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Scoping Study and Pilot Survey of Fens: Appendices

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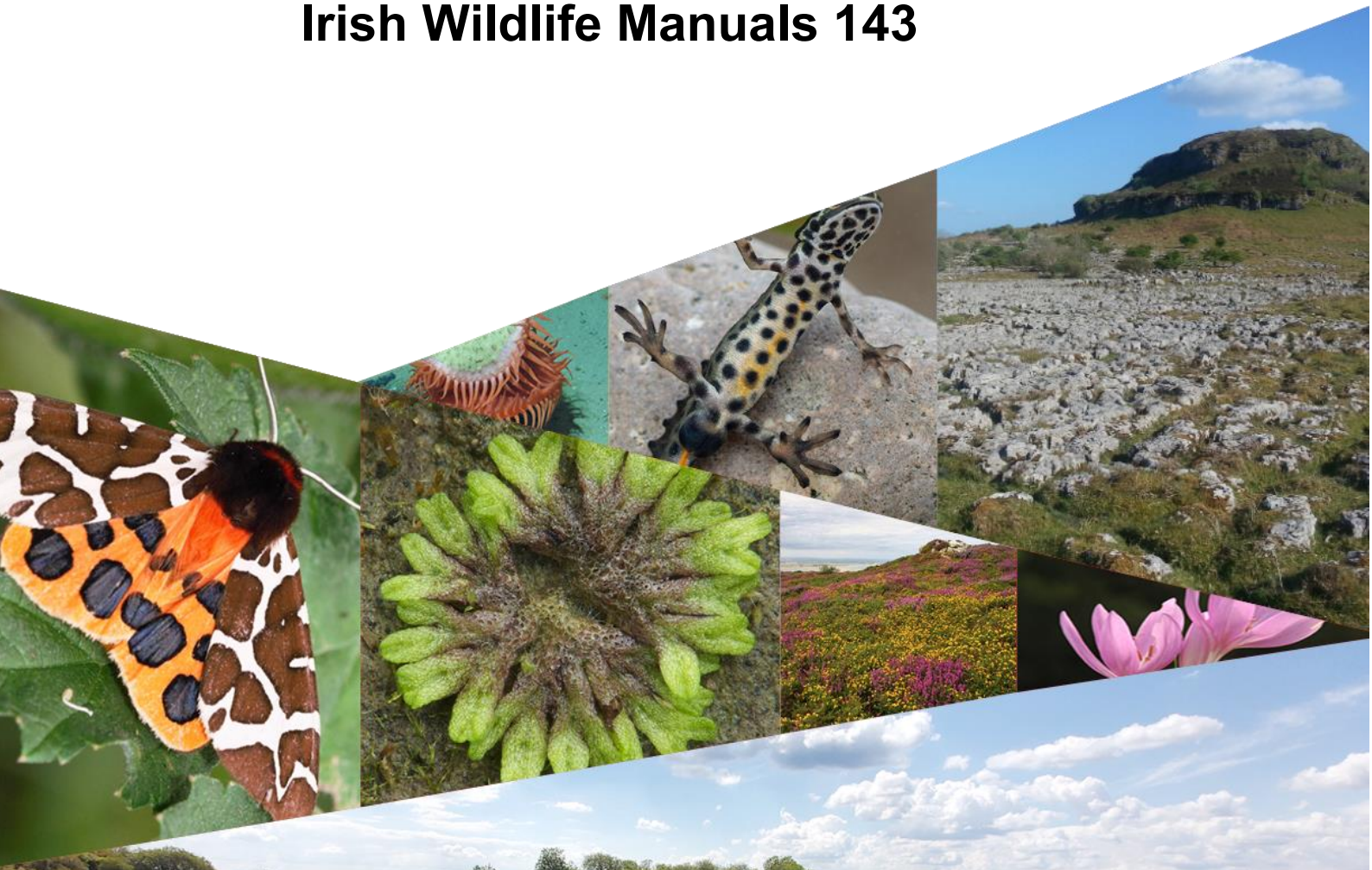

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Front cover, small photographs from top row:

A deepwater fly trap anemone *Phelliactis* sp., Yvonne Leahy; **Common Newt** *Lissotriton vulgaris,* Brian Nelson; **Limestone pavement**, Bricklieve Mountains, Co. Sligo, Andy Bleasdale; **Garden Tiger** *Arctia caja,* Brian Nelson; **Violet Crystalwort** *Riccia huebeneriana*, Robert Thompson; **Coastal heath**, Howth Head, Co. Dublin, Maurice Eakin; **Meadow Saffron** *Colchicum autumnale*, Lorcan Scott

Bottom photograph: **Transition mire and reed swamp**, Fin Lough, Offaly, James Martin

Scoping Study and Pilot Survey of Fens: Appendices

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Appendix 1 Annex I fen habitat descriptions (Long *et al.*, 2018)

7140 Transition mires and quaking bogs

Description and occurrence

Transition mires and quaking bogs are physically unstable peat-forming communities, typically occurring as swards or floating mats over saturated peat or open water. The habitat type encompasses a broad range of plant communities that are characteristic of ombrotrophic to soligenous waters. There is usually an abundant bryophyte layer. Vegetation ranges from extensive floating mats of small to medium sedges with *Sphagnum* on open water, to localised basic flushes over acid peat with base-tolerant *Sphagnum* and brown mosses. Aquatic and semi-aquatic vegetation is frequently present. Whilst some plant communities (*e.g.,* those in infilling dystrophic pools) are typical of acid waters, it is also characteristic to find communities that are intermediate between acid bog/ poor fen and basic rich fen. Transition mires are generally mineral rich (but not necessarily calcium rich), with oligotrophic to mesotrophic water with slightly basic to moderately acid pH. Transition mires may occupy a physically transitional zone between bog and fen vegetation (such as in the lagg zone of a raised bog), or where groundwater seeps through deep peat (upland soligenous flushes for instance). They can also represent a transitional stage between groundwater fed fen and rainwater fed bog, as peat accumulates and isolates the vegetation from groundwater (for instance in lowland topogenous depressions and open water transitions). Transition mire vegetation may also be found in damaged habitats, such as flooded peat cuttings over calcareous substrate.

