163 forestry replanting				501 paths, tracks, cycling tracks		
	164 forestry clearance				502 routes, autoroutes		
	165 removal of undergrowth				503 railway lines, TGV		
	166 removal of dead & dying trees				504 port areas		
	167 exploitation without replanting				505 airport		
	168 felling of native or mixed woodland				506 aerodrome, heliport		
	170 Animal breeding				507 bridge, viaduct		
	171 Animal breeding: stock feeding				508 tunnel		
	180 Burning				509 other communications networks		
	190 Agricult. & forestry activities not referred to above				**510 Energy transport**		
	200 Fish & Shellfish Aquaculture				511 Energy transport: electricity lines		
	210 Professional fishing				512 Energy transport: pipe lines		
	211 Professional fishing: fixed location fishing				513 Energy transport: other forms of energy transport		
	212 Professional fishing: trawling				520 Shipping		
	213 Professional fishing: drift-net fishing				530 Improved access to site		
	220 Leisure fishing				590 Other forms of transportation & communication		
	221 Leisure fishing: bait digging				**600 Sport & leisure structures**		
	230 Hunting				601 Sport & leisure structures: golf course		
	240 Taking/Removal of fauna, general				603 Sport & leisure structures: stadium		
	241 collection (e.g. insects, reptiles, amphibians)				604 Sport & leisure structures: circuit, track		
	242 taking from nest (e.g. falcons)				607 Sport & leisure structures: sports pitch		
	243 trapping, poisoning, poaching				608 Sport & leisure structures: camping & caravans		
	244 other forms of taking fauna				609 other sport/leisure complexes		
	250 Taking/Removal of flora, general				610 Interpretative centres		
	251 pillaging of floristic stations				**620 Outdoor sports & leisure activities**		
	290 Hunting, fishing or collecting not listed to above				622 walking, horseriding & non-motorised vehicles		
	300 Sand & gravel extraction				623 motorised vehicles		
	301 Sand & gravel extraction: quarries				624 mountaineering, rock climbing, spieleology		
	302 S & g extraction: removal of beach materials				690 Other leisure impacts not referred to above		
	310 Peat Extraction						
	311 Peat Extraction: hand-cutting of peat						

✓	Site impacts or activities cont.	Int	Inf	✓	Site impacts or activities cont.	Int	Inf
✓	**Example**	**A**	**-2**				
	700 Pollution				**940 Natural catastrophes**		
	701 Pollution: water pollution				941 Natural catastrophes: inundation		
	702 Pollution: air pollution				943 Natural catastrophes: collapse of terrain, landslide		
	703 Pollution: soil pollution				944 Natural catastrophes: storm, cyclone		
	709 Pollution: other forms or mixed forms of pollution				948 Natural catastrophes: fire (natural)		
	710 Noise nuisance				949 Natural catastrophes: other natural catastrophes		
	720 Trampling, overuse				**950 Biocœnotic evolution**		
	730 Military Manoeuvres				951 accumulation of organic material		
	740 Vandalism				952 eutrophication		
	790 Other pollution or human impacts/activities				953 acidification		
	800 Landfill, land reclamation & drying out, general				954 invasion by a species		
	801 polderisation				**960 Interspecific faunal relations**		
	802 reclamation of land from the sea, estuary or marsh				961 competition (e.g. gull/tern)		
	803 infilling of ditches, dykes, pools, marshes or pits				962 parasitism		
	810 Drainage				963 introduction of disease		
	811 management of aquatic & bank vegetation for drainage purposes				964 genetic pollution		
	820 Removal of sediments (e.g. mud)				965 predation		
	830 Canalisation				966 antagonism arising from introduction of species		
	840 Flooding				967 antagonism with domestic animals		
	850 Modification of hydrographic functioning, general				969 other forms of interspecific faunal competition		
	851 modification of marine currents				**970 Interspecific floral relations**		
	852 modifying structures of inland water course				971 competition		
	853 management of water levels				972 parasitism		
	860 Dumping, depositing of dredged deposits				973 introduction of disease		
	870 Dykes, embankments, artificial beaches, general				974 genetic pollution		
	871 Dykes, embankments, artificial beaches, general: sea defence or coastal protection works				975 lack of pollinating agents		
	890 **Other human induced changes in hydraulic conditions**				976 damage by game species		
	900 Erosion				979 other forms of interspecific floral competition		
	910 Silting up				**990 Other natural processes**		
	920 Drying out						
	930 Submersion						

Site Threats

Please tick the types of threats affecting the site and include the note number after the threat type.

✓	**Example Threat type**	**N22**		
	No observable site threats			400 Urbanised areas, human habitation
	102 Cultivation mowing/cutting			421 Disposal of household waste
	140 Grazing			502 Communication networks routes, autoroutes
	143 Overgrazing by cattle			510 Energy transport
	141 Abandonment of pastoral systems			620 Outdoor sports and leisure activities
	150 Restructuring of agricultural land holding			700 Pollution
	152 Removal of scrub			701 Water Pollution
	160 General Forestry management			790 Other pollution or human impacts
	161 Forestry planting			800 Landfill, land reclamation and drying out, general
	180 Burning			803 Infilling ditches, dykes, ponds, marshes and pits
	230 Hunting			810 Drainage, local and arterial schemes
	300 Sand gravel extraction			890 Other human induced changes in hydraulic conditions
	301 Quarries			900 Erosion
	310 Peat Extraction			950 Biocenotic evolution
	311 Hand-cutting of peat			951 Accumulation of organic material
	312 Mechanical removal of peat			954 Invasion by a species

National Fen Survey of Ireland Relevé Card

Site Name		**Relevé Size m²**		**Altitude (m)**	
Site Code		**Slope** degrees		**Aspect**	
Relevé Code		**Survey Date**			
County		**Discovery Map No.**			
X Y Grid Ref		**Water Sample Code No.**			
Surveyor(s)		**Water Table Height (cm)**			
Photo Nos.		**pH**			
		Conductivity			
Substrate type	☐Clay ☐Peat ☐Silt ☐Tufa ☐Rock ☐Other:			**Depth (cm)**	
Stability	☐Very Firm ☐Firm ☐Some quaking ☐Quaking ☐Floating mat				
Management in Relevé	☐None ☐R. grazing ☐Burnt ☐Cut for: ☐Other:				
Adjacent landuse	☐Semi-natural habitat ☐Pasture rough ☐Pasture semi-improved ☐Improved pasture ☐Arable ☐Urban ☐Forestry ☐Other:				
Hydrology					

Layers	Cover %	Height (cm)
Total Cover		
Tree		
Shrub		
Herbs/Grass/Sedge		
Bryophytes		
Litter		
Bare Peat/Soil		
Algal		
Open Water		

Fen Vegetation Type

Fen Habitat: ❑ **7140 Transition Mire** ❑ **7210 Cladium fen** ❑ **7230 Alkaline fen**
❑ **7220 Petrifying springs** ❑ **Poor fen** ❑ **Non-calcareous springs**

Quadrat Description (Additional flora species surrounding area, 5 m radius; plus faunal records)

Cover value	**+:** single individual – no measurable cover	**1:** 1-2 individuals – no measurable cover	**2:** several individuals but less than 1% cover	**3:** 1-5%	**4:** 6-10%	**5:** 11-25%
		6: 26-33%	**7:** 34-50%	**8:** 51-75%	**9:** 76-90%	**10:** 91-100%

	Aneura ping	*180*		*Sphag ripar*	*225*		Cirsium dis	041		Juncus bulb	089		Potamo perfol	136
	Aulocom pal	*181*		*Sphag squarr*	*226*		Cirsium pal	042		Juncus cong	235		Potamo poly	138
	Brachy riv	*182*		*Sphag subnit*	*227*		Cladium mar	043		Juncus eff	090		Pot erecta	139
	Bry pseudo	*183*		*Sphag subsec*	*228*		Dactlyor incar	044		Juncus subn	091		Pot palust	140
	Call gig	*184*		*Thuid tamar*	*230*		Dactlyor macu	045		Lemna min	092		Ranunc flam	141
	Call stram	*185*		*Toment nit*	*231*		Dactlyor maj	046		Lemna tri	093		Ranunc ling	142
	Call cusp	*186*		Agros can	001		Dactyl glom	047		Leont autum	094		Rhynch alba	143
	Calyp muell	*187*		Agrost stol	002		Descha caes	048		Littor unifl	095		Rorrip amph	144
	Camp stell	*188*		Alisma pl aq	003		Drosera rot	049		Lotus ulig	096		Rorrip palus	145
	Cinc font	*189*		Alnus glut	004		Dryopt affin	050		Luzula camp	097		Rumex atosa	146
	Cladop fluit	*190*		Alop genic	005		Dryopt carth	051		Luzula mult	098		Rumex cong	147
	Clim dend	*191*		Anag tenella	006		Dryopt fx-ma	052		Lynchnis flos	099		Rumex hydro	148
	Craton filicin	*192*		Angel sylv	007		Eleoch mult	053		Lycopus eu	100		Salix aur	149
	Ctenid moll	*193*		Anthox od	008		Eleoch pal	054		Lysimac nem	101		Salix cin	150
	Dicran scop	*194*		Apium inunda	009		Eleoch quin	055		Lythrum sal	102		Salix frag	151
	Drep cosson	*195*		Apium nodi	010		Elodea can	056		Mentha aq	103		Salix rep	152
	Drep revolv	*197*		Berula erec	011		Epilob hirs	057		Menyanthes	104		Salix vim	153
	Euclad vertic	*198*		Betula pub	012		Epilob obscur	058		Molinia	105		Saxifrag aizo	154
	Eurhyn prae	*199*		Bidens cer	013		Epilob palu	059		Myosot laxa	106		Schoeno lac	155
	Fiss adian	*200*		Bidens tripar	014		Epilob parvi	060		Myosot secu	267		Schoenus	156
	Font anti	*201*		Briza med	015		Epipactis pal	061		Myosot scor	107		Senecio aq	157
	Hamat verni	*202*		Callitrich stag	016		Equis fluv	062		Myrica gale	108		Sparg erec	158
	Hyloc splend	*203*		Calluna vul	017		Equis pal	063		Myrioph alter	109		Sparg min	159
	Palust comm	*204*		Caltha pal	018		Equis varie	064		Myrioph spic	110		Stellar gram	160
	Palust c v c	*205*		Cardam pra	019		Erica tet	065		Narth ossi	112		Stellar pal	161
	Palust co v fa	*206*		Carex curta	020		Erioph ang	066		Nastur off	113		Stellar ulig	162
	Pellia epi	*207*		Carex diand	021		Erioph lat	068		Nuphar lut	114		Succisa prat	163
	Philon calc	*208*		Carex dioic	022		Erioph vag	069		Nymph alba	115		Thelyp pal	164
	Plagio aff	*209*		Carex disti	023		Eupat cann	070		Oenanth aq	116		Trigloc pal	165
	Plagio ellip	*210*		Carex echin	024		Fest arund	071		Oenanth croc	117		Typh ang	166
	Pleur schre	*262*		Carex flac	025		Fest rub	072		Parnassia pal	119		Typha latif	167
	Polyt comm	*130*		Carex hos	026		Filipend ulm	073		Pedic palust	120		Utric austral	168
	Scleropo pur	*211*		Carex lasio	027		Galium pal	074		Phalar arund	121		Utric inter	169
	Rhizo punc	*212*		Carex limosa	028		Galium sax	075		Phragmites	122		Utric minor	170
	Rhytid squar	*213*		Carex nigra	029		Galium ulig	076		Pinguic vul	123		Utric vulg	171
	Rhytid triq	*214*		Carex panic	030		Glyceria fluit	077		Plantago lan	124		Vaccin oxy	172
	Scorp scorp	*216*		Carex pancl	031		Glyceria not	078		Poa prat	125		Valeria offic	173
	Sphag fimb	*217*		Carex pulica	032		Hippuris	080		Poa triv	126		Veron an-aq	174
	Sphag angus	*218*		Carex ros	033		Holcus lan	081		Polygala serp	127		Veron becca	175
	Sphag capil	*241*		Carex brach	034		Hydrocot vul	082		Polygo amph	128		Veron caten	176
	Sphag cusp	*219*		Carex oed	035		Hyperic elod	083		Polygo hydro	129		Veron scutel	177
	Sphag dent	*220*		Carex virid	036		Hyperic tetrap	084		Potamo berc	131		Vicia cracca	178
	Sphag fallax	*221*		Cent nigra	037		Hypoch rad	085		Potamo color	132		Viola pal	179
	Sphag pal	*222*		Cerast font	038		Iris psuedo	086		Potamo crisp	133		Algae	233
	Sphag papil	*223*		Chara spp	039		Juncus acuti	087		Potamo lucen	134			
	Sphag recurv	*224*		Cicuta viro	040		Juncus artic	088		Potamo obtus	135			

National Fen Survey of Ireland – Bryophyte Reference Collection

Species:		**Collector:**	
Site Name:		**Collection Date:**	
Site/Releve code:			
County/VC No.	**VC No:**		
Grid reference:		**Discovery map:**	
Altitude (m):			

Habitat Notes:

Survey Appendix 4.
Categories of Slope (after Hodgeson 1974)

Slope in degrees

0-1	level
2-3	gently sloping
4-7	moderately sloping
8-11	strongly sloping
12-15	moderately steeply sloping
16-25	steeply sloping
26-35	very steeply sloping
35 +	precipitous

Survey Appendix 5.
Definitions of Substrate Type

Clay (C): Wet clay will have a degree of cohesion and plasticity. If sufficiently wet it can be readily rolled in the hand and will not disintegrate. It often feels sticky.

(A stiff, sticky sedimentary material that is soft and pliable when wet and consists mainly of various silicates of aluminum. Clay particles are smaller than silt, having a diameter less than 0.0039 mm. Clay is widely used to make bricks, pottery, and tiles.)