Typical species

Vascular plants: *Agrostis stolonifera, Caltha palustris, Cardamine pratensis, Carex demissa, C. diandra, C. lasiocarpa, C. lepidocarpa, C. limosa, C. nigra, C. pulicaris, C. rostrata, Comarum palustre, Epilobium palustre, Equisetum fluviatile, Eriophorum angustifolium, E. latifolium, Filipendula ulmaria, Galium palustre, Hydrocotyle vulgaris, Lysimachia vulgaris, Lythrum salicaria, Mentha aquatica, Menyanthes trifoliata, Molinia caerulea, Myrica gale, Pedicularis palustris, Phragmites australis, Potamogeton polygonifolius, Ranunculus flammula, Rhynchospora alba, Silene flos-cuculi, Succisa pratensis, Valeriana officinalis* and *Viola palustris*.

Bryophytes: *Aneura pinguis, Aulacomnium palustre, Bryum pseudotriquetrum, Calliergon giganteum, Calliergon stellatum, Fissidens adianthoides, Philonotis fontana, Polytrichum commune, Sarmentypnum exannulatum, Scorpidium cossonii, S. revolvens, S. scorpioides, Sphagnum contortum, S. denticulatum, S. fallax, S. fimbriatum, S. palustre, S. squarrosum, S. subnitens* and *Straminergon stramineum*.

High-quality indicator species: *Cinclidium stygium, Eriophorum gracile, Hamatocaulis vernicosus, Hammarbya paludosa, Pyrola rotundifolia* subsp*. rotundifolia, Saxifraga hirculus, Sphagnum platyphyllum, S. subsecundum, S. teres, S. warnstorfii* and *Tomentypnum nitens*.

Clarification: *Sphagnum* species may not always be present in habitat 7140.

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

Description and occurrence

The Annex I habitat *Cladium* fens refers to *Cladium mariscus* beds which are in contact with species-rich vegetation of small sedge fens (*i.e., Cladium mariscus* and species of the *Caricion davallianae*). This can occur where there are species-rich open swards of *Cladium mariscus* with elements of small-sedge fen, fen meadow and tall-herb fen. These may be naturally species-rich or managed to prevent dominance of *Cladium mariscus.* However, the Annex I habitat can also occur where species-poor or mono-dominant stands of *Cladium mariscus* transition to species-rich alkaline fen vegetation types at their margins, or occur in a mosaic of species-poor and species-rich vegetation. This latter situation tends to be more common in Ireland. In these instances, the whole stand of *Cladium mariscus*, including areas that support species-poor vegetation, is referrable to the Annex I habitat. *Cladium* fen can occur in a wide range of habitats, in both topogenous and soligenous situations, such as the emergent zone of calcareous lakes, valley fens, floodplains, wet meadows and calcium-rich flush areas within blanket bogs in the west. The habitat is characterised by waterlogged peat soils, a high water table (at or above the surface), and near neutral to alkaline oligotrophic to mesotrophic water.

Typical species

Vascular plants: *Anagallis tenella, Caltha palustris, Carex demissa, C. diandra, C. dioica, C. echinata, C. flacca, C. hostiana, C. lasiocarpa, C. lepidocarpa, C. nigra, C. panicea, C. paniculata, C. pulicaris, C. riparia, C. rostrata, Cirsium dissectum, Cladium mariscus, Comarum palustre, Eleocharis multicaulis, Eleocharis quinqueflora, Equisetum fluviatile, Eriophorum latifolium, Galium palustre, Hydrocotyle vulgaris, J. articulatus, J. bulbosus, J. subnodulosus, Lythrum salicaria, Mentha aquatica, Menyanthes trifoliata, Molinia caerulea, Parnassia palustris, Pedicularis palustris, Phragmites australis, Pinguicula vulgaris, Ranunculus flammula, Schoenus nigricans, Selaginella selaginoides, Silene flos-cuculi* and *Succisa pratensis.*

Bryophytes: *Aneura pinguis, Bryum pseudotriquetrum, Calliergon giganteum, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, P. falcata, Plagiomnium elatum, Philonotis calcarea, Scorpidium cossonii* and *S. scorpioides.*

High-quality indicator species: *Dactylorhiza incarnata, Dactylorhiza traunsteineri* and *Epipactis palustris*.

Amendment and clarification: For the NFS, it is proposed that habitat 7210 consists of (i) open *Cladium* swards with more than 25% *Cladium* cover and with species characteristic of habitats 7230, 7140, 6410 or 6430 and (ii) dense beds of *Cladium* adjacent to areas of habitats 7230, 7140, 6410 and 6430. By expanding the list of possible adjacent habitats (from just habitat 7230), the definition of open sward instances and closed sward instances are made more consistent. By limiting adjacent habitats to Annex I habitats it is ensured that only dense stands in high ecological value systems are regarded as habitat 7210.

7230 Alkaline fens

Description and occurrence

Alkaline fens are groundwater fed, generally peat-forming systems with extensive areas of species-rich small sedge and brown moss communities. They occur in areas where there is a high water table and a base-rich, often calcareous, water supply. Alkaline fens can develop in areas where vertical water movement predominates (topogenous), such as poorly drained basins or hollows and open water transitions; or where horizontal water movement is also important (soligenous), such as flushes, valley fens and the laggs of raised bogs. However, this distinction is not always clear (such as in large floodplain fens which can include both elements). Fen systems are often a complex mosaic of habitats, with tall sedge beds, reedbeds, wet grasslands, springs and open-water co-occurring.

Typical species

Vascular plants: *Anagallis tenella, Briza media, Carex demissa, C. dioica, C. flacca, C. hostiana, C. lasiocarpa, C. lepidocarpa, C. nigra, C. panicea, C. pulicaris, C. rostrata, Chara* spp*., Eleocharis quinqueflora, Equisetum palustre, Eriophorum latifolium, Galium palustre, Hydrocotyle vulgaris, Juncus articulatus, Juncus bulbosus, Juncus subnodulosus, Linum catharticum, Mentha aquatica, Molinia caerulea, Parnassia palustris, Pedicularis palustris, Pinguicula grandiflora, P. vulgaris, Ranunculus flammula, Schoenus nigricans, Selaginella selaginoides, Succisa pratensis* and *Triglochin palustre*.

Bryophytes: *Aneura pinguis, Blindia acuta, Bryum pseudotriquetrum, Calliergon giganteum, Calliergonella cuspidata, Campylium stellatum, Ctenidium molluscum, Fissidens adianthoides, Palustriella commutata, Palustriella falcata, Plagiomnium elatum, Philonotis calcarea, Rhizomnium pseudopunctatum, Sarmentypnum sarmentosum, Scorpidium cossonii, Scorpidium revolvens* and *Scorpidium scorpioides*.

High-quality indicator species: *Cinclidium stygium, Dactylorhiza incarnata, D. traunsteineri, Epipactis palustris, Pseudocalliergon lycopodioides, Pseudocalliergon trifarium, Stellaria palustris, Tomentypnum nitens.*

Appendix 2 Review of the National Fen Survey Manual (Foss & Crushell, 2008a)

In the table below, IWM 2023 refers to this report.

Section of NFS Manual (Foss & Crushell, 2008a)	Comments following 2020 review
1 INTRODUCTION	
1.1 THE MANUAL	
1.2 AIMS OF NATIONAL FEN SURVEY	Mostly still applies; could add as additional aims of the NFS: "to assess the Annex I fen habitats via structure & function assessment criteria, and to quantify any impacts or conservation measures taking place in the sites. These data will be used to carry out a national assessment of fens as part of Ireland's Article 17 reporting obligations."
1.3 INTENDED USE OF DATA, CONSISTENCY AND TRAINING	Designation of sites is not a primary aim of the NFS.
1.4 STRUCTURE OF SURVEY	Still applies (subject to NPWS resources)
1.5 IDENTIFICATION OF SITES FOR SURVEY	Superseded by IWM 2023
1.5.1 Sites recorded in the NPWS Fen Survey Database 2007	Superseded by IWM 2023
1.5.2 Additional Sites Reported by External Experts	Superseded by IWM 2023
1.5.3 Sites Identified from GIS Aerial Photography Survey	Superseded by IWM 2023
1.5.4 Additional Survey Sites	Superseded by IWM 2023
2 DEFINITIONS & TERMINOLOGY	
2.1 IMPORTANT DEFINITIONS	
2.1.1 Survey	Mostly still applies; however, Site Synoptic Report example superseded by IWM 2023
2.1.2 NFS Site Form	Mostly still applies; however, Site Synoptic Report example superseded by IWM 2023
2.1.3 NFS Database	Text still applies, but database has been superseded by 2021 Access database
2.1.4 The Site	Still applies
2.1.5 Boundary	NFS site boundaries may or may not correspond to designated area
2.1.6 Fen	Still applies
2.1.7 Transitions and Mosaics	Still applies
2.1.8 Site Size	Still applies; however, reference to springs may be irrelevant for new iteration of NFS
2.1.9 Whether or Not to Survey	Superseded by IWM 2023
2.1.10 Site Field Pack	Superseded by IWM 2023
2.2 FEN TYPES	Superseded by IWM 2023
2.3 RICH-FEN AND POOR-FEN	Superseded by IWM 2023
2.4 COMPARISON OF LIKE-WITH-LIKE	Superseded by IWM 2023
2.5 NFS FEN CLASSIFICATION SCHEME	Superseded by IWM 2023
3 NATIONAL FEN SURVEY DATABASE	This section superseded by 2021 Access database; structure documented in SPSF19 Resource Catalogue

Section of NFS Manual (Foss & Crushell, 2008a)	Comments following 2020 review
3.1 BACKGROUND	This section superseded by 2021 Access database; structure documented in SPSF19 Resource Catalogue
3.2 STRUCTURE	This section superseded by 2021 Access database; structure documented in SPSF19 Resource Catalogue
3.3 DATABASE OPERATION & DATA ENTRY	This section superseded by 2021 Access database; structure documented in SPSF19 Resource Catalogue
4 PRE-SURVEY WORK	
4.1 NFS GEOGRAPHIC INFORMATION SYSTEM	Mostly still applies; MapGenie or similar may be used instead of Colour orthophotos; Discovery series may no longer be applicable as ITM projection now used; CORINE land cover map is not appropriate for survey of this fine a scale; no need for Points file, should just have Polygons file (produced in 2020 as part of the Pilot Fen Survey)
4.2 WHICH SITES TO SURVEY	Mostly still applies; addition information supplied in IWM 2023
4.3 SITE FIELD PACK CONTENTS	Superseded by IWM 2023
4.4 SURVEY TEAMS – SITE FIELD PACK PREPARATION	This section superseded by IWM 2023
4.4.1 NFS Site Form Completion	This section superseded by IWM 2023
4.4.2 Site Map Preparation	This section superseded by IWM 2023
4.4.3 Background Data Research on Sites	This section superseded by IWM 2023
4.4.4 On-going Data Input to NFS Database	This section superseded by IWM 2023
4.4.5 NFS Mapping of Site Locations	This section superseded by IWM 2023
4.4.6 Field Equipment Checklist	This section superseded by IWM 2023
4.4.7 Checklist of Completed Site Survey Pack – Pre-Survey	This section superseded by IWM 2023
4.5 ROLE OF CO-ORDINATOR(S)	
4.5.1 County GIS Dataset Compilation	Still applies
4.5.2 GIS County Aerial Photographic Survey	Still applies
4.5.3 Training on GIS Survey Map & Final Habitat Map Preparation	Still applies
4.5.4 NFS Project Orientation Workshop	Still applies
4.5.5 Water Chemistry Logistics	Depends on NPWS resources as to whether or not water chemistry sampling and tests will be carried out.
5 FEN FIELD SURVEY	
5.1 SURVEY TEAMS - FIELD SURVEY METHODS	
5.1.1 General Survey Strategy	Superseded by IWM 2023
5.1.2 Safety Advice	Superseded by IWM 2023: Section 6.5
5.1.3 NFS Site Form Completion	Superseded by IWM 2023
5.1.4 Site Description and Site Survey Notes	Superseded by IWM 2023
5.1.5 Ground Photographic Survey and Notes	Superseded by IWM 2023
5.1.6 Relevé Recording Scheme	Superseded by IWM 2023
5.1.7 Relevé Card Completion	Superseded by IWM 2023
5.1.8 Floristic Data Outside Relevés	Superseded by IWM 2023
5.1.9 Fossitt Habitats present within Site	Superseded by IWM 2023
5.1.10 Water Sample Collection	Superseded by IWM 2023