Peat (P): Fresh peat is often brown in colour but when exposed to air turns black. Upper layers are usually poorly decomposed so that plant remains are often still identifiable.

Peat which is more decomposed (i.e. of a greater degree of humification), has less identifiable plant remains and a greater proportion of amorphous material. When a sample is compressed in the hand, water will be squeezed-out of the sample, and if the sample is relatively decomposed the amorphous peat material will also be squeezed through the fingers.

Silt (S): No individual grains may be identified within a silt sample. It may have a slightly sticky feel, but it does not have the cohesion of clay. It generally has a smooth, soapy feel.

(A sedimentary material consisting of grains or particles of disintegrated rock, smaller than sand and larger than clay. The diameter of the particles ranges from 0.0039 to 0.0625 mm. Silt is often found at the bottom of bodies of water where it accumulates slowly by settling through the water.)

Tufa (T): Tufa is a surface deposit of calcite (calcium carbonate). It is associated with certain spring-fed calcareous-rich fens which receive water from calcium-carbonate aquifers. I forms a white/cream deposit on the substrate, around the stems of plants and within moss patches. The deposit may be quite solid and impart a crust to the mosses. It may also be relatively soft and simply coat the surface.

Marl (M): A crumbly mixture of clays, calcium and magnesium carbonates, and remnants of shells that forms in both freshwater and marine environments. May be found under cutaway peat bogs.

Rock (R)

Solid unweathered rock lying beneath surface deposits of soil or exposed on the surface as a outcrop.

Abbreviations are for use on hydrochemistry results table (see Results Appendix 6).

Survey Appendix 6.
Definitions of Substrate Stability

Very Firm (VF): Solid substrate, showing no quaking action when walked on.

Often found where shallow peat layer occurs over mineral soil or bedrock; i.e. in flushed blanket bog areas on a significant slope.

Firm (F): Firm substrate, showing no quaking action when walked on.

Often found where shallow peat layer occurs over mineral soil or bedrock; or on highly humified peat layers found on cutaway peat areas.

Some Quaking (SM): Substrate shows slight quaking action when walked on.

Quaking (Q): Substrate shows quaking action characteristic when walked on. Able to support human weight, showing slight subsidance only when stood on for a prolonged period.

Often found where a scraw of fen vegetation has developed some distance from lakeshore edge; or on well established and infilled hollows in cutaway bog hollows or basin depressions.

Floating (F): Extremely soft and quaking substrate, not able to support human weight, subsiding or sinking when stood on for any prolonged period.

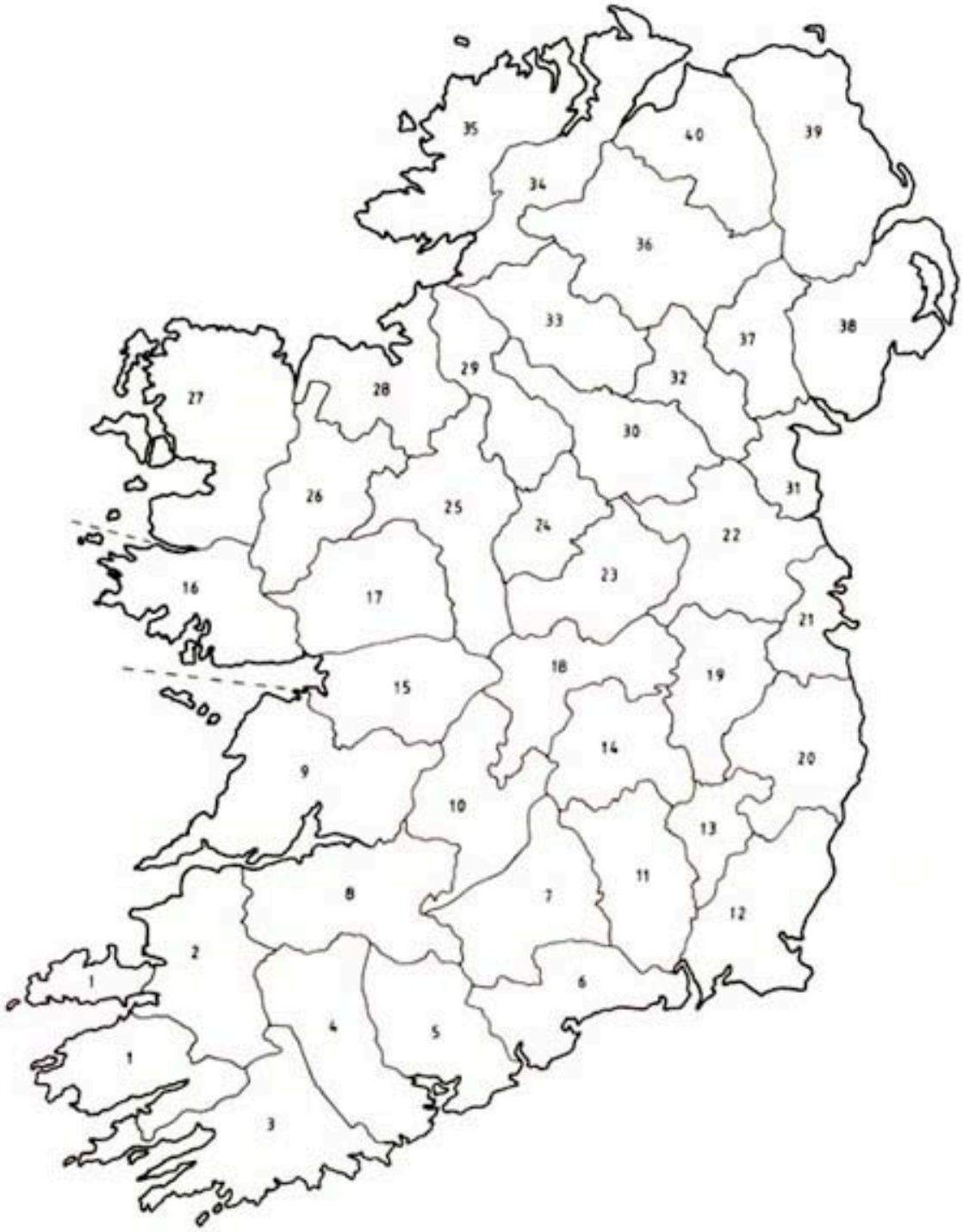
Often found where a floating scraw of fen vegetation has developed on lakeshore edge or on recently infilled hollows in cutaway bog hollows.

Abbreviations are for use on hydrochemistry results table (see Results Appendix 6).

Survey Appendix 7.
NFS County Codes & Vice County Codes

County Name	County Abbreviation	Vice County Code
Antrim	AM	H39
Armagh	AH	H37
Carlow	CW	H13
Cavan	CV	H30
Clare	CL	H9
Cork	CO	West H3; Mid H4; East H5
Donegal	DG	East H34; West H35
Derry	DY	H40
Down	DW	H38
Dublin	DL	H21
Fermanagh	FH	H33
Galway	GA	SE H15; West H 16; NE H17
Kerry	KE	South H1; North H2
Kildare	KD	H19
Kilkenny	KK	H11
Laois	LA	H14
Leitrim	LE	H29
Limerick	LI	H8
Longford	LF	H24
Louth	LH	H31
Mayo	MA	East H26; West H27
Meath	ME	H22
Monaghan	MO	H32
Offaly	OF	H18
Roscommon	RO	H25
Sligo	SL	H28
Tipperary	TI	South H7; North H10
Tyrone	TE	H36
Waterford	WA	H6
Westmeath	WM	H23
Wexford	WX	H12
Wicklow	WI	H20

Vice County Map of Ireland



National Fen Survey of Ireland - NPWS Fossitt Habitat Assignment Form

Site Name: _____ **Site Code:** _____

Date Completed: _____ **Initials:** _____ Please tick all habitats recorded within the site boundary.

	B Cultivated & built land		***FP Springs***		**W Woodland and scrub**
	BC Cultivated land		FP1 Calcareous springs		***WD Highly modified/non-native woodland***
	BC1 Arable crops		FP2 Non-Calcareous springs		WD1 (Mixed) broadleaved woodland
	BC2 Horticultural land		***FS Swamps***		WD2 Mixed broadleaved/conifer woodland
	BC3 Tilled land		FS1 Reed and large sedge swamps		WD3 (Mixed) conifer woodland
	BC4 Flower beds and borders		FS2 Tall herb swamps		WD4 Conifer plantation
	BL Built land		***FW Watercourses***		WD5 Scattered trees and parkland
	BL1 Stone walls and other stonework		FW1 Eroding/upland rivers		***WL Linear woodland/scrub***
	BL2 Earth banks		FW2 Depositing/lowland rivers		WL1 Hedgerows
	BL3 Buildings and artificial surfaces		FW3 Canals		WL2 Treelines
	C Coastland		FW4 Drainage ditches		***WN Semi-natural woodland***
	CB Shingle and gravel banks		**G Grassland & Marsh**		WN1 Oak-birch-holly woodland
	CB1 Shingle and gravel banks		***GA Improved Grassland***		WN2 Oak-ash-hazel woodland
	CC Coastal constructions		GA1 Improved agricultural grassland		WN3 Yew woodland
	CC1 Sea walls, piers and jetties		GA2 Amenity grassland (improved)		WN4 Wet pedunculate oak-ash woodland
	CC2 Fish cages and rafts		***GM Marsh***		WN5 Riparian woodland
	CD Sand dune systems		GM1 Marsh		WN6 Wet willow-alder-ash woodland
	CD1 Embryonic dunes		***GS Semi-Natural Grassland***		WN7 Bog woodland
	CD2 Marram dunes		GS1 Dry calcareous and neutral grassland		***WS Scrub/transitional woodland***
	CD3 Fixed dunes		GS2 Dry meadows and grassy verges		WS1 Scrub
	CD4 Dune scrub and woodland		GS3 Dry-humid acid grassland		WS2 Immature woodland
	CD5 Dune slacks		GS4 Wet grassland		WS3 Ornamental/non-native shrub
	CD6 Machair		**H Heath and dense bracken**		WS4 Short rotation coppice
	CM Salt marshes		***HD Dense Bracken***		WS5 Recently-felled woodland
	CM1 Lower salt marsh		HD1 Dense bracken		
	CM2 Upper salt marsh		***HH Heath***		
	CS Sea cliffs & isles		HH1 Dry siliceous heath		
	CS1 Rocky sea cliffs		HH2 Dry calcareous heath		
	CS2 Sea stacks and islets		HH3 Wet heath		
	CS3 Sedimentary sea cliffs		HH4 Montane heath		
	CW Brackish water		**L Littoral (intertidal)**		
	CW1 Lagoons and saline lakes		***LR Littoral rock***		
	CW2 Tidal rivers		LR1 Exposed rocky shores		
	E Exposed rock & disturbed ground		LR2 Moderately exposed rocky shores		
	ED Disturbed ground		LR3 Sheltered rocky shores		
	ED1 Exposed sand, gravel or till		LR4 Mixed substrate shores		
	ED2 Spoil and bare ground		LR5 Sea Caves		
	ED3 Recolonising bare ground		***LS Littoral sediments***		
	ED4 Active quarries and mines		LS1 Shingle and gravel shores		
	ED5 Refuse and other waste		LS2 Sandshores		
	ER Exposed Ground		LS3 Muddy sand shores		
	ER1 Exposed siliceous rock		LS4 Mudshores		
	ER2 Exposed calcareous rock		LS5 Mixed sediment shores		
	ER3 Siliceous scree and loose rock		**P Peatlands**		
	ER4 Calcareous scree and loose rock		***PB Bogs***		
	EU Underground rock and caves		PB1 Raised bogs		
	EU1 Non-marine caves		PB2 Upland blanket bog		
	EU2 Artificial underground habitats		PB3 Lowland blanket bog		
	FL Freshwater		PB4 Cutover bog		
	FL Lakes & Ponds		PB5 Eroding blanket bog		
	FL1 Dystrophic lakes		***PF Fens & Flushes***		
	FL2 Acid oligotrophic lakes		PF1 Rich fen and flush		
	FL3 Limestone/marl lakes		PF2 Poor fen and flush		
	FL4 Mesotrophic lakes		PF3 Transition mire & quaking bog		
	FL5 Eutrophic lakes				
	FL6 Turloughs				
	FL7 Reservoirs				
	FL8 Other artificial lakes and ponds				

European Union Habitat Assignment - Data Recording Form

SITECODE: ____ ____ Initials: _____

SITE_NAME: _____ Date completed: ___/___/____

☐ *Priority habitats are shaded*

Additional Habitats Directive Habitats Recorded: Yes___ No ___

(1110) Sandbanks which are slightly covered by sea water ...	☐
(1130) Estuaries	☐
(1140) Mudflats and sandflats not covered by seawater ...	☐
(1150) Coastal lagoons	☐
(1160) Large shallow inlets and bays	☐
(1170) Reefs	☐
(1210) Annual vegetation of drift lines	☐
(1220) Perennial vegetation of stony banks	☐
(1230) Vegetated sea cliffs of the Atlantic and Baltic coasts	☐
(1310) Salicornia and other annuals colonizing mud and ...	☐
(1320) Spartina swards (Spartinion maritimae)	☐
(1330) Atlantic salt meadows (Glauco-Puccinellietalia ...	☐
(1410) Mediterranean salt meadows (Juncetalia maritimi)	☐
(1420) Mediterranean and thermo-Atlantic halophilous scrub	☐
(2110) Embryonic shifting dunes	☐
(2120) Shifting dunes along the shoreline with Ammophila ...	☐
(2130) Fixed coastal dunes with herbaceous vegetation ...	☐
(2140) Decalcified fixed dunes with Empetrum nigrum	☐
(2150) Atlantic decalcified fixed dunes (Calluno-Ulicetea)	☐
(2160) Dunes with Hippophae rhamnoides	☐
(2170) Dunes with Salix repens ssp.argentea (Salix arenariae)	☐
(2190) Humid dune slacks	☐
(21A0) Machairs (* in Ireland)	☐
(3110) Oligotrophic waters containing ... of sandy plains ...	☐
(3130) Oligotrophic to mesotrophic standing waters with ...	☐
(3140) Hard oligo-mesotrophic waters with benthic veg...	☐
(3150) Natural euthrophic lakes with Magnopotamion or ...	☐
(3160) Natural dystrophic lakes and ponds	☐
(3180) Turloughs	☐
(3260) Water courses of plain to montane levels with ...	☐
(3270) Rivers with muddy banks with Chenopodion rubri ...	☐
(4010) Northern Atlantic wet heaths with Erica tetralix	☐
(4030) European dry heaths	☐
(4060) Alpine and Boreal heaths	☐
(5130) Juniperus communis formations on heaths or calc ...	☐
(9991) Semi-natural calcareous dry grasslands (orchid-poor)	☐
(6210) Semi-natural calcareous dry grasslands (orchid-rich)	☐

Main Source:

Auto from Merge database v2 (A)
NHA Site File (B)
MPSU Plan (C)
Natura 2000 (D)
Blanket Bog Survey (E)
Raised Bog Survey (F)
Marine SACs folder (G)
SPA Habitat Folders (H)
Raised Bog Monitoring Survey (J)
Coastal Monitoring Survey (K)
Woodlands Survey (L)
Aerial Photos (M)
DIU Surveys (N)
CORINE Biotopes database (O)
Subsite database report (P)
Coastal Survey (Q)
Other (S)
[please list and number additional sources, S1, S2, etc.]

(6410) Molinia meadows on calcareous, peaty or clay...	☐
(6510) Lowland hay meadows (Alopecurus pratensis, ...	☐
(7110) Active raised bogs	☐
(7120) Degraded raised bogs still capable of natural ...	☐
(7220) Petrifying springs with tufa formation ...	☐
(7230) Alkaline fens	☐
(8110) Siliceous scree of the montane to snow levels ...	☐
(8120) Calcareous and calcshist screes of montane ...	☐
(8240) Limestone pavements	☐
(8310) Caves not open to the public	☐
(8330) Submerged or partly submerged sea caves	☐
(6130) Calaminarian grasslands of the Violetalia ...	☐
(6230) Species-rich Nardus grasslands, on siliceous ...	☐
(6430) Hydrophilous tall herb fringe communities ...	☐
(7130) Blanket bog (*active only)	☐
(9990) Blanket bog (not active)	☐
(7140) Transition mires and quaking bogs	☐
(7150) Depressions on peat substrates of the Rhynch...	☐
(7210) Calcareous fens with Cladium mariscus and ...	☐
(8210) Calcareous rocky slopes with chasmophytic v...	☐
(8220) Siliceous rocky slopes with chasmophytic veg	☐
(91D0) Bog woodland	☐
(91E0) Alluvial forests with Alnus glutinosa and Frax...	☐
(91J0) Taxus baccata woods of the British Isles	☐
(91A0) Old sessile oak woods with Ilex and Blech...	☐

Notes:

European Union Species Assignment - Data Recording Form

SITECODE:

Initials: _____

SITE_NAME:

Date completed: ___/___/____

☐ *Taxa not in Annex II*

Additional Habitats Directive Species Recorded for site: Yes___ No ___

1092	*Austropotamobius pallipes*	☐
1065	*Euphydryas aurinia*	☐
1024	*Geomalacus maculosus*	☐
1029	*Margaritifera margaritifera*	☐
1990	*Margaritifera durrovensis*	☐
1014	*Vertigo angustior*	☐
1013	*Vertigo geyeri*	☐
1016	*Vertigo moulinsiana*	☐
1102	*Alosa alosa*	☐
1103	*Alosa fallax*	☐
1099	*Lampetra fluviatilis*	☐
1096	*Lampetra planeri*	☐
1095	*Petromyzon marinus*	☐
1106	*Salmo salar*	☐
1364	*Halichoerus grypus*	☐
1355	*Lutra lutra*	☐
1365	*Phoca vitulina*	☐
1351	*Phocoena phocoena*	☐
1303	*Rhinolophus hipposideros*	☐
1349	*Tursiops truncatus*	☐
1393	*Drepanocladus vernicosus*	☐
1833	*Najas flexilis*	☐
1395	*Petalophyllum ralfsii*	☐
1528	*Saxifraga hirculus*	☐
1421	*Trichomanes speciosum*	☐

Main Source:

Auto from Merge database v2 (A)
NHA Site File (B)
MPSU Plan (C)
Natura 2000 (D)
Blanket Bog Survey (E)
Raised Bog Survey (F)
Marine SACs folder (G)
SPA Habitat Folders (H)
Raised Bog Monitoring Survey (J)
Coastal Monitoring Survey (K)
Woodlands Survey (L)
Aerial Photos (M)
DIU Surveys (N)
CORINE Biotopes database (O)
Subsite database report (P)
Coastal Survey (Q)
Other (S)
[please list and number additional sources, S1, S2, etc.]

Notes:

National ASI Survey - Site Card: Ecologists

Site Name: Site Code:

Local Name: Ranger:
(if different)

Area: (Hectares) Counties:

Grid Reference for the site: Half-Inch Map Number(s):

Six-Inch Map Number(s): Year of first designation:

Recorder details	Recorder(s)	Date
First Visit: Subsequent Visit(s):		

Main Habitat:

If changed, please delete above and comment.

Habitat Details:

Please tick the habitats observed within the site boundary below:
Then, if possible, indicate whether habitat types are: 1 Rare (c. <5%); 2 Occasional (c. 5-20%); 3 Frequent (c. 21-50%); 4 Dominant (c. >50%)

- ☐ Open marine waters
- ☐ Tidal rivers & estuarine channels
- ☐ Sea inlets and bays
- ☐ Mud flats & sand flats
- ☐ Salt marshes
- ☐ Sand dunes
- ☐ Machair
- ☐ Brackish lakes
- ☐ Sandy coastal beaches
- ☐ Shingle beaches
- ☐ Boulder beaches
- ☐ Bedrock shores
- ☐ Rocky sea cliffs
- ☐ Clay sea cliffs
- ☐ Sea stacks & islets
- ☐ Lakes and ponds (incl. reservoirs)
- ☐ Turloughs
- ☐ Rivers & streams
- ☐ Drainage ditches
- ☐ Canals
- ☐ Non-marine islands
- ☐ Lowland dry grassland (not improved)
- ☐ Lowland wet grassland (incl. rushy fields)
- ☐ Upland grassland on peaty soil
- ☐ Upland grassland on mineral soil
- ☐ Improved grassland (heavily fertilized/reseeded)
- ☐ Arable land
- ☐ Amenity grassland & Parkland
- ☐ Heath
- ☐ Raised bog (upland & lowland)
- ☐ Blanket bog (upland & lowland)
- ☐ Cutaway bog
- ☐ Fens & flushes
- ☐ Reedbeds & other swamps
- ☐ Freshwater marshes
- ☐ Dense bracken
- ☐ Hedge
- ☐ Scrub
- ☐ Dry, broadleaved semi-natural woodland
- ☐ Wet, broadleaved semi-natural woodland
- ☐ Mixed woodland (natives & exotics)
- ☐ Commercial forest
- ☐ Scree
- ☐ Limestone pavement
- ☐ Exposed rock (excluding limestone pavement)
- ☐ Weedy wasteground areas
- ☐ Quarries/Sand pits
- ☐ Old walls
- ☐ Artificial underground habitats
- ☐ Caves
- ☐ Buildings & Roads

Comments on habitats:

Please record Site Notes on the attached sheet for each habitat ticked and list note numbers here:

Site Name:

Site Code:

Threats: If there are threats to the site from current or planned activities in adjacent areas or planned activities within the site please record these with Site Notes and list the note numbers here:

Site Boundary: Please record Site Notes for boundary types and list the note numbers here:

NOTE: There is a requirement to record Site Notes for boundary types B11-B14.

Site Quality: Please give a personal account of the site quality. Use the criteria provided in the box below as a guide and supply any additional comments as Site Notes. List the note numbers here:

Naturalness
Size
Diversity
Species rarity
Habitat rarity
Typicality
Scenic value
General

In your view should the site be designated as an NHA? Yes ☐ No ☐ If Yes, then do you consider the site is of

LOCAL ☐ REGIONAL ☐ NATIONAL ☐ INTERNATIONAL ☐ importance?

General site description: If the details of the site are considered inadequate please give a concise site description as a Site Note.
Record the note number here:

Ownership: Do you know the owner(s)/ user(s) of the land within the site boundary? Yes ☐ No ☐

If Yes, please indicate ownership boundaries on the Ownership/Access Map and supply details as Ownership/Access Notes. List the note numbers relating to Ownership here:

Access to site:

Did you have physical access difficulties? Yes ☐ No ☐

If Yes, please supply details as Ownership/Access Notes and list the note numbers here:

Please indicate advised access points on the Ownership/Access Map using the following symbol: 

Did you have permission difficulties? Yes ☐ No ☐

If Yes, please supply details as Ownership/Access Notes, including the name and address of the party refusing access, and list the note numbers here:

Site Name:

Site Code:

Landuse:

Please tick the main landuses within the site boundary.

Then, if possible, indicate whether landuse types are:
1 - Rare (c. <5%); 2 - Occasional (c. 5-20%); 3 - Frequent (c. 21-50%); 4 - Dominant (c. >50%)

- ☐ Arable farming
- ☐ Forestry
- ☐ Meadow - silage
- ☐ - hay
- ☐ - use unknown
- ☐ Grazing - sheep
- ☐ - cattle
- ☐ - other (specify)
- ☐ - grazer unknown
- ☐ Agricultural buildings

- ☐ Airports/Airstrips
- ☐ Boating
- ☐ Fishing
- ☐ Hunting &/or Shooting
- ☐ Golfing
- ☐ Sports pitch

- ☐ Caravans / Camping
- ☐ Horse Riding

- ☐ Amenity management
- ☐ Conservation management

- ☐ Water abstraction
- ☐ Legal dumping

- ☐ Aquaculture
- ☐ Quarrying / Mining
- ☐ Industrial

- ☐ Residential (urban)
- ☐ Residential (scattered)
- ☐ Roads

- ☐ Peat cutting (by hand)
- ☐ Peat cutting (by machine)

- ☐ OTHER ACTIVITIES (please specify)

If none of above apply then tick below:

☐ No noticible activities

Comments on landuse:

Record additional information as Site Notes on the attached sheet and list note numbers here:

Damaging Operations:

If there has been a deterioration in the Scientific Interest of the site since last described, please tick the types of damaging operations responsible and rate the severity of their impact using the following scale: 1 - Not Serious; 2 - Serious; 3 - Very Serious.

Remember, a Site Note is required for each area affected by any of the damaging operations below.
Please mark damaged area(s) on the 6" Site Map with a dashed line and assign the appropriate note number.

- ☐ Coastal infilling or reclamation
- ☐ Wetland infilling
- ☐ Agricultural improvement
- ☐ Clearance of scrub
- ☐ Hedgerow removal
- ☐ Felling of native or mixed woodland
- ☐ Drainage
- ☐ Modifications to water courses

- ☐ Grazing
- ☐ Mowing / Cutting
- ☐ Burning
- ☐ Application of fertilizers
- ☐ Application of pesticides

- ☐ Bait digging
- ☐ Hunting and fishing
- ☐ Golfing
- ☐ Camping / Caravanning
- ☐ Other recreation

- ☐ Littering
- ☐ Dumping
- ☐ Building / Civil Engineering
- ☐ Water polluting operations

- ☐ Aquaculture

- ☐ Peat cutting, hand
- ☐ Peat cutting, mechanical
- ☐ Inland mineral extraction
- ☐ Removal of beach material
- ☐ Collection of biological material
- ☐ Collection of geological material

- ☐ Introduction of exotic species
- ☐ Natural spread of unwanted species
- ☐ Afforestation

- ☐ OTHER (Please specify)

Comments on damaging operations:

If none of the above apply then tick below:

☐ No observable damaging operations

Please record Site Notes on the attached sheet and list note numbers here:-

Office Card 1

Site Name:

Site Code:

Survey Notes:

Threats:

Please tick the types of threats affecting the site and record the note numbers after the threat type:

- ☐ Coastal infilling or reclamation
- ☐ Wetland infilling
- ☐ Agricultural improvement
- ☐ Clearance of scrub
- ☐ Hedgerow removal
- ☐ Felling of native or mixed woodland
- ☐ Drainage
- ☐ Modifications to water courses

- ☐ Grazing
- ☐ Mowing / Cutting
- ☐ Burning
- ☐ Application of fertilizers
- ☐ Application of pesticides

- ☐ Bait digging
- ☐ Hunting and fishing
- ☐ Golfing
- ☐ Camping / Caravanning
- ☐ Other recreation

- ☐ Littering
- ☐ Dumping
- ☐ Building / Civil Engineering
- ☐ Water polluting operations

- ☐ Aquaculture

- ☐ Peat cutting, hand
- ☐ Peat cutting, mechanical
- ☐ Inland mineral extraction
- ☐ Removal of beach material
- ☐ Collection of biological material
- ☐ Collection of geological material

- ☐ Introduction of exotic species
- ☐ Natural spread of unwanted species
- ☐ Afforestation

- ☐ OTHER (Please specify)

If none of the above apply then tick below:

- ☐ No known threats

Current Site Status:
(Please choose one)

- Confirmed NHA ☐
- Subsite of NHA ☐
- Non-NHA: Proposed NHA ☐
- Non-NHA: Confirmed ☐
- Non NHA: Pending Consultation ☐

Map(s) & Details despatched for digitising? ☐ (Y/N)

Date: _____

Photographs filed? ☐ (Tick)

Negatives filed? ☐ (Tick)

Film Reference Number(s): _____

Return checked by: _____ Date: _____

Site Inventory - 1:10,560 (6") Map Boundary Check

Office Card 2

Site Name:

Site Code:

Boundary version:

Boundary: Prepared by: Date:

Checked by: Date:

Approved by: Date:
(optional)

Number of polygons: ____

Boundary polygon(s) complete? ☐ (Y/N)

Further boundary survey recommended? ☐ (Y/N)

Boundary source:
(Choose 1 or more)

- Field survey - ecologists ☐
- Field survey - rangers ☐
- Sighted - otherwise unchecked ☐
- Analytical Plotter - Stereo pairs ☐
- Hand drawn from oblique photos ☐
- Hand drawn from vertical photos ☐
- In-house boundary ☐
- Original boundary - unchecked ☐
- External source ☐

Boundary History:

Site Name:

Site Code:

Photograph Notes:

Please mark the position from which each photograph was taken on the Site Map with a "**P**", a sequence number and a direction arrow.
Remember to log details of each photograph in sequence below (P1, P2 ...) noting the frame number of the photograph in brackets and stating the interest in each photograph.