Section of NFS Manual (Foss & Crushell, 2008a)	Comments following 2020 review
5.1.11 Checklist of Site Field Pack – Following Field Survey	Superseded by IWM 2023
5.2 ROLE OF CO-ORDINATOR(S)	This section all still applies
5.2.1 Quality control of field survey	This section all still applies
5.2.2 Quality control of NFS Database inputs	This section all still applies
5.2.3 Quality control of Habitat Mapping	This section all still applies
5.2.4 Hydro-chemistry Analysis	This section all still applies
5.2.5 Ongoing project management	This section all still applies
6 POST-SURVEY WORK	
6.1 SURVEY TEAMS – POST SURVEY WORK	
6.1.1 Completion of Site Description and Survey Notes	Mostly still applies; recommend entry into Excel rather than Word to facilitate copying into Access database.
6.1.2 Digitising of Site Notes Map	Mostly still applies; background mapping may differ from that suggested by Foss & Crushell (*e.g.,* may be colour MapGenie maps instead)
6.1.3 Completion of Ground Photographic Survey Captions	Superseded by NPWS project submission protocols for preparing image catalogue for all photos taken and submitted
6.1.4 Relevé Data Computerisation	Superseded if Turboveg vegetation database is used instead of paper sheets.
6.1.5 Fen Type Classification on Sites Surveyed	Superseded by IWM 2023
6.1.6 Digitising Site Habitat Maps	Superseded by IWM 2023; if following an existing habitat colour scheme, use Smith *et al.* (2011)'s best practice guidance on habitat mapping
6.1.7 Hydro-chemistry Data Computerisation	Superseded; record all data in a shapefile with attributes to cater for all the variables recorded or analysed.
6.1.8 Site Evaluation and Ranking	Mostly still applies; methodology of IWM 2023 should be followed
6.1.9 Completion of NFS Database Site Record & Site Synopsis Report	Still applies, though method of production of site reports may vary from that outlined in manual (*e.g.,* may be mail merge procedure rather than produced from database)
6.1.10 Completion of NPWS Paper Based Site Survey Pack	Obsolete: paper site packs no longer required by NPWS
6.2 ROLE OF CO-ORDINATOR(S)	This section all still applies
6.2.1 Quality Control of Survey Teams Post Survey	This section all still applies
6.2.2 GIS Habitat Map Information and Habitat Area Estimation	This section all still applies
6.2.3 Hydro-chemistry Data	This section all still applies
6.2.4 NFS Summary County Report	This section all still applies
6.2.5 Completed County Survey Deliverables	This section all still applies
7 OVERALL SYNTHESIS OF NFS FINDINGS	Much of this still applies; however, some items are obsolete, *e.g.,* amendments to the current fen classification scheme recognised in Ireland is largely being tackled by the IVC
8 BIBLIOGRAPHY	Still stands as useful resource
9 GLOSSARY	Still stands as useful resource
10 NFS LIST OF GENERAL APPENDICES	

Section of NFS Manual (Foss & Crushell, 2008a)	Comments following 2020 review
General Appendix 1: NFS Background Data Sources referring to Irish Fens	Still stands as a useful resource though now probably a bit out of date
General Appendix 2: NFS Database layout	Obsolete
General Appendix 3: NFS Data input to NFS database - explanatory notes	Obsolete
General Appendix 4: NFS Irish Fen Classification Schemes	Superseded by IWM 2023
General Appendix 5: Phytosociological synoptic table of Monaghan Fen Types (Excel format)	Superseded by IVC
General Appendix 5: Phytosociological classification table of Irish Fen Types (Excel format)	Still stands, though a bit out of date as IVC comes into more general use
General Appendix 6: NFS Impacts and Activities list	Superseded by EU list given in IWM 2023
11 NFS LIST OF SURVEY APPENDICES	
Survey Appendix 1 NFS Site Form (Microsoft Word format)	Format superseded by IWM 2023
Survey Appendix 2 NFS Relevé Card (Microsoft Word format)	Format superseded by IWM 2023; paper form superseded by electronic entry (*e.g.,* via Turboveg database)
Survey Appendix 3 NFS Bryophyte Reference Collection Envelope	Still applies if collecting bryophyte samples for identification, though some information could be omitted, *e.g.,* Discovery map
Survey Appendix 4 Categories of Slope (Microsoft Word format)	Obsolete: slope measured in degrees
Survey Appendix 5 Definitions of Substrate Type (Microsoft Word format)	Obsolete: not recorded (though can be recorded in site description if desired)
Survey Appendix 6 Definitions of Substrate Stability (Microsoft Word format)	Superseded by IWM 2023
Survey Appendix 7 NFS County Codes & Vice County Codes	Still applies
Survey Appendix 8 NPWS Fossitt Habitat Assignment Form (Microsoft Word format)	Superseded by IWM 2023
Survey Appendix 9 NPWS EU Habitats Directive - Habitats Assignment	Superseded by IWM 2023
Survey Appendix 10 NPWS EU Habitats Directive - Species Assignment	List still applies, but no requirement for recording Annex II species
Survey Appendix 11 NPWS NHA Ecologists Form (PDF format)	Still applies (used by NPWS)
Survey Appendix 12 NFS Survey Equipment Checklist (Microsoft Word format)	Superseded by IWM 2023
Survey Appendix 13 Fen Flora Species Checklist (Excel format)	Superseded by IWM 2023
12 NFS LIST OF RESULTS APPENDICES	Formats superseded by IWM 2023; information still stands for the sites surveyed

Appendix 3 Assessment Criteria for Annex I Fen Habitats Surveyed During the Pilot Fen Survey 2019-2020

7140 Transition mires

Assessment criteria		Scale of assessment
Vegetation composition		
1a† 1b† 1c†	FE2B: number of positive indicator species from Groups i or ii present ≥ 3 FE2E: number of positive indicator species from Groups i or ii present ≥ 3 FE2C/D: number of positive indicator species from Groups i or ii present ≥ 6 (see typical species below)	Relevé
2	Number of species from Group i present ≥ 1 (see typical species below)	Relevé
3	Cover of the following species: small to medium sized *Carex* spp., *Comarum palustre*, *Equisetum fluviatile*, *Hydrocotyle vulgaris*, *Hypericum elodes*, *Mentha aquatica*, *Menyanthes trifoliata*, *Sphagnum* spp. collectively ≥ 25%	Relevé
4	Cover of the following species: *Anthoxanthum odoratum*, *Epilobium hirsutum*, *Holcus lanatus* collectively < 1%	Relevé
5	Cover of non-native species < 1%	Relevé
Vegetation structure		
6	†FE2C/D/E: ≥ 50% of the tips of live leaves and/or flowering shoots of vascular plants should be more than 15 cm above the ground surface	Relevé
Physical structure		
7	Cover of disturbed bare ground < 10%	Relevé
8	Cover of disturbed bare ground < 10%	Local vicinity
9	Area showing signs of drainage resulting from heavy trampling or tracking or ditches < 10%	Local vicinity

†Assess only the criteria relevant to the community being assessed.