Example: P1(22) *Hand cutting on eastern boundary.*

Survey Appendix 12.
National Fen Survey of Ireland
Survey Equipment Checklist

Selection of field keys (suggested)		**General Equipment**	
BSBI Sedges Key		Field note book; ordinary & waterproof	
Philips Grasses		Clip board x 2 with large clear bag for wet weather work	
Philips Flowering Plants		Red and green fibre tip pens (map work)	
Philips Mosses		Pencil/Pens/Rubber/Sharpener	
Webb et al.			
Watson Mosses		Water samples bottles x 100	
Smith Mosses		Permanent marker to label bottles x 2	
BSBI Umbellifer key		2 m Depth probe rod x1	
		Ice box and ice packs	
Equipment for survey		Bags to collect moss samples x 100	
Compass			
Hand lens		Large plastic boxes x2 to hold field gear & paperwork in survey vehicle	
Camera (digital); Camera Manual			
pH / Conductivity meter			
GPS unit		**Paper Resources**	
Field Binoculars		All Discovery Maps for County	
		NPWS NFS Guidelines Manual	
Laboratory Equipment		NPWS NHA Survey Manual	
Microscope; slides etc for moss ID		Individual Site Field Packs	
Binocular microscope		Other relevant reports	
Moss bags for reference collection x 200 – blank photocopies		Letter of introduction for landowners	
		NFS Relevé Cards x 150 - blank	
		NFS Site forms x 30 - blank	
		EPA Water Sample sheet x50 - blank	
Electronic Equipment		NPWS NHA Ecologist Site Forms x 50 - blank	
Camera Charger/Additional Battery		NPWS Fossitt Habitat assignment sheets x 100 - blank	
Camera extra SD Card (optional)		NPWS EU Habs Dir Habitat assignment sheets x 50 – blank	
Card reader for PC transfer of images		EU Habs Dir Species assignment sheets x 50 – blank	
External Backup Device for Digital Imagery/ SurveyData		County Council/ NPWS staff contact details – Heritage Officer, Ranger etc.	
Blank CD-R for data backup			
Laptop & charger/ power cable etc.			
		General	
		Wellies/Waders/Walking boots	
		Wet gear/jacket etc.	
		Cap/Scarf	
Optional		Sun tan cream	
Digital/Tape recorder for field notes (optional)		Bug spray	
Trowel		Drivers licence	
		First Aid box	

National Fen Survey of Ireland

Survey Appendix 13. Fen flora checklist, with species name & code number, species abbreviations as used on NFS Releve Card, together with English species names and previous synonyms

Species Code	Abbreviation	Species full name	English Names	Latin Synonyms
001	Agros can	Agrostis canina	Velvet Bent	
002	Agrost stol	Agrostis stolonifera	Creeping Bent Grass	
233	Algae	Algae	Algae	
003	Alisma pl aq	Alisma plantago aquatica	Water-plantain	
004	Alnus glut	Alnus glutinosa	Alder	
005	Alop genic	Alopecurus geniculatus	Marsh Foxtail	
006	Anag tenella	Anagallis tenella	Bog Pimpernel	
180	Aneura ping	Aneura pinguis	Liverwort	Riccardia pinguis
007	Angel sylv	Angelica sylvestris	Angelica	
008	Anthox od	Anthoxanthum odoratum	Sweet Vernal Grass	
009	Apium inunda	Apium inundatum	Lesser Marshwort	
010	Apium nodi	Apium nodiflorum	Fool's Water Cress	
246	Arrhen elatius	Arrhenatherum elatius	False Oat-grass	
242	Athyrium f-f	Athyrium filix-femina	Lady Fern	
181	Aulocom pal	Aulacomnium palustre	Moss	
011	Berula erec	Berula erecta	Lesser Water-parsnip	
012	Betula pub	Betula pubescens	Birch	
013	Bidens cer	Bidens cerua	Nodding bur-marigold	
014	Bidens tripar	Bidens tripartia	Trifid bur-marigold	
182	Brachy riv	Brachythecium rivulare	Moss	
015	Briza med	Briza media	Quaking Grass	
183	Bry pseudo	Bryum pseudotriquetrum	Moss	
186	Call cusp	Calliergonella cuspidata	Spear Moss	Calliergon or Arcocladium cuspidatum
184	Call gig	Calliergon giganteum	Moss	Acrocladium giganteum
185	Call stram	Calliergon stramineum	Moss	
016	Callitrich stag	Callitriche stagnalis	Common water-starwort	
017	Calluna vul	Calluna vulgaris	Ling Heather	
018	Caltha pal	Caltha palustris	Marsh Marigold, Kingcup	
187	Calyp muell	Calypogeia muelleriana	Liverwort	Calypogeia muellerana
188	Camp stell	Campylium stellatum	Moss	
019	Cardam pra	Cardamine pratensis	Lady's Smock	
247	Carex acutifor	Carex acutiformis	Lesser Pond Sedge	
034	Carex brach	Carex viridula ssp. brachyrhyncha	Long-stalked Yellow Sedge	Carex lepidocarpa
020	Carex curta	Carex curta	White Sedge	
021	Carex diand	Carex diandra	Lesser Tussock Sedge	
022	Carex dioic	Carex dioica	Dioecious Sedge	
023	Carex disti	Carex disticha	Brown Sedge	
024	Carex echin	Carex echinata	Star Sedge	
025	Carex flac	Carex flacca	Glaucous Sedge	
026	Carex hos	Carex hostiana	Tawny Sedge	
027	Carex lasio	Carex lasiocarpa	Slender Sedge	
028	Carex limosa	Carex limosa	Bog Sedge	
029	Carex nigra	Carex nigra	Common Sedge	
035	Carex oed	Carex viridula ssp. oedocarpa	Common Yellow Sedge	Carex demissa
031	Carex pancl	Carex paniculata	Greater Tussock Sedge	
030	Carex panic	Carex panicea	Carnation Sedge	
032	Carex pulica	Carex pulicaris	Flea Sedge	
033	Carex ros	Carex rostrata	Bottle Sedge	
036	Carex virid	Carex viridula ssp. viridula	Small-fruited Yellow Sedge	C. serotina/C. oederi
037	Cent nigra	Centaurea nigra	Blackheads	
265	Cepahaloz spp	Cephaloziella spp.	Liverwort	
038	Cerast font	Cerastium fontanum	Common mouse-ear	
039	Chara spp	Chara spp	Stoneowrt	
040	Cicuta viro	Cicuta virosa	Cowbane	
189	Cinc font	Cinclidotus fontinaloides	Moss	

041	Cirsium dis	Cirsium dissectum	Meadow Thistle, Fen Thistle	
042	Cirsium pal	Cirsium palustre	Marsh Thistle	
043	Cladium mar	Cladium mariscus	Saw Sedge	
190	Cladop fluit	Cladopodiella fluitans	Liverwort	Cephalozia fluitans
191	Clim dend	Climacium dendroides	Moss	
192	Craton filicin	Cratoneuron filicinum	Moss	Amblystegium filicinum
260	Crepis palud	Crepis paludosa	Marsh Hawk's-beard	
193	Ctenid moll	Ctenidium molluscum	Moss	
044	Dactlyor incar	Dactylorhiza incarnata	Marsh Orchid	
045	Dactlyor macul	Dactylorhiza maculata	Heath Spotted-orchid	
046	Dactlyor maj	Dactylorhiza majalis	Broad-leaved Marsh-orchid	
047	Dactyl glom	Dactylus glomerata	Cock's-foot	
048	Descham caes	Deschampsia caespitosa	Tufted hair-grass	
194	Dicran scop	Dicranum scoparium	Moss	
195	Drep cosson	Drepanocladus cossonii	Moss	Drepanocladus intermedius
197	Drep revolv	Drepanocladus revolvens	Moss	
266	Drep uncinat	Drepanocladus uncinatus	Moss	
049	Drosera rot	Drosera rotundifolia	Round-leaved Sundew	
050	Dryopt affin	Dryopteris affinis	Scaly male-fern	
051	Dryopt carth	Dryopteris carthusiana	Narrow buckler-fern	
052	Dryopt fx-ma	Dryopteris felix-mas	Male-fern	
053	Eleoch mult	Eleocharis multicaulis	Many stalked Spike-rush	
054	Eleoch pal	Eleocharis palustris	Common Spike-rush	
055	Eleoch quin	Eleocharis quinqueflora	Few-flowered Spike-rush	
056	Elodea can	Elodea canadensis	Canadian Water-weed	
057	Epilob hirs	Epilobium hirsutum	Great Willowherb	
058	Epilob obscur	Epilobium obscurum	Short-fruited Willowherb	
059	Epilob palu	Epilobium palustre	Marsh Willowherb	
060	Epilob parvi	Epilobium parviflorum	Hoary Willowherb	
061	Epipactis pal	Epipactis palustris	Marsh Helleborine	
062	Equis fluv	Equisetum fluviatile	Water Horsetail	
063	Equis pal	Equisetum palustre	Marsh Horsetail	
064	Equis varie	Equisetum variegatum	Variegated Horsetail	
065	Erica tet	Erica tetralix	Cross-leaved Heath	
066	Erioph ang	Eriophorum angustifolium	Many-headed Bog Cotton	
067	Erioph grac	Eriophorum gracile	Slender Cotton Grass	
068	Erioph lat	Eriophorum latifolium	Broad-leaved Cotton Grass	
069	Erioph vag	Eriophorum vaginatum	Single-headed Bog Cotton	
198	Euclad vertic	Eucladium verticillatum	Moss	
070	Eupat cann	Eupatorium cannabinum	Hemp Agrimony	
199	Eurhyn prae	Eurhynchium praelongum	Moss	
071	Fest arund	Festuca arundinacea	Tall fescue	
072	Fest rub	Festuca rubra	Red Fescue	
073	Filipend ulm	Filipendula ulmaria	Meadowsweet	
200	Fiss adian	Fissidens adianthoides	Moss	
201	Font anti	Fontinalis antipyretica	Moss	
249	Fraxinus excel	Fraxinus excelsior	Ash	
074	Galium pal	Galium palustre	Common Marsh-bedstraw	
075	Galium sax	Galium saxatile	Heath Bedstraw	
076	Galium ulig	Galium uliginosum	Fen Bedstraw	
240	Ger robert	Geranium robertianum	Herb Robert	
077	Glyceria fluit	Glyceria fluitans	Float sweet-grass	
078	Glyceria not	Glyceria notata	Sweet-grass	
202	Hamat verni	Hamatocaulis vernicosus	Moss	Drepanocladus vernicosus
079	Hamm paludo	Hammarbya palusdosa	Bog Orchid	
080	Hippuris	Hippuris vulgaris	Mare's-tail	
081	Holcus lan	Holcus lanatus	Yorhshire Fog	
082	Hydrocot vul	Hydrocotyle vulgaris	Marsh Pennywort	
203	Hyloc splend	Hylocomium splendens	Red Feather Moss	
236	Hyp cup v res	Hypnum cupressiforme var. resupinatum	Moss	
083	Hyperic elod	Hypericum elodes	Marsh St John's-Wort	
084	Hyperic tetrap	Hypericum tetrapterum	Square stalked St John's-Wort	