Typical species for 7140:

FE2B (infilling pool community)	**FE2C/D/E (*Carex rostrata* fen and flush)**	
Group i	**Group i**	
Carex canescens	*Caltha palustris*	*Comarum palustre*
Carex lasiocarpa	*Carex demissa*	*Epilobium palustre*
Carex limosa	*Carex diandra*	*Equisetum fluviatile*
Menyanthes trifoliata	*Carex lasiocarpa*	*Galium palustre*
Sphagnum spp. (count separately)	*Carex lepidocarpa*	*Mentha aquatica*
	Carex limosa	*Menyanthes trifoliata*
Group ii	*Carex nigra*	*Phragmites australis*
Drosera spp. (count separately)	*Carex rostrata*	*Sphagnum* spp. (count separately)
Eriophorum angustifolium	**Group ii**	
Rhynchospora spp. (count separately)	*Angelica sylvestris*	*Lythrum salicaria*
	Cardamine pratensis	*Selaginella selaginoides*
	Eriophorum angustifolium	*Succisa pratensis*
	Lysimachia vulgaris	*Viola palustris*

7210 *Cladium* fens

	Assessment criteria	Scale of assessment
Vegetation composition		
1	*Cladium mariscus* cover ≥ 25%	Relevé
2	No. of positive vascular indicator species ≥ 3 (not applicable for dense, primary stands)	Relevé
3	Total cover of *Anthoxanthum odoratum, Epilobium hirsutum, Holcus lanatus* and *Ranunculus repens* < 5%	Relevé
4	Cover of non-native species < 1%	Relevé
5	Cover of scattered native trees / shrubs < 10%	Local vicinity
6	Total cover of *Juncus effusus, Typha latifolia* and *Phragmites australis* < 10%	Local vicinity
Vegetation structure		
7	Live shoots > 1 m high ≥ 10%	Relevé
Physical structure		
8	Cover of disturbed bare ground < 10%	Relevé
9	Cover of disturbed bare ground < 10%	Local vicinity
10	Area showing signs of drainage resulting from heavy trampling or tracking or ditches < 10%	Local vicinity
11	Disturbed vegetation (if tufa present) < 1%	Local vicinity

Typical species for 7210:

Angelica sylvestris	*Carex panicea*	*Filipendula ulmaria*	*Molinia caerulea*
Caltha palustris	*Carex rostrata*	*Juncus bulbosus*	*Pinguicula vulgaris*
Carex demissa	*Cirsium dissectum*	*Lysimachia tenella*	*Selaginella selaginoides*
Carex dioica	*Comarum palustre*	*Lysimachia vulgaris*	*Schoenus nigricans*
Carex lasiocarpa	*Eleocharis quinqueflora*	*Lythrum salicaria*	*Valeriana officinalis*
Carex lepidocarpa	*Equisetum fluviatile*	*Menyanthes trifoliata*	

7230 Alkaline fens

Assessment criteria		Scale of assessment
Vegetation composition		
1	At least one brown moss species present	Relevé
2a†	FE1C number of positive vascular indicator species present ≥ 2	Relevé
2b†	FE1A/B: number of positive vascular indicator species present ≥ 3	Relevé
3a†	FE1C: vegetation cover of brown mosses and vascular indicator species ≥ 20%	Relevé
3b†	FE1A/B: vegetation cover of brown mosses and vascular indicator species ≥ 75%	Relevé
4	Total cover of the following species: *Anthoxanthum odoratum, Epilobium hirsutum, Holcus lanatus, Ranunculus repens* < 1%	Relevé
5	Cover of non-native species < 1%	Relevé
6	Cover of scattered native trees and scrub < 10%	Local vicinity
7	Total cover of *Juncus effusus* and *Phragmites australis* < 10%	Local vicinity
Vegetation structure		
8a†	FE1C: At least 50% of the live leaves/flowering shoots are more than 5 cm above ground surface	Relevé
8b†	FE1A/B: At least 50% of the live leaves/flowering shoots are more than 15 cm above ground surface	Relevé
Physical structure		
9	Cover of disturbed, bare ground < 10%	Relevé
10	Cover of disturbed, bare ground < 10%	Local vicinity
11	Area showing signs of drainage resulting from ditches or heavy trampling or tracking < 10%	Local vicinity
12	Where tufa is present, disturbed proportion of vegetation cover < 1%	Local vicinity

†Assess only the criteria relevant to the community (see below) being assessed.

Typical species:

Brown mosses	**FE1A/B (*Schoenus* flushes and fens)**	**FE1C (small-sedge flushes and fens)**
Bryum pseudotriquetrum	*Carex demissa*	*Carex demissa*
Campylium stellatum	*Carex dioica*	*Carex lepidocarpa*
Ctenidium molluscum	*Carex lasiocarpa*	*Carex panicea*
Fissidens adianthoides	*Carex lepidocarpa*	*Eleocharis quinqueflora*
Palustriella commutata	*Carex panicea*	*Juncus bulbosus*
Palustriella falcata	*Carex rostrata*	*Pinguicula vulgaris*
Sarmentypnum sarmentosum	*Cirsium dissectum*	
Scorpidium cossonii	*Lysimachia tenella*	
Scorpidium revolvens	*Molinia caerulea*	
Scorpidium scorpioides	*Pinguicula vulgaris*	
	Schoenus nigricans	
	Selaginella selaginoides	

Appendix 4 Changes in Nomenclature for Some Typical Fen Vascular Plant and Bryophyte Species

Current name[1]	Ireland2008v12 name[2]	Other synonyms
Vascular plants		
Agrostis vinealis	*Agrostis canina* subsp. *montana*	
Avenella flexuosa	*Deschampsia flexuosa*	
Carex canescens	*Carex canescens*	*Carex curta*
Carex demissa	*Carex viridula* subsp. *oedocarpa*	
Carex lepidocarpa	*Carex viridula* subsp. *brachyrrhyncha*	
Carex leporina	*Carex leporina*	*Carex ovalis*
Comarum palustre	*Potentilla palustris*	
Dactylorhiza traunsteinerioides	*Dactylorhiza traunsteineri*	
Eleogiton fluitans	*Isolepis fluitans*	
Helosciadium nodiflorum	*Apium nodiflorum*	
Helosciadium inundatum	*Apium inundatum*	
Jacobaea aquatica	*Senecio aquaticus*	
Jacobaea vulgaris	*Senecio jacobaea*	
Lotus pedunculatus	*Lotus pedunculatus*	*Lotus uliginosus*
Lysimachia tenella	*Anagallis tenella*	
Nasturtium officinale	*Rorippa nasturtium-aquaticum*	
Reynoutria japonica	*Fallopia japonica*	
Schoenoplectus lacustris	*Scirpus lacustris* subsp. *lacustris*	
Schedonorus arundinaceus	*Festuca arundinacea*	
Schedonorus pratensis	*Festuca pratensis*	
Scorzoneroides autumnalis	*Leontodon autumnalis*	
Silene flos-cuculi	*Lychnis flos-cuculi*	
Stellaria alsine	*Stellaria uliginosa*	
Stuckenia pectinatus	*Potamogeton pectinatus*	
Thymus drucei	*Thymus polytrichus*	
Bryophytes		
Chiloscyphus pallescens	*Chiloscyphus pallescens*	*Chiloscyphus polyanthos* var. *pallescens*
Chiloscyphus polyanthos	*Chiloscyphus polyanthos*	*Chiloscyphus polyanthos* var. *polyanthos*
Calliergonella cuspidata	*Calliergonella cuspidata*	*Calliergon cuspidatum*
Campylium stellatum	*Campylium stellatum* var. *stellatum*	
Campylium protensum	*Campylium stellatum* var. *protensum*	
Hamatocaulis vernicosus	*Hamatocaulis vernicosus*	*Drepanocladus vernicosus*
Kindbergia praelonga	*Kindbergia praelonga*	*Eurhynchium praelongum*
Oxyrrhynchium speciosum	*Eurhynchium speciosum*	
Palustriella commutata	*Palustriella commutata* var. *commutata*	
Palustriella falcata	*Palustriella commutata* var. *falcata*	
Pseudocalliergon lycopodioides	*Drepanocladus lycopodioides*	