085	Hypoch rad	Hypochoeris radicata	Cat's Ear	
086	Iris psuedo	Iris pseudacorus	Flag Iris	
087	Juncus acuti	Juncus acutiflorus	Sharp-flowered Rush	
088	Juncus artic	Juncus articulatus	Jointed Rush	
089	Juncus bulb	Juncus bulbosus	Bulbous Rush	
235	Juncus cong	Juncus conglomeratus	Compact Rush	
090	Juncus eff	Juncus effusus	Soft Rush	
091	Juncus subn	Juncus subnodulosus	Blunt-flowered Rush	
248	Lathyrus mon	Lathyrus montanus	Bitter-vetch	
092	Lemna min	Lemna minor	Common Duckweed	
093	Lemna tri	Lemna trisulca	Ivy-leaved Duckweed	
094	Leont autum	Leontodon autumnalis	Autumn Hawkbit	
095	Littor unifl	Littorella uniflora	Shoreweed	
264	Lophoc bident	Lophocolea bidentata	Liverwort	
096	Lotus ulig	Lotus uliginosus	Greater Bird-foot-trefoil	
097	Luzula camp	Luzula campestris	Field wood-rush	
098	Luzula mult	Luzula multiflora	Heath wood-rush	
100	Lycopus eu	Lycopus europaeus	Gipsywort	
099	Lynchnis flos	Lychnis flos-cuculi	Ragged Robin	
101	Lysimach nem	Lysimachia nemorum	Yellow Pimpernel	
102	Lythrum sal	Lythrum salicaria	Purple Loosestrife	
257	Marchant poly	Marchantia polymorpha	Liverwort	
103	Mentha aq	Mentha aquatica	Water Mint	
104	Menyanthes	Menyanthes trifoliata	Bog Bean	
105	Molinia	Molinia caerulea	Purple Moor Grass	
258	Mylia anom	Mylia anomala	Liverwort	
106	Myosot laxa	Myosotis laxa	Tufted forget-me-not	
107	Myosot scor	Myosotis scorpioides	Water forget-me-not	
267	Myostis secund	Myosotis secunda	Creeping forget-me-not	
108	Myrica gale	Myrica gale	Bog Myrtle	
109	Myrioph alter	Myriophyllum alterniflorum	Alternate water-milfoil	
110	Myrioph spic	Myriophyllum spicatum	Spiked water-milfoil	
111	Nardus stricta	Nardus stricta	Mat-grass	
112	Narth ossi	Narthecium ossifragum	Bog Asphodel, Brittle Bones	
113	Nastur off	Nasturtium officinale	Water-cress	
114	Nuphar lut	Nuphar lutea	Yellow water lily	
115	Nymph alba	Nymphaea alba	White water lily	
116	Oenanth aq	Oenanthe aquatica	Fine-leaved water-dropwort	
117	Oenanth croc	Oenanthe crocata	Hemlock water-dropwort	
118	Osmunda	Osmunda regalis	Royal Fern	
205	Palust co v co	Palustriella commutata var commutata	Moss	Cratoneuron commutatum var commutatum
206	Palust co v fa	Palustriella commutata var falcata	Moss	Cratoneuron commutatum var falcata
204	Palust comm	Palustriella commutata	Moss	Cratoneuron commutatum
119	Parnassia pal	Parnassia palustris	Grass of Parnassus	
120	Pedic palust	Pedicularis palustris	Marsh Lousewort	
207	Pellia epi	Pellia epiphylla	Lousewort	
121	Phalar arund	Phalaris arundinacea	Reed Canary-grass	
208	Philon calc	Philonotis calcarea	Moss	
251	Phleum prat	Phleum pratense	Timothy	
122	Phragmites	Phragmites australis	Common Reed	
256	Picea spp	Picea sp	Spruce	
123	Pinguic vul	Pinguicula vulgaris	Butterwort	
255	Pinus syl	Pinus sylvestris	Scots Pine	
238	Plag rost	Plagiomnium rostratum	Moss	
209	Plagio aff	Plagiomnium affine	Moss	Mnium affine
210	Plagio ellip	Plagiomnium ellipticum	Moss	
124	Plantago lan	Plantago lanceolata	Plantain	
262	Pleuroz schreb	Pleurozium schreberi	Moss	
125	Poa prat	Poa pratensis	Smooth meadow-grass	
126	Poa triv	Poa trivialis	Rough meadow-grass	
127	Polygala serp	Polygala serpyllifolia	Milkwort	
128	Polygo amph	Polygonum amphibium	Amphibious bistort	
129	Polygo hydro	Polygonum hydropiper	Water-pepper	
130	Polyt comm	Polytrichum commune	Common Hair-moss	

139	Pot erecta	Potentilla erecta	Tormentil	
140	Pot palust	Potentilla palustris	Marsh cinquefoil	
137	Potam poly	Potamogeton polygonifolius	Bog Pondweed	
131	Potamo berch	Potamogeton berchtoldii	Small Pondweed	
132	Potamo color	Potamogeton coloratus	Fen Pondweed	
133	Potamo crisp	Potamogeton crispus	Curled Pondweed	
134	Potamo lucen	Potamogeton lucens	Shining Pondweed	
138	Potamo natan	Potamogeton natans	Broad-leaved Pondweed	
135	Potamo obtus	Potamogeton obtusifolius	Blunt-leaved Pondweed	
136	Potamo perfol	Potamogeton perfoliatus	Perfoliate Pondweed	
268	Potent anser	Potentilla anserine	Silverweed	
245	Pterid aquil	Pteridium aquilinum	Bracken	
252	Ranunc acris	Ranunculus acris	Meadow Buttercup	
141	Ranunc flam	Ranunculus flammula	Lesser Spearwort	
142	Ranunc ling	Ranunculus lingua	Greater Spearwort	
263	Ranunc rep	Ranunculus repens	Creeping Buttercup	
212	Rhizo punc	Rhizomnium punctatum	Moss	Mnium punctatum
143	Rhynch alba	Rhynchospora alba	White beak-sedge	
213	Rhytid squar	Rhytidiadelphus squarrosus	Moss	
214	Rhytid triq	Rhytidiadelphus triquetrus	Moss	
261	Riccardia ping	Riccardia pinguis	Liverwort	
144	Rorrip amph	Rorippa amphibia	Great yellow-cress	
145	Rorrip palus	Rorippa palustris	Marsh yellow-cress	
244	Rubus frut agg	Rubus fructicosus agg	Bramble; Blackberry	
146	Rumex atosa	Rumex acetosa	Common Sorrel	
147	Rumex cong	Rumex conglomeratus	Clustered Dock	
148	Rumex hydro	Rumex hydrolapathum	Water Dock	
149	Salix aur	Salix aurita	Eared Willow	
150	Salix cin	Salix cinerea ssp oleifolia	Grey Willow	Salix cinerea var. atrocinerea
151	Salix frag	Salix fragilis	Crack Willow	
152	Salix rep	Salix repens	Creeping Willow	
153	Salix vim	Salix viminalis	Osier	
154	Saxifrag aizo	Saxifraga aizoides	Yellow Mountain Saxifrage	
259	Scapania undu	Scapania undulata	Liverwort	
155	Schoeno lac	Schoenoplectus lacustris	Common club-rush	Scirpus lacustris
156	Schoenus	Schoenus nigricans	Black Bog Rush	
211	Sclero pur	Scleropodium purum	Moss	Pseudoscleropodium purum
216	Scorp scorp	Scorpidium scorpioides	Moss	
157	Senecio aq	Senecio aquaticus	Marsh Ragwort	
237	Solidago vir	Solidago virgaurea	Goldenrod	
158	Sparg erec	Sparganium erectum	Branched Bur-reed	
159	Sparg min	Sparganium minimum	Least Bur-reed	
218	Sphag angust	Sphagnum angustifolium	Bog Moss	Sphagnum recurvum var. tenue
241	Sphag cap	Sphagnum capillifolium	Bog Moss	
219	Sphag cusp	Sphagnum cuspidatum	Bog Moss	
220	Sphag dent	Sphagnum denticulatum	Bog Moss	Sphagnum auricultaum var auriculatum
221	Sphag fallax	Sphagnum fallax	Bog Moss	Sphagnum apiculatum Sphagnum recurvum var. mucronatum
217	Sphag fimb	Sphagnum fimbriatum	Bog Moss	
222	Sphag pal	Sphagnum palustre	Bog Moss	
223	Sphag papil	Sphagnum papillosum	Bog Moss	
224	Sphag recurv	Sphagnum recurvum	Bog Moss	
225	Sphag ripar	Sphagnum riparium	Bog Moss	
226	Sphag squarr	Sphagnum squarrosum	Bog Moss	
227	Sphag subnit	Sphagnum subnitens	Bog Moss	
228	Sphag subsec	Sphagnum subsecundum	Bog Moss	
229	Sphag teres	Sphagnum teres	Bog Moss	
160	Stellar gram	Stellaria graminea	Lesser Stichwort	
161	Stellar pal	Stellaria palustris	Marsh Stichwort	
162	Stellar ulig	Stellaria uliginosa	Bog Stichwort	
163	Succisa prat	Succisa pratensis	Devils Bit Scabious	
164	Thelyp pal	Thelpteris palustris	Marsh Fern	
230	Thuid tamar	Thuidium tamariscinum	Moss	

231	Toment nit	Tomentypnum nitens	Moss	Homalothecium nitens
269	Trifol repens	Trifolium repens	White Clover	
165	Trigloc pal	Triglochin palustris	Arrow Grass	
166	Typh ang	Typha angustifolia	Lesser Bulrush	
167	Typha lat	Typha latifolia	Reed mace, Bulrush	
243	Ulex europ	Ulex europaeus	Gorse	
250	Urtica dioica	Urtica dioica	Nettle	
168	Utric austral	Utricularia australis	Bladderwort	
169	Utric inter	Utricularia intermedia	Intermediate Bladderwort	
170	Utric minor	Utricularia minor	Lesser Bladderwort	
171	Utric vulg	Utricularia vulgaris	Greater Bladderwort	
172	Vaccin oxy	Vaccinium oxycoccus	Cranberry	
173	Valeria offic	Valeriana officinalis	Wild Valerian	
174	Veron an-aq	Veronica anagallis-aquatica	Blue water-speedwell	
175	Veron becca	Veronica beccabunga	Brooklime	
176	Veron caten	Veronica catenata	Pink water-speedwell	
177	Veron scutel	Veronica scutellata	Marsh speedwell	
178	Vicia cracca	Vicia cracca	Tufted Vetch	
253	Vicia sepium	Vicia sepium	Bush vetch	
179	Viola pal	Viola palustris	Marsh Violet	
232	Wanrst exan	Warnstorfia exannulata	Moss	Drepanocladus exannulatus var rotea; Drepanocladus exannulatus
234	*Vacant*			
270	*Vacant*			
254	*Vacant*			

Continue to add species as required, and increment code numbers by one.
Additions should be communicated to project co-ordinator.

12 NFS List of Results Appendices

Results Document templates use ResDoc naming convention, on the CD Rom accompanying this report.

Results Appendix 1.

Sample of Completed NFS Site Synopsis Report

Contents:

1. Site synopsis report as printed from NFS Database
2. GIS Aerial Photograph of site
3. Hand drawn Six inch map with site notes marked
4. GIS Six inch map with site notes marked
5. GIS Final Habitat map
6. Ground Photographs with captions

National Fen Survey of Ireland Database - Site Synopsis

Site Name: AGHNAMULLEN FEN **Site Code:** 002904

Current Conservaton Designations: Undesignated site

National Grid Reference: H 684 172 **County:** MO **Total Site Area (ha):** 8.2

Discovery Grid Ref: 268433 317194 **Vice County:** H32

6" map No. 23 **Discovery map No.** 28A **Air photograph No.** 1422C

NFS Overall Site Results Section

NFS Brief site description

Lake site, which was a former mill pond, with area of transition mire with *Carex diandra* at north-eastern end. Very undisturbed site with excellent habitat diversity including transition mire, poor fen, lake, reed beds, wet scrub woodland and adjacent hazel woodland on drumlin.

Site conservation evaluation based on NFS

☐ A Rating: Recommended for SAC status (International)	☐ C Rating: High local conservation value
☒ B Rating: Recommended for NHA status (National)	☐ D Rating: Moderate local conservation value
☐ C + Rating: County conservation value	☐ E Rating: Low local conservation value

Fen Survey evaluation based on NFS

Diverse site with good examples of transition mire and mesotrophic lake and associated wetland habitats together with adjacent hazel woodland.

Fen Survey Conservation Recommendations based on NFS

Site should be designated and managed as a Natural Heritage Area.

NFS Date of Survey:
23 May 2007

NFS Surveyor Names:
Peter Foss & Patrick Crushell

NFS Survey Data Summary:
New NHA site card created
Site boundary defined
Releve data collected
Water chemistry samples collected
Detailed site survey (NFS) undertaken

Main Habitats on Site: LAKE, TRANSITION MIRE & WOODLAND

Fossitt habitat types present within site based on NFS:

FL Lakes & Ponds
FS1 Reed and large sedge swamps
FW4 Drainage ditches
GM1 Marsh
GS4 Wet grassland
PF2 Poor fen and flush
PF3 Transition mire & quaking bog
WL1 Hedgerows
WN2 Oak-ash-hazel woodland
WN6 Wet willow-alder-ash woodland
WS1 Scrub

NFS Fen Habitat Type(s) on site:

- ☐ Cladium fen 7210/PF1
- ☐ Alkaline fen 7230/PF1
- ☒ Poor fen/PF2
- ☒ Transition Mire 7140/PF3
- ☐ Petrifying Spring 7220/FP1
- ☐ Non calcareous spring/FP2

NFS Fen Habitat Extent on site (ha):

* Cladium Fen 7210	
Alkaline fen 7230	
Poor fens	.001
Transition Mire 7140	2.14
* Petrifying Springs 7220	
Non Calcareous Springs	

Total Fen Area (sum of all fen areas)

2.141

General NFS Results Section

Townland Names: Aghnamullen, Tamlet, Mullanary Glebe

River Catchment: Avaghon Lake - River Dromore - River Annalee

Topography: Inter drumlin lake site with transition mire.

Solid geology: Silurian Metasediments and Volcanics

Quaternary deposits: Cutover raised bog

Hyrdology: Inflow and outflow at the southern end of the lake. Remaining site receives surface runoff from surrounding high drumlins.

Releve numbers: 2904-R1; 2904-R2

Photographic numbers: DSC 49-70

Substrate type: Peat

Substrate stability: > 200

Range Altitude (m):

Range Peat depth (cm):

Range Water depth (cm): At the surface

Water sample number: 2904-W1; 2904-W2

Field pH range:

Field Condictivity range:

NFS Site landuse, impacts, activities and threats

NFS Landuse Within site boundary

Activity	Scale
Grazing - cattle	1 Rare (<5%)
Meadow - silage	1 Rare (<5%)

Fishing	2 Occasional (5-20%)

NFS Surrounding Landuse - Outside site boundary

Meadow - silage
Grazing - cattle
Roads

NFS Impact & Activities Influencing Conservation Status of Site

Intensity of the influence of an activity is rated as A = high, B = medium, C = low influence and D unknown.
Impact is rated as –2 = irreparable negative influence, -1 = reparable negative influence, 0 = neutral, +1= natural positive influence and +2 = strongly managed positive influence.

Activity	Intensity	Influence
140 Grazing	C = low	0 = neutral
220 Leisure fishing	D = unknown	0 = neutral
701 water pollution	D = unknown	- 1 = reparable negative influence

NFS Site Threats

Activity	Note Number(s)
140 Grazing	N2
701 water pollution	N/A

NFS Site Description; Notes and Ground Photograph Captions

NFS Site Synopsis with Fen interest description

Aghnamullen fen is a former mill pond located 3 km south west of Ballybay.