Current name[1]	**Ireland2008v12 name[2]**	**Other synonyms**
Pseudocalliergon trifarium	*Calliergon trifarium*	
Pseudoscleropodium purum	*Scleropodium purum*	
Sarmentypnum exannulatum	*Warnstorfia exannulata*	
Sarmentypnum sarmentosum	*Calliergon sarmentosum*	*Warnstorfia sarmentosa*
Scorpidium cossonii	*Drepanocladus cossonii*	
Scorpidium revolvens	*Drepanocladus revolvens*	
Sphagnum angustifolium	*Sphagnum angustifolium*	*Sphagnum recurvum* var. *tenue*
Sphagnum denticulatum	*Sphagnum denticulatum*	*Sphagnum auriculatum*
Sphagnum divinum	*Sphagnum magellanicum*	
Sphagnum fallax	*Sphagnum fallax*	*Sphagnum recurvum* var. *mucronatum*
Sphagnum inundatum	*Sphagnum inundatum*	*Sphagnum auriculatum* var. *inundatum*
Sphagnum medium	*Sphagnum magellanicum*	
Straminergon stramineum	*Calliergon stramineum*	
Tomentypnum nitens	*Homalothecium nitens*	*Homalothecium nitens*

[1]Stace (2019) for vascular plants; Blockeel *et al.* (2014a, b) and later changes for bryophytes

[2]Species checklist used in Turboveg by the National Biodiversity Data Centre (NBDC) for the National Vegetation Database

Appendix 5 List of Invertebrates Previously Recorded from Sites Surveyed in the Pilot Fen Survey 2019-2020

Pollardstown Fen

SCIENTIFIC NAME	SOURCE
MOLLUSCA	
GASTROPODA	
Aciculidae	
Acicula fusca	Moorkens & Killeen (2011)
Agriolimacidae	
Deroceras laeve	Moorkens & Killeen (2011)
Clausiliidae	
Clausilia bidentata	Moorkens & Killeen (2011)
Cochlicopidae	
Cochlicopa lubrica	Moorkens & Killeen (2011)
Discidae	
Discus rotundatus	Moorkens & Killeen (2011)
Ellobiidae	
Carychium minimum	Moorkens & Killeen (2011)
Carychium tridentatum	Moorkens & Killeen (2011)
Euconulidae	
Euconulus alderi	Moorkens & Killeen (2011)
Euconulus praticola	Moorkens & Killeen (2011)
Gastrodontidae	
Aegopinella pura	Moorkens & Killeen (2011)
Nesovitrea hammonis	Moorkens & Killeen (2011)
Zonitoides nitidus	Moorkens & Killeen (2011)
Helicidae	
Cepaea hortensis	Moorkens & Killeen (2011)
Hygromiidae	
Ashfordia granulata	Moorkens & Killeen (2011)
Trochulus hispidus	Moorkens & Killeen (2011)
Lauriidae	
Lauria cylindracea	Moorkens & Killeen (2011)
Leiostyla anglica	Moorkens & Killeen (2011)
Lymnaeidae	
Galba truncatula	Moorkens & Killeen (2011)
Stagnicola fuscus	Moorkens & Killeen (2011)
Planorbidae	
Bathyomphalus contortus	Moorkens & Killeen (2011)
Pristilomatidae	
Vitrea crystallina	Moorkens & Killeen (2011)
Punctidae	
Punctum pygmaeum	Moorkens & Killeen (2011)

Succineidae	
Oxyloma elegans	Moorkens & Killeen (2011)
Succinea putris	Moorkens & Killeen (2011)
Truncatellinidae	
Columella aspera	Moorkens & Killeen (2011)
Columella edentula	Moorkens & Killeen (2011)
Valloniidae	
Acanthinula aculeata	Moorkens & Killeen (2011)
Vallonia costata	Moorkens & Killeen (2011)
Vallonia pulchella	Moorkens & Killeen (2011)
Vertiginidae	
Vertigo angustior	Moorkens & Killeen (2011)
Vertigo antivertigo	Moorkens & Killeen (2011)
Vertigo geyeri	Moorkens & Killeen (2011)
Vertigo moulinsiana	Moorkens & Killeen (2011)
Vertigo pygmaea	Moorkens & Killeen (2011)
Vertigo substriata	Moorkens & Killeen (2011)
BIVALVIA	
Sphaeriidae	
Pisidium obtusale	Moorkens & Killeen (2011)
Pisidium personatum	Moorkens & Killeen (2011)
ARACHNIDA	
ACARINA	
Ascidae	
Platyseius italicus	Wisdom *et al*. (2011)
Brachychthoniidae	
Liochthonius simplex	Wisdom *et al*. (2011)
Camisiidae	
Heminothrus peltifer	Wisdom *et al*. (2011)
Ceratozetidae	
Fuscozetes fuscipes	Wisdom *et al*. (2011)
Latilamellobates incisella	Wisdom *et al*. (2011)
Chamobatidae	
Chamobates schuetzi	Wisdom *et al*. (2011)
Nothridae	
Nothrus silvestris	Wisdom *et al*. (2011)
Nanhermannidae	
Nanhermannia dorsalis	Wisdom *et al*. (2011)
Carabodidae	
Carabodes willmanni	Wisdom *et al*. (2011)
Ceratoppiidae	
Ceratoppia bipilis	Wisdom *et al*. (2011)
Hypochthomiidae	
Hypochthonius rufulus	Wisdom *et al*. (2011)
Macrochelidae	
Geholaspis mandibularis	Wisdom *et al*. (2011)
Oppiidae	

Oppiella nova	Wisdom *et al*. (2011)
Oribatulidae	
Liebstadia similis	Wisdom *et al*. (2011)
Parasitidae	
Lysigamasus celticus	Wisdom *et al*. (2011)
Pergamasus crassipes	Wisdom *et al*. (2011)
Punctoribatidae	
Minunthozetes semirufus	Wisdom *et al*. (2011)
Thyrisomidae	
Banksinoma lanceolata	Wisdom *et al*. (2011)
Veigaiidae	
Veigaia cerva	Wisdom *et al*. (2011)
ARANEAE	
Agelenidae	
Agelena labyrinthica	Van Helsdingen (1997)
Araneidae	
Araniella cucurbitina	Van Helsdingen (1997)
Hypsosinga pygmaea	Van Helsdingen (1997)
Larinioides cornutus	Van Helsdingen (1997)
Clubionidae	
Clubiona phragmitis	Van Helsdingen (1997)
Clubiona stagnatilis	Van Helsdingen (1997)
Clubiona subtilis	Van Helsdingen (1997)
Dictynidae	
Dictyna arundinacea	Van Helsdingen (1997)
Hahniidae	
Antistea elegans	Van Helsdingen (1997)
Linyphiidae	
Baryphyma gowerense	Van Helsdingen (1997)
Baryphyma trifrons	Van Helsdingen (1997)
Bathyphantes parvulus	Van Helsdingen (1997)
Centromerus levitarsis	Van Helsdingen (1997)
Dismodicus bifrons	Van Helsdingen (1997)
Gongylidium rufipes	Van Helsdingen (1997)
Hypomma bituberculatum	Van Helsdingen (1997)
Kaestneria pullata	Van Helsdingen (1997)
Lophomma punctatum	Van Helsdingen (1997)
Maso sundevalli	Van Helsdingen (1997)
Microlinyphia impigra	Van Helsdingen (1997)
Microlinyphia pusilla	Van Helsdingen (1997)
Neriene clathrata	Van Helsdingen (1997)
Oedothorax gibbosus	Van Helsdingen (1997)
Ostearius melanopygius	Van Helsdingen (1997)
Palliduphantes ericaeus	Van Helsdingen (1997)
Pocadicnemis juncea	Van Helsdingen (1997)
Tallusia experta	Van Helsdingen (1997)
Taranucnus setosus	Van Helsdingen (1997)

Tenuiphantes mengei	Van Helsdingen (1997)
Tenuiphantes tenuis	Van Helsdingen (1997)
Tenuiphantes zimmermanni	Van Helsdingen (1997)
Walckenaeria unicornis	Van Helsdingen (1997)
Lycosidae	
Pardosa nigriceps	Van Helsdingen (1997)
Pardosa pullata	Van Helsdingen (1997)
Pirata hygrophilus	Van Helsdingen (1997)
Pirata piscatorius	Van Helsdingen (1997)
Pirata tenuitarsis	Van Helsdingen (1997)
Trochosa spinipalpis	Van Helsdingen (1997)
Trochosa terricola	Van Helsdingen (1997)
Mimetidae	
Ero sp. (juv)	Van Helsdingen (1997)
Miturgidae	
Zora spinimana	Van Helsdingen (1997)
Philodromidae	
Tibellus maritimus	Van Helsdingen (1997)
Pisauridae	
Dolomedes fimbriatus	Van Helsdingen (1997)
Salticidae	
Neon reticulatus	Van Helsdingen (1997)
Tetragnathidae	
Metellina mengei	Van Helsdingen (1997)
Pachygnatha clercki	Van Helsdingen (1997)
Tetragnatha extensa	Van Helsdingen (1997)
Tetragnatha montana	Van Helsdingen (1997)
Theridiidae	
Episinus angulatus	Van Helsdingen (1997)
Neottiura bimaculata	Van Helsdingen (1997)
Pholcomma gibbum	Van Helsdingen (1997)
Robertus lividus	Van Helsdingen (1997)
Rugathodes instabilis	Van Helsdingen (1997)
Theridiosomatidae	
Theridiosoma gemmosum	Van Helsdingen (1997)
Thomisidae	
Ozyptila brevipes	Van Helsdingen (1997)
Ozyptila trux	Van Helsdingen (1997)
Xysticus erraticus	Van Helsdingen (1997)
Xysticus ulmi	Van Helsdingen (1997)
DIPTERA	
Acroceridae	
Acrocera orbicula	Speight (1982)
Anisopodidae	
Sylvicola zetterstedti	IBS (2020a)
Ceratopogonidae	
Bezzia annulipes	Ashe *et al.* (2012)

Bezzia leucogaster	Ashe *et al.* (2012)
Bezzia solstitialis	Ashe *et al.* (2012)
Forcipomyia pulchrithorax	Ashe *et al.* (2012)
Palpomyia lineata	Ashe *et al.* (2012) from Chandler *et al.* (2008)
Stilobezzia gracilis	Ashe *et al.* (2012)
Culicidae	
Anopheles claviger	Ashe *et al.* (1991a)
Coquillettidia richiardii	Ashe *et al.* (1991a)
Culex pipiens	Ashe *et al.* (1991a)
Culiseta annulata	Ashe *et al.* (1991a)
Lonchaeidae	
Protearomyia nigra	Chandler (1986)
Chloropidae	
Cryptonevra flavitarsis	Ismay *et al.* (2001)
Oscinisoma cognatum	Ismay *et al.* (2001)
Sciaridae	
Bradysia giraudii	Menzel *et al.* (2006)
Bradysia nitidicollis	Menzel *et al.* (2006)
Bradysia pectoralis	Menzel *et al.* (2006)
Bradysia polonica	Menzel *et al.* (2006)
Bradysia vagans	Menzel *et al.* (2006)
Corynoptera curvispinosa	Menzel *et al.* (2006)
Corynoptera forcipata	Menzel *et al.* (2006)
Corynoptera vagula	Menzel *et al.* (2006)
Cratyna falcifera	Menzel *et al.* (2006)
Pseudolycoriella brunnea	Menzel *et al.* (2006)
Scatopsciara atomaria	Menzel *et al.* (2006)
Scatopsciara multispina	Menzel *et al.* (2006)
Scatopsciara nana	Menzel *et al.* (2006)
Scatopsciara vitripennis	Menzel *et al.* (2006)
Scatopsciara weiperti	Menzel *et al.* (2006)
Schwenckfeldina carbonaria	Menzel *et al.* (2006)), O'Connor & Chandler (2000)
Dixidae	
Dixa autumnalis	IBS (2020c)
Dixa nebulosa	O'Connor & Ashe (2004)
Agromyzidae	
Cerodontha luctuosa	O'Connor & Chandler (2006)
Liriomyza flaveola	O'Connor & Chandler (2006)
Drosophilidae	
Lordiphosa andalusiaca	O'Connor *et al*. (2007a)
Scaptomyza pallida	O'Connor *et al*. (2007a)
Ulidiidae	
Herina oscillans	Speight & Chandler (1983)
Scathophagidae	
Cordilura aemula	Speight (1983)
Pipunculidae	
Dorylomorpha maculata	Speight (1986)