The site is very undisturbed and has a good range of semi-natural habitats including transition mire, poor fen, lake, reed beds, wet scrub woodland and hazel woodland on an adjacent drumlin. The lake occurs in a narrow inter drumlin valley which acts as the main catchment for the lake.

The lake is surrounded by a 10-15 m wide reed bed (*Phragmites australis*) edge with *Typha latifolia*. A *Nuphar lutea* floating community occurs into the open water in front of the reed fringe.

Other species found in the reed zone include *Menyanthes trifoliata, Alisma plantago-aquatica, Glyceria fluitans, Filipendula ulmaria, Potentilla palustris, Carex nigra, Equisetum fluviatile, Mentha aquatica,* and *Iris pseudacorus*.

At the north-eastern end of the lake, and to a lesser extent at the western edge of the lake, an extensive area of quaking scraw has developed a transition mire community with *Carex diandra* with large intervening pools dominated by *Menyanthes trifoliata* and abundant *Carex rostrata*.

Within the transition mire area, small patches of poor fen / bog vegetation exists where *Sphagnum spp.*, *Eriophorum angustifolium* and *Lychnis flos-cuculi* are common.

Mixed woodland on slopes above the northern end of the lake includes *Corylus avellana* (dominant species), *Crataegus monogyna*, *Salix cinerea*, and *Fraxinus excelsior*.

This site is of high ecological importance in a natural setting displaying a good example of transition mire and poor fen developing adjacent to a lake. The relatively small inter-drumlin catchment surrounding the site should be considered for inclusion within any conservation area to control nutrient inputs to the lake.

NFS Site Notes

N1 Habitat – Reed fringe which occurs around almost the entire shore of the lake and is from 10 to 15 wide. Species in this reed zone include *Typha latifolia, Equisetum fluviatile, Mentha aquatica, Callitriche stagnalis, Carex rostrata, Irish*

pseudacorus, Menyanthes trifoliata, Alisma plantago aquatica, Glyceria fluitans, Filipendula ulmaria, Potentilla palustris and *Carex nigra*.

Nuphar lutea is emergent in the open water in front of reed zone.

N2 Damage – 10-15 m wide area where cattle go to drink from lake and the reed zone has been completely destroyed by trampling.

N3 Habitat – A 15 m wide area of quaking transition mire behind the reed fringing zone of the lake. Peat depth exceeded 2 m. Species recorded include *Carex nigra, C. curta, Caltha palustris, Menyanthes trifoliata, Galium palustre, Cardamine pratensis, Eriophorum angustifolium, Calliergonella cuspidata*.

N4 Habitat – Extensive areas of Carex diandra quaking transition mire area with scattered Willow bushes. Area has an extensive bryophyte layer. Species in the general area include: *Carex nigra, C. curta, C. diandra, C. rostrata, C. panicea, Caltha palustris, Menyanthes trifoliata, Galium palustre, Cardamine pratensis, Hydrocotyle vulgaris, Eriophorum angustifolium, Angelica sylvestris, Lychnis flos-cuculi, Filipendula ulmaria, Cicuta virosa, Equisetum fluviatile, Juncus effusus, Lycopus europaeus, Mentha aquatica, Potentilla palustris, Succisa pratensis, Calliergonella cuspidate.*

See relevé number 2904-R1 & R2 from Monaghan Fen Survey 2007 for species present in the transition mire area with relative cover values.

N5 Habitat – Among the transition fen area large shallow pools dominated by *Menyanthes trifoliata* with *Carex rostrata* commonly occurring and occasional *Hydrocotyle vulgaris*, and *Equisetum fluviatile*. Water often has an oily surface sheen.

N6 Habitat – Woodland on lower slope of hill dominated by *Corylus avellana*. Other species recorded in woodland include *Fraxinus excelsior, Salix cinerea, Crataegus monogyna*.

N7 Habitat – *Ulex europaeus* scrub on rocky outcrops.

N8 Habitat – Improved pasture used for cattle grazing and possibly silage production.

N9 Habitat – Mineral soil and rock outcrops with grassland and *Ulex europaeus* heathland.

N10 Habitat – There is an extensive area of wet woodland behind the reed fringe on the southern shore of the lake. Woodland is dominated by *Salix* spp.

N11 Drainage – Outflow stream from lake.

N12 Habitat – Small area of *Schoenoplectus lacustris* with *Menyanthes trifoliata*. *Carex viridula* spp. *oedocarpa* occurred in this area.

N 13 Habitat – A small area 10 x 10 m dominated by *Sphagnum* spp. with *Eriophorum angustifolium*, *Angelica sylvestris* and *Lychnis flos-cuculi*.

NFS Ground Photographic Notes

DSC 49 – South eastern end of Aghnamullen lake with fringing *Typha latifolia* zone on the southern and northern shore of the lake.

DSC 50 – South eastern end of Aghnamullen lake with fringing *Typha latifolia* zone on the southern shore of the lake, with Willow scrub behind reed fringe and *Ulex europaeus* knoll behind.

DSC 51 – View towards northern end of lake.

DSC 52 – Northern shore of lake at Note 2 where cattle have access to water to drink and trampling has totally removed the *Typha* reed zone.

DSC 53 – Close up view of *Typha latifolia* reed zone around Lake with abundant *Equisetum fluviatile*.

DSC 56 – Small area of quaking transition mire on the northern shore of the lake (Note 3). Emergent *Nuphar lutea* and *Nymphaea alba* in lake.

DSC 58 – *Carex diandra* transition mire at north eastern end of site (Note 3).

DSC 59 – *Carex diandra* transition mire at north eastern end of site (Note 3) with Hazel scrub on ridge behind.

DSC 63 – Close up view of *Carex diandra* transition mire at north eastern end of site (Note 3).

DSC 64 – Close up view of *Carex rostrata* and *Menyanthes trifoliata* pools at north eastern end of site.

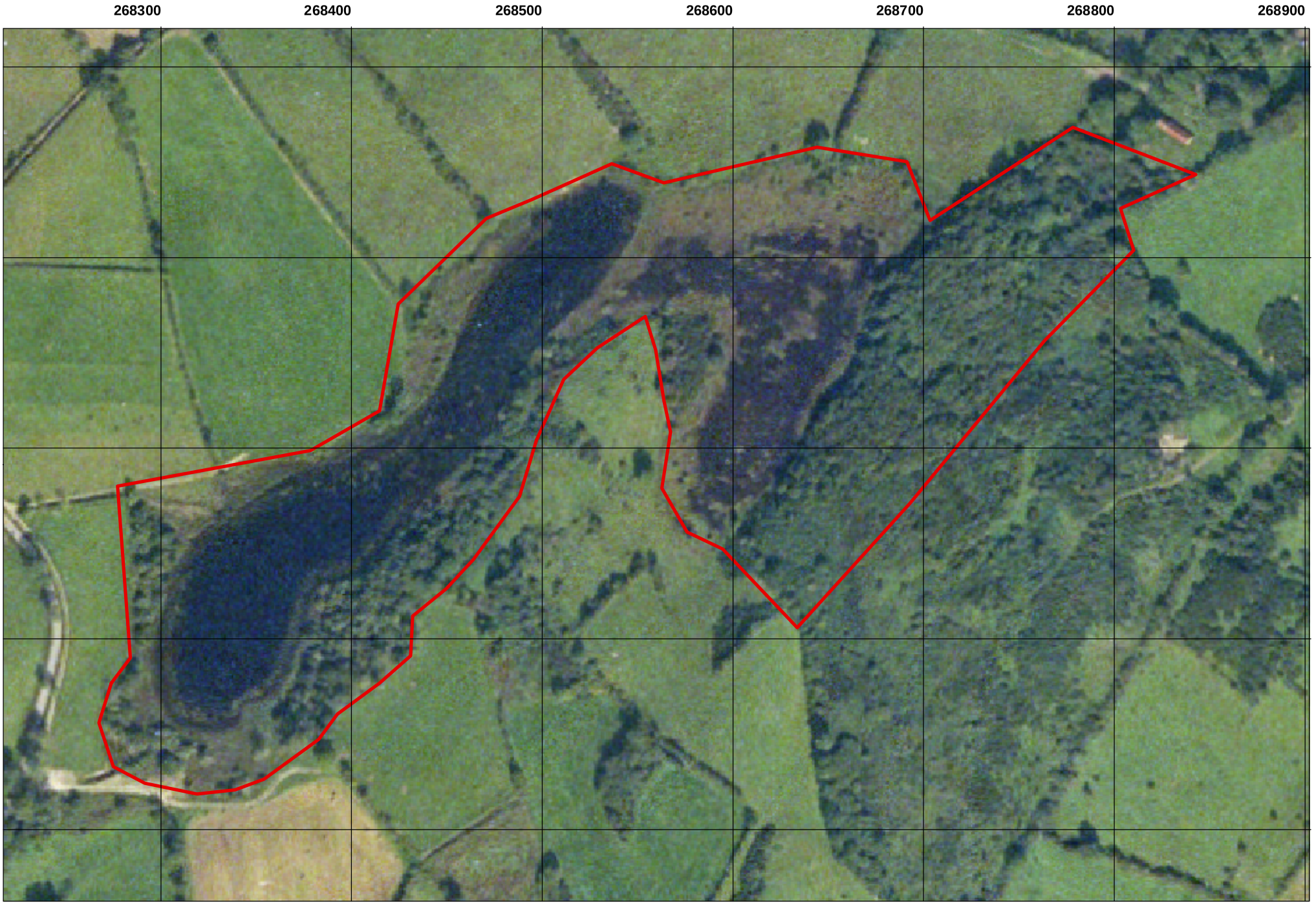
DSC 65 – Close up view of *Menyanthes trifoliata* pools at north eastern end of site.

DSC 66 – *Carex diandra* transition mire at north eastern end of site with Hazel scrub on ridge behind.

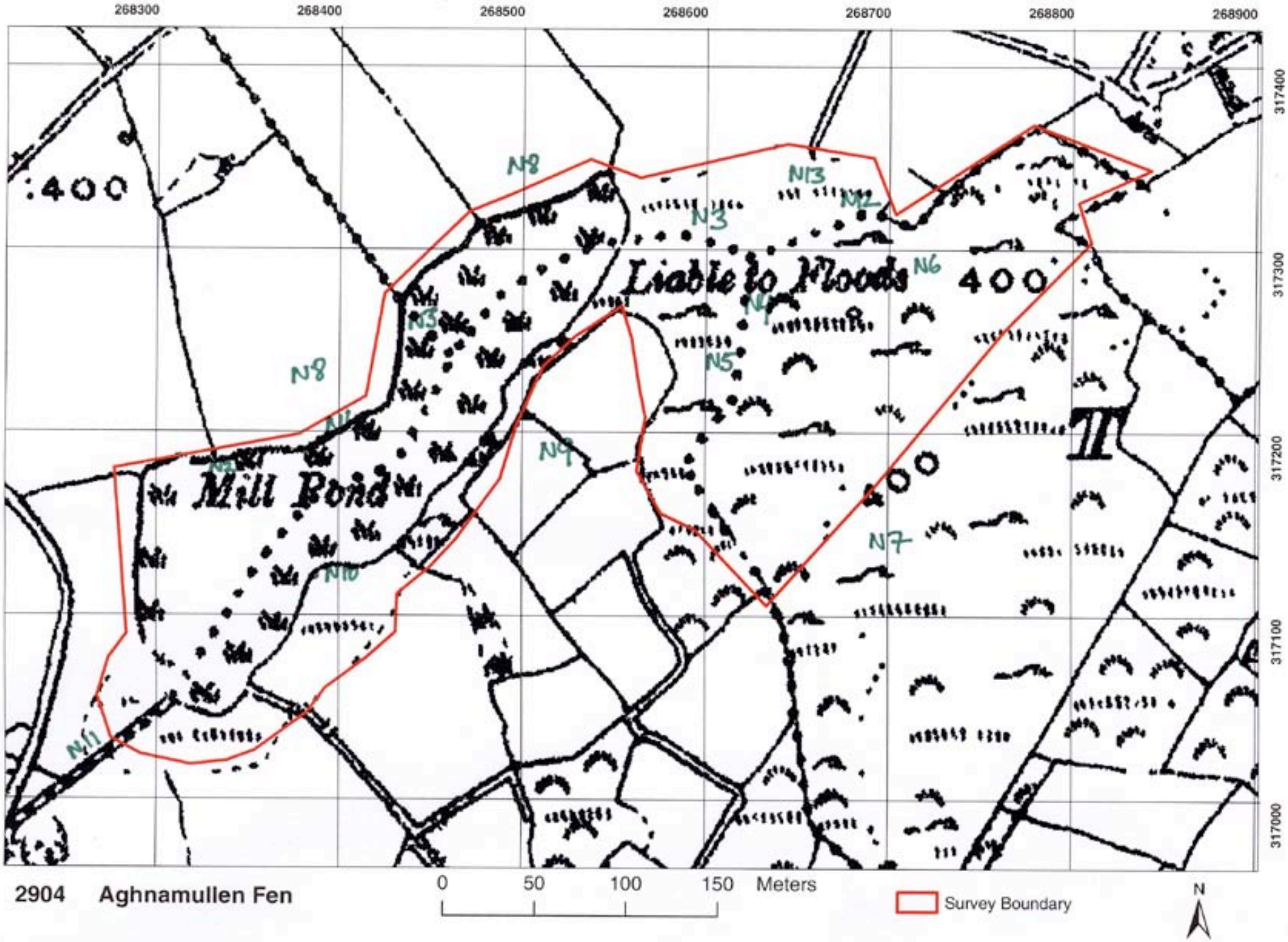
DSC 67 – *Carex diandra* transition mire at north eastern end of site with Hazel scrub on ridge behind and *Menyanthes* pool on RHS.

DSC 69 – *Carex diandra* transition mire at north eastern end of.

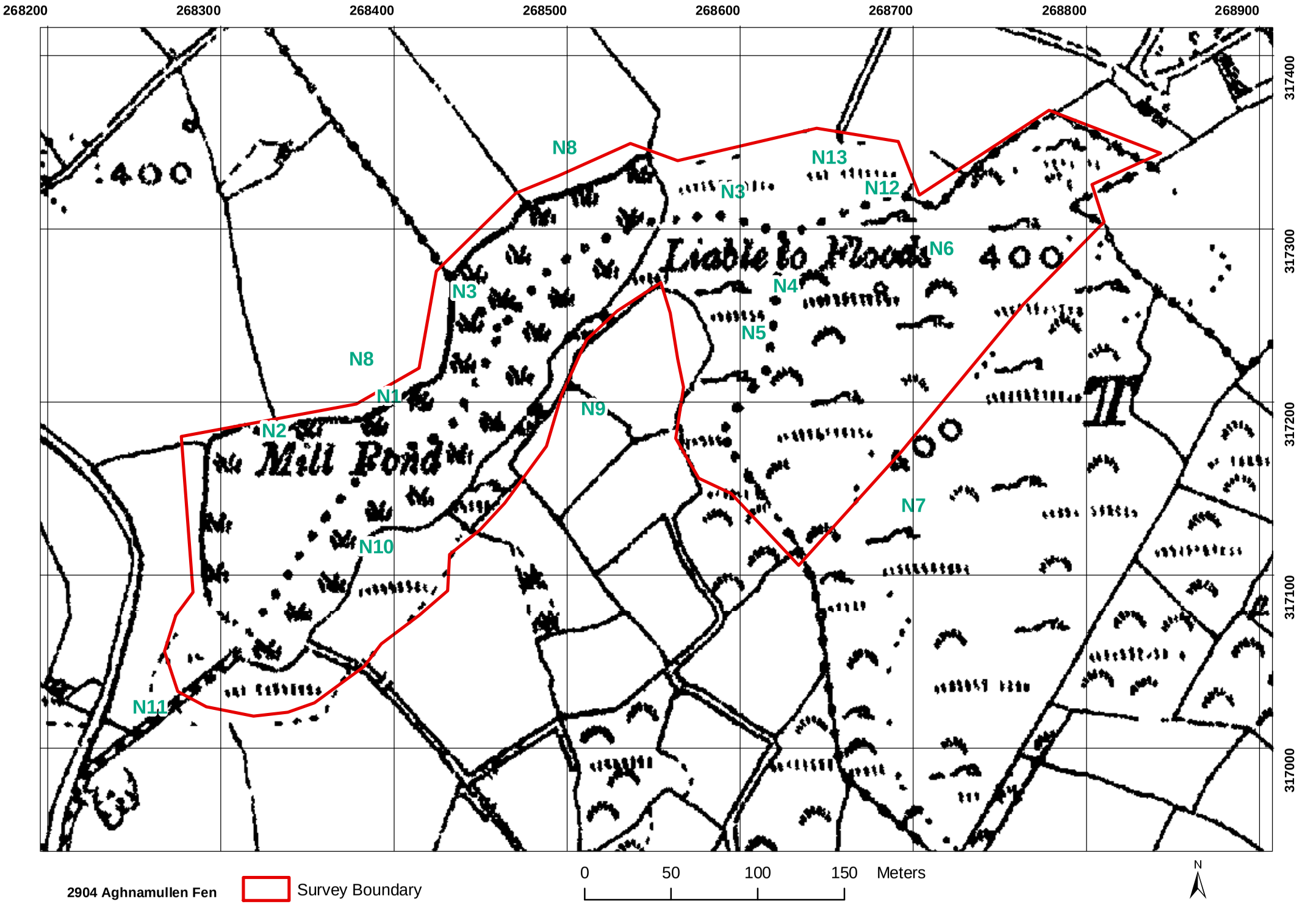
DSC 70 – *Carex diandra* transition mire at north eastern end of site with Hazel scrub on ridge behind, and *Schoenoplectus lacustris* stand in foreground.

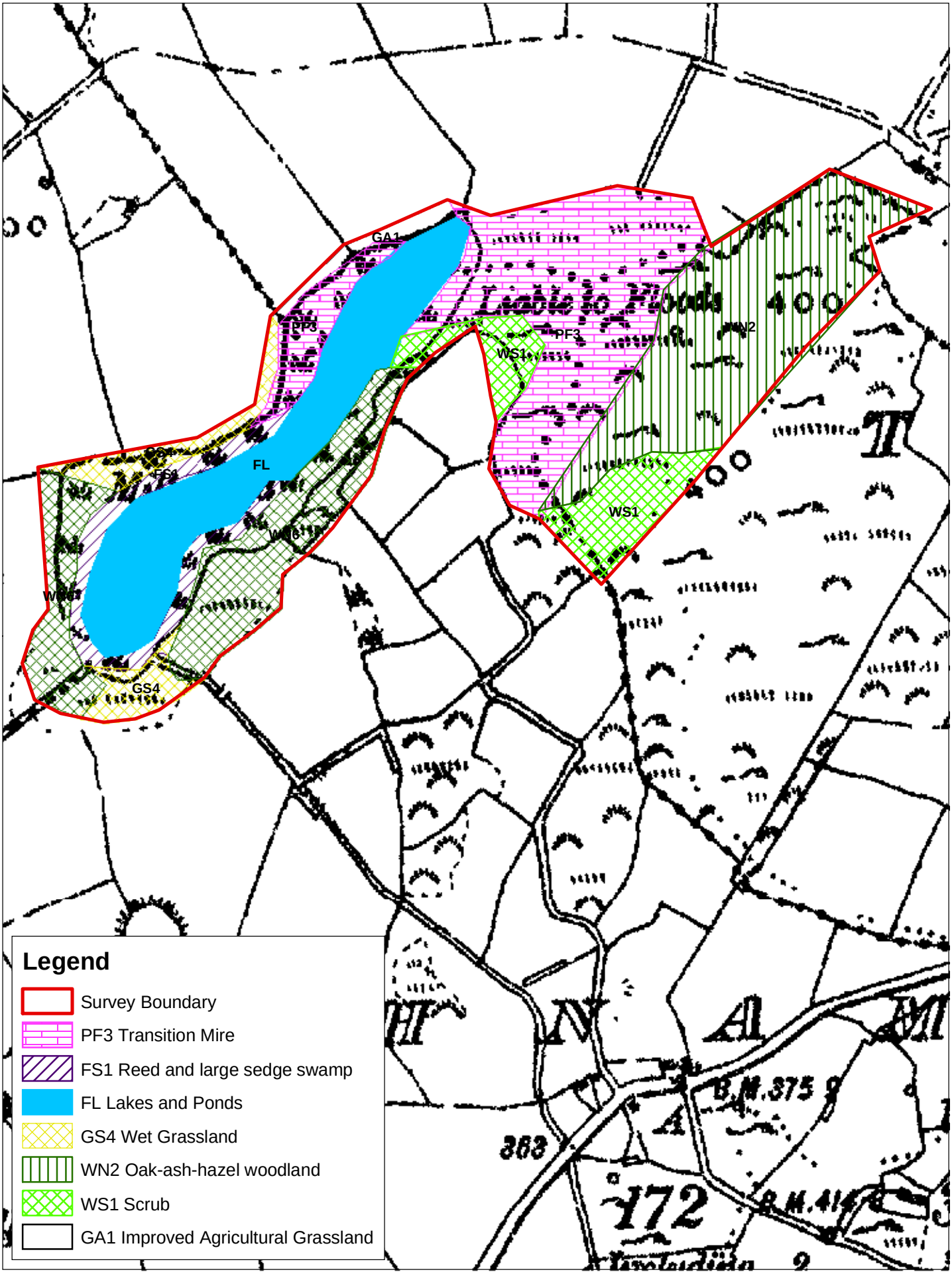


2904 Aghnamullen Fen



2904 Aghnamullen Fen


268200
268300
268400
268500
268600
268700
268800
268900
317400
317300
317200
317100
317000
400
Liable to Floods
Mill Pond
N1
N2
N3
N4
N5
N6
N7
N8
N9
N10
N11
N12
N13
0
50
100
150
Meters
N
2904 Aghnamullen Fen
Survey Boundary



2904 Aghnamullen

Monaghan Fen Survey 2007

Site Name: Aghnamullen

Site Code Number: 2904

Date of survey: 23 May 2007

Surveyed by: Peter Foss & Patrick Crushell

Photographic Descriptions

DSC 49 – South eastern end of Aghnamullen lake with fringing *Typha latifolia* zone on the southern and northern shore of the lake.

DSC 50 – South eastern end of Aghnamullen lake with fringing *Typha latifolia* zone on the southern shore of the lake, with Willow scrub behind reed fringe and *Ulex europaeus* knoll behind.

DSC 51 – View towards northern end of lake.

DSC 52 – Northern shore of lake at Note 2 where cattle have access to water to drink and trampling has totally removed the *Typha* reed zone.

DSC 53 – Close up view of *Typha latifolia* reed zone around Lake with abundant *Equisetum fluviatile.*

DSC 56 – Small area of quaking transition mire on the northern shore of the lake (Note 3). Emergent *Nupar lutea* and *Nymphaea alba* in lake.

DSC 58 – *Carex diandra* transition mire at north eastern end of site (Note 3).

DSC 59 – *Carex diandra* transition mire at north eastern end of site (Note 3) with Hazel scrub on ridge behind.

DSC 63 – Close up view of *Carex diandra* transition mire at north eastern end of site (Note 3).

DSC 64 – Close up view of *Carex rostrata* and *Menyanthes trifoliata* pools at north eastern end of site.

DSC 65 – Close up view of *Menyanthes trifoliata* pools at north eastern end of site.

DSC 66 – *Carex diandra* transition mire at north eastern end of site with Hazel scrub on ridge behind.

DSC 67 – *Carex diandra* transition mire at north eastern end of site with Hazel scrub on ridge behind and Menyanthes pool on RHS.

DSC 69 – *Carex diandra* transition mire at north eastern end of.

DSC 70 – *Carex diandra* transition mire at north eastern end of site with Hazel scrub on ridge behind, and Schoenoplectus lacustris stand in foreground.

DSC_0049.JPG

DSC_0050.JPG

DSC_0051.JPG

DSC_0054.JPG

DSC_0055.JPG

etc.

DSC_0056.JPG

National Fen Survey of Ireland

Results Appendix 2A. Sites surveyed in detail in County (name) with site source, survey status and conservation designation prior to survey on the NFS (year).

Totals 1 7

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
002900	AGHABOY TOWNLAND FEN	Original NPWS FEN Study List	1	31 May 2007	No NHA survey	7.3	H 626 350	Undesignated site	D

National Fen Survey of Ireland

Results Appendix 2B. Sites surveyed in detail in County (name) in (year) with predicted fen types and area, and fen types and total area confirmed following the NFS.

					Total Fen Area:	**4**	**Total Fen Area:**	**0**
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**
002900	AGHABOY TOWNLAND FEN (sample)	7.3	H 620 350	Poor fen PF2	4	No fen on site	0	D

National Fen Survey of Ireland

Results Appendix 3. Sites surveyed in Brief in County (name) in (year) to assess their potential fen interest.

Site Name	Grid Reference	Date Site Surveyed	Site comments/habitat notes	Conservation Designations
AGHABOY LAKE (sample)	H 590 346	9 June 2007	Small inter drumlin lake with fringing *Typha latifolia* edge with emergent *Nuphar lutea*. Edge of lake heavily grazed and grading into wet pasture and then improved grassland. On northern side of the lake a relatively large flat marginal zone is dominated by wet *Juncus effusus* rich grassland. Some infill has been dumped on north-eastern shore. No fen zone present around lake.	Undesignated site

National Fen Survey of Ireland

Results Appendix 4. Un-surveyed sites in County (name) in (year) with potential fen interest.

Site Name	Grid Reference	Date Site Surveyed	Site comments/habitat notes	Conservation Designations
AGHABOY LAKE (sample)	H 590 346	9 June 2007	Small inter drumlin lake with fringing *Typha latifolia* edge with emergent *Nuphar lutea*. Edge of lake heavily grazed and grading into wet pasture and then improved grassland. Potential fen location.	Undesignated site

National Fen Survey of Ireland

Results Appendix 5: Relevé Table of vegetation quadrats collected during the NFS of County (name) in (year).

Domin cover values used: +: single individual – no measurable cover; 1: 1-2 individuals – no measurable cover; 2: several individual
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; 10: 91

Relevé Table No.	0
Size (meters squared)	4
Altitude (m)	100
Slope (degrees)	0
Aspect	na
Water Sample number	W1
Water table height	-20
Field pH	8.07
Field Conductivity	100
Substate type	P
Substrate depth cm	60
Substrate Stability	Q
Total cover %	250
Trees %	0
Shrub %	0
Herb/Grass/Sedge %	90
Bryophytes %	70
Algal %	0
Bare Peat/Soil %	0
Litter%	90
Open Water %	0
Height Herb layer cm	100
Habitat type	CF

	Site name		Killyvilly																	
	Relevé Number	No. Occurrences	1839-R1																	
	Spp. per relevé		22																	
Number	**Species full name**																			
1	Agrostis canina	0																		
2	Agrostis stolonifera	0																		
3	Alisma plantago aquatica	0																		
4	Alnus glutinosa	0																		
7	Angelica sylvestris	1	+																	
8	Anthoxanthum odoratum	0																		
9	Apium inundatum	0																		
12	Betula pubescens	0																		
15	Briza media	1	1																	
17	Calluna vulgaris	0																		
18	Caltha palustris	0																		
19	Cardamine pratensis	0																		
20	Carex curta	0																		
21	Carex diandra	0																		
23	Carex disticha	0																		
24	Carex echinata	0																		
25	Carex flacca	1	1																	
28	Carex limosa	0																		
29	Carex nigra	0																		
30	Carex panicea	1	1																	
31	Carex paniculata	0																		
32	Carex pulicaris	1	+																	
33	Carex rostrata	0																		
34	Carex viridula ssp. brachyrhynch	1	1																	
35	Carex viridula ssp. oedocarpa	0																		
37	Centaurea nigra	0																		
40	Cicuta virosa	0																		

National Fen Survey of Ireland

Results Appendix 6. Laboratory Hydrochemistry data from water samples taken on sites during the NFS of County (name) in (year).

Fen type: PF=Poor Fen; AF=Alkaline fen; TM=Transition Mire; NCS=Non-Calcaeous Spring; PS=Petrifying Spring

EPA Water Sample Code	Site Name	Related Releve Code Number	Species Richness	Water Table Height (cm)	Subsrate Depth (cm)	Subsrate Type	Subsrate Stability	Field pH	Field Conductivity	Fen Type	Ammonia	Total Oxidised Nitrogen	Total Phosphorus	Ortho-Phosphate	Electrical Conductivity	pH	Alkalinity	Sulphate	Calcium	Magnesium	Potassium	Sodium	Iron	Manganese	Copper	Zinc
											mg/l N	mg/l N	mg/l P	mg/l P	µS/cm @25C		mg/l CaCO3	mg/l SO4	mg/l Ca	mg/l	mg/l	mg/l	µg/l	µg/l	µg/l	µg/l
1603_5	ESHBRACK BOG	1603(2)-R1	17	-5	>200	P	Q	6	75	TM	0.08	<0.05	<0.010	<0.02	48	5.7	<12	1	<5.00	0.99	<1	<5.00	702.6	18	<1	2.4
MINIMUM VALUE					30	30	30	30	30		0.03	0.13	0.019	0.02	44	4.5	14	1	5.48	0.97	0.97	5.05	67.1	4.1	2.1	1
MAXIMUM VALUE					200	200	200	200	200		1.49	2.12	1.234	0.25	630	8.2	324	93.3	104.98	10.92	11.24	19.04	54616.5	11359	20.2	263.1
AVERAGE					90.00	90.00	90.00	90.00	90.00		0.23	0.89	0.29	0.07	250.44	6.52	110.61	10.01	40.44	3.56	3.04	8.15	2154.54	772.27	4.80	20.33
Standard Deviation					57.8	58	58	58	58		0.279	1.077	0.2782	0.075	159.9	0.8	82.68	16.378	30.548	1.982	2.309	2.95	7470.85	1989.3	3.58	44.92

National Fen Survey of Ireland

Results Appendix 7: NFS Site Conservation Evaluation of sites surveyed in County (name) in (year).

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

	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
Site Name/ Scoring System Applied				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 not 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 manageme	0 = no scenic/landscape appeal; 5 = high scenic/landscape appeal	0 = site has no value for conservation; 5 = site has high value for conservation
KILROOSKY LOUGH CLUSTER	001786	A	**67**	5	5	3	5	5	5	5	3	5	5	5	3	3	5	5

Results Appendix 8.

NFS - Site Description and Sites Notes

County: (name)

Site Name: (name)

Site Code Number: (code)

Date of survey: (date – format dd/mm/yyyy)

Surveyed by: (surveyor names)

Site Description Brief (max. 200 words)

(enter brief site description)(Sample - Transition mire area occurring on cutover raised bog in an inter drumlin valley. The site is broken into 3 compartments by a third class road off the R180 running in an east to west direction and an access road running northwards from this. The site is densely wooded along the third class road with *Betula pubescens* and *Salix cinerea*. The central more open area of the fen is dominated by *Carex diandra* transition mire with low lying fen patches dominated by *Carex rostrata*.)

Detailed Site Description

(enter detailed site description)

(Sample - Aghnamullen fen is a former mill pond located 3 km south west of Ballybay.

The site is very undisturbed and has a good range of semi-natural habitats including transition mire, poor fen, lake, reed beds, wet scrub woodland and hazel woodland on an adjacent drumlin. The lake occurs in a narrow inter drumlin valley which acts as the main catchment for the lake.

The lake is surrounded by a 10-15 m wide reed bed (*Phragmites australis*) edge with *Typha latifolia*. A *Nuphar lutea* floating community occurs into the open water in front of the reed fringe.

Other species found in the reed zone include *Menyanthes trifoliata, Alisma plantago-aquatica, Glyceria fluitans, Filipendula ulmaria, Potentilla palustris, Carex nigra, Equisetum fluviatile, Mentha aquatica,* and *Iris pseudacorus*.

At the north-eastern end of the lake, and to a lesser extent at the western edge of the lake, an extensive area of quaking scraw has developed a transition mire community with *Carex diandra* with large intervening pools dominated by *Menyanthes trifoliata* and abundant *Carex rostrata*.

Within the transition mire area, small patches of poor fen / bog vegetation exists where *Sphagnum spp.*, *Eriophorum angustifolium* and *Lychnis flos-cuculi* are common.

Mixed woodland on slopes above the northern end of the lake includes *Corylus avellana* (dominant species), *Crataegus monogyna*, *Salix cinerea*, and *Fraxinus excelsior*.

This site is of high ecological importance in a natural setting displaying a good example of transition mire and poor fen developing adjacent to a lake. The relatively small inter-drumlin catchment surrounding the site should be considered for inclusion within any conservation area to control nutrient inputs to the lake.)

Site Notes Section

(enter site survey notes)

(Sample:

N1 Habitat – 257300 332700: Reed fringe which occurs around almost the entire shore of the lake and is from 10 to 15 wide. Species in this reed zone include *Typha latifolia, Equisetum fluviatile, Mentha aquatica, Callitriche stagnalis, Carex rostrata, Irish pseudacorus, Menyanthes trifoliata, Alisma plantago aquatica, Glyceria fluitans, Filipendula ulmaria, Potentilla palustris* and *Carex nigra*.

Nuphar lutea is emergent in the open water in front of reed zone.

N2 Damage – 257350 332750: 10-15 m wide area where cattle go to drink from lake and the reed zone has been completely destroyed by trampling.

N3 Habitat – 257300 332700: A 15 m wide area of quaking transition mire behind the reed fringing zone of the lake. Peat depth exceeded 2 m. Species recorded include *Carex nigra, C. curta, Caltha palustris, Menyanthes trifoliata, Galium palustre, Cardamine pratensis, Eriophorum angustifolium, Calliergonella cuspidata*.

N4 Habitat – 257300 332700: Extensive areas of Carex diandra quaking transition mire area with scattered Willow bushes. Area has an extensive bryophyte layer. Species in the general area include: *Carex nigra, C. curta, C. diandra, C. rostrata, C. panicea, Caltha palustris, Menyanthes trifoliata, Galium palustre, Cardamine pratensis, Hydrocotyle vulgaris, Eriophorum angustifolium, Angelica sylvestris, Lychnis flos-cuculi, Filipendula ulmaria, Cicuta virosa, Equisetum fluviatile, Juncus effusus, Lycopus europaeus, Mentha aquatica, Potentilla palustris, Succisa pratensis, Calliergonella cuspidate.*

N4 Releve - 257280 332750: See relevé number 2904-R1 & R2 from Monaghan Fen Survey 2007 for species present in the transition mire area with relative cover values.

N5 Habitat – 257300 332700: Among the transition fen area large shallow pools dominated by *Menyanthes trifoliata* with *Carex rostrata* commonly occurring and occasional *Hydrocotyle vulgaris*, and *Equisetum fluviatile*. Water often has an oily surface sheen.)

Results Appendix 9.

NFS - Ground Photograph Captions

County: (name)

Site Name: (name)

Site Code Number: (code)

Date of survey: (date – format dd/mm/yyyy)

Surveyed by: (surveyor names)

Photographs by: (photographer name) unless otherwise stated.

Photographic Descriptions

(enter photograph image code and caption)

(Sample:

DSC 94 – 257310 332700: Cutover bog area with wet grassland and Willow scrub in the northern part of the site, north of the road running to the crossroads in the east.

DSC 96 – 257260 332700: Main area of site with cutover bog dominated by *Juncus effusus* and Willow scrub,to the south of the road running to the crossroads in the east. Area in foreground is revegetated spoil.

DSC 97 – 257300 332630: Main area of site with cutover bog dominated by *Juncus effusus* and Willow scrub, to the south of the road running to the crossroads in the east. Area in foreground is revegetated spoil.

DSC 98 – 257350 332700: Main area of site with cutover bog dominated by *Juncus effusus* and Willow scrub,to the south of the road running to the crossroads in the east.)

Results Appendix 10.
List of Deliverables to be Completed by Survey Teams as part of a County NFS

- **NFS Summary County Report** (Word format – Co-orinator(s) responsibility)

- **Sites Surveyed in Detail table** (Excel format – see Results Appendix 2 for blank template)
- **Sites Surveyed in Brief table** (Excel format – see Results Appendix 3 for blank template)
- **Sites Un-surveyed to Date table** (Excel format – see Results Appendix 4 for blank template)

- **Relevé data table** (Excel format – see Results Appendix 5 for blank template)
- **Hydrochemistry data table** (Excel format – see Results Appendix 6 for blank template)
- **Site Conservation Evaluation table** (Excel format – see Results Appendix 7 for blank template)

- **Completed NFS Database** (Filemaker Pro format)
- **Individual Site Synopsis Reports printed from NFS database** (for inclusion in field pack – see below)

- Individual Site Survey Descriptions and Notes (Word Format; see Results Appendix 8, for inclusion in field pack - optional)

- Individual Site Ground Photograph Captions (Word Format; see Results Appendix 9, for inclusion in field pack and digitally with Photographic Image Folders, see below)
-
- **Individual Site Digital Ground Photographic image folders** (Jpeg format images with text file containing Individual Site Ground Photograph Captions, see above)

- **Individual Site GIS Aerial photograph/s** (Arc View format)
- **Individual Site GIS Final Habitat Maps** (Arc View format)
- **Individual Site GIS shape files for Habitat Maps** (Arc View format)
- **Completed 1:5000 GIS Map with Survey Notes marked** (Arc View format)
- **Individual 1:5000 GIS shape files for Survey Notes Map** (Arc View format)

Completed Paper Based Site Field Packs for each site surveyed, containing:

- Copy of original field notes
- Original relevé cards
- NFS Fossitt Habitat Assignment Form (see Survey Appendix 8)
- NFS Site Form (see Survey Appendix 1)
- Site Synopsis Report printed from the NFS Database
- Final GIS Habitat Map of site
- Final GIS 1:5000 map of site showing location of Site Survey Notes etc. and site boundary
- Final GIS Aerial photograph of site with site boundary
- Original maps and Aerial photographs used during the field survey with attached notes
- Background information and previous survey information on site
- Ground Photographs printed off with code numbers as per Ground Photograph Captions file

Additionally, where the site has been ranked as of A or B conservation value (NHA or SAC status) the following completed items should also be included with the Site Field Pack:

- NPWS EU Habitats Assignment sheet (see Survey Appendix 9)
- NPWS EU Species Assignment sheet (see Survey Appendix 10)
- NPWS National NHA Survey - Site Card: Ecologists (see Survey Appendix 11)

Results Appendix 11.
List of Deliverables for Completed National Fen Survey of Ireland

- Individual NFS County Summary Reports
- Sites Surveyed in Detail table from all County Surveys
- Sites Surveyed in Brief table from all County Surveys
- Un-Surveyed Site table from all County Surveys

- Relevé data table from all County Surveys
- Hydro chemistry data table from all County Surveys
- Site Conservation Evaluation table from all County Surveys

- Completed NFS Database

- Completed NFS Paper Based Site Field Packs from all County Surveys

- Completed Site GIS Habitat and Notes Maps from all County Surveys
- Completed GIS shape files for Habitat and Notes Maps from all County Surveys

NFS Data Analysis following completion of all County Surveys:

- Data consolidation exercise
- Total phytosociological relevé analysis and evaluation of the Irish fen vegetation classification scheme
- Total hydro chemical and environmental variables data analysis on Irish fen communities
- Countrywide site list evaluation and ranking. Re-appraisal of existing ranking of sites and selection of sites for designation as SAC, NHA and sites of local conservation importance
- Final selection of new and existing SAC network of sites, based primarily on their fen interest
- De-designation of severely degraded sites and removal from conservation list where fen and other habitat value is considered to have been lost and cannot be restored
- Development of a series of common standards for the future monitoring of Irish fen resource will be produced

Results Appendix 12.
NFS GIS Habitat Mapping Symbols

Results Appendix 13.

CORINE Landcover 2000 Categories

Class 1: Built up area

- 111 Continuous urban fabric
- 112 Discontinuous urban fabric
- 121 Industrial or commercial units
- 122 Road and rail networks and associated land
- 123 Port areas
- 124 Airports
- 131 Mineral extraction sites
- 132 Dump sites
- 133 Construction sites
- 141 Green urban areas
- 142 Sport and leisure facilities

Class 2: Agricultural area

- 211 Non-irrigated arable land
- 231 Pastures
- 242 Complex cultivation patterns
- 243 Land principally occupied by agriculture, with significant areas of natural vegetation

Class 3: Forest and natural area

- 311 Broad-leaved forest
- 312 Coniferous forest
- 313 Mixed forest
- 321 Natural grassland
- 322 Moors and heathland
- 324 Transitional woodland-shrub
- 331 Beaches, dunes, and sand plains
- 332 Bare rock
- 333 Sparsely vegetated areas
- 334 Burnt areas

Class 4: Wetland, salt

- 411 Inland marshes
- 412 Peatbogs
- 421 Salt marshes
- 423 Intertidal flats

Class 5: Water

- 511 Water courses
- 512 Water bodies
- 521 Coastal lagoons
- 522 Estuaries