Sarcophagidae	
Sarcophaga aratrix	Blackith (2020)
Sarcophaga carnaria	Blackith (2020)
Sarcophaga crassimargo	Blackith (2020)
Sarcophaga haemorrhoa	Blackith (2020)
Sarcophaga melanura	Blackith (2020)
Sarcophaga sinuata	Blackith (2020)
Sarcophaga subvicina	Blackith (2020)
Sarcophaga vagans	Blackith (2020)
Syrphidae	
Anasimyia contracta	Speight & Gittings (2020)
Anasimyia lineata	Speight (2002), Speight & Gittings (2020)
Baccha elongata	Speight (2002), Speight & Gittings (2020)
Cheilosia albitarsis	Speight & Gittings (2020)
Cheilosia bergenstammi	Speight (2002)
Cheilosia illustrata	Speight (2002)
Cheilosia impressa	Speight (2002)
Cheilosia nebulosa	Speight (2002)
Cheilosia pagana	Speight (2002), Speight & Gittings (2020)
Cheilosia variabilis	Speight (2002)
Cheilosia vernalis	Speight (2002)
Chrysogaster cemiteriorum	Speight (2002), Speight & Gittings (2020)
Chrysogaster solstitialis	Speight (2002), Speight & Gittings (2020)
Chrysotoxum bicinctum	Speight (2002), Speight & Gittings (2020)
Chrysotoxum fasciatus	Speight (2002)
Criorhina berberina	Speight & Gittings (2020)
Dasysyrphus albostriatus	Speight (2002), Speight & Gittings (2020)
Dasysyrphus tricinctus	Speight & Gittings (2020)
Epistrophe eligans	Speight & Gittings (2020)
Episyrphus balteatus	Speight (2002), Speight & Gittings (2020)
Eristalinus sepulchralis	Speight (2002), Speight & Gittings (2020)
Eristalis abusivus	Speight (2002)
Eristalis arbustorum	Speight (2002), Speight & Gittings (2020)
Eristalis horticola	Speight (2002), Speight & Gittings (2020)
Eristalis intricaria	Speight (2002), Speight & Gittings (2020)
Eristalis nemorum	Speight (2002)
Eristalis pertinax	Speight (2002), Speight & Gittings (2020)
Eristalis tenax	Speight (2002)
Eumerus strigatus	Speight (2002), Speight & Gittings (2020)
Eupeodes bucculatus	Speight (2002)
Eupeodes corollae	Speight (2002), Speight & Gittings (2020)
Eupeodes latifasciatus	Speight (2002), Speight & Gittings (2020)
Eupeodes luniger	Speight (2002)
Ferdinandea cuprea	Speight (2002), Speight & Gittings (2020)
Helophilus hybridus	Speight (2002), Speight & Gittings (2020)
Helophilus pendulus	Speight (2002), Speight & Gittings (2020)
Lejogaster metallina	Speight (2002), Speight & Gittings (2020)

Lejogaster tarsata	Speight (2002), Speight & Gittings (2020)
Leucozona laternaria	Speight (2002)
Leucozona lucorum	Speight (2002), Speight & Gittings (2020)
Melangyna lasiophthalma	Speight (2002)
Melangyna umbellatarum	Speight (2002), Speight & Gittings (2020)
Melanogaster aerosa	Speight (2002), Speight & Gittings (2020)
Melanogaster hirtella	Speight (2002), Speight & Gittings (2020)
Melanostoma mellinum	Speight (2002), Speight & Gittings (2020)
Melanostoma scalare	Speight (2002), Speight & Gittings (2020)
Meliscaeva cinctella	Speight (2002)
Microdon myrmicae	Speight (2002)
Myathropa florea	Speight & Gittings (2020)
Neoascia geniculata	Speight (2002)
Neoascia meticulosa	Speight & Gittings (2020)
Neoascia podagrica	Speight (2002), Speight & Gittings (2020)
Neoascia tenur	Speight (2002), Speight & Gittings (2020)
Orthonevra geniculata	Speight (2002), Speight & Gittings (2020)
Paragus haemorrhous	Speight (2002)
Parhelophilus consimilis	Speight (2002), Speight & Gittings (2020)
Pipiza austriaca	Speight & Gittings (2020)
Pipiza noctiluca	Speight (2002)
Platycheirus albimanus	Speight (2002), Speight & Gittings (2020)
Platycheirus amplus	Speight (2002)
Platycheirus angustatus	Speight (2002), Speight & Gittings (2020)
Platycheirus clypeatus	Speight (2002), Speight & Gittings (2020)
Platycheirus fulviventris	Speight (2002), Speight & Gittings (2020)
Platycheirus granditarsus	Speight (2002), Speight & Gittings (2020)
Platycheirus immarginatus	Speight (2002)
Platycheirus manicatus	Speight (2002), Speight & Gittings (2020)
Platycheirus occultus	Speight (2002), Speight & Gittings (2020)
Platycheirus rosarum	Speight (2002), Speight & Gittings (2020)
Platycheirus scambus	Speight (2002), Speight & Gittings (2020)
Platycheirus scutatus	Speight (2002), Speight & Gittings (2020)
Rhingia campestris	Speight (2002), Speight & Gittings (2020)
Riponnensia splendens	Speight (2002)
Scaeva pyrastri	Speight (2002), Speight & Gittings (2020)
Sericomyia silentis	Speight (2002), Speight & Gittings (2020)
Sphaerophoria interrupta	Speight (2002)
Sphaerophoria philanthus	Speight (2002)
Sphegina clunipes	Speight (2002)
Sphegina elegans	Speight (2002)
Syritta pipiens	Speight (2002), Speight & Gittings (2020)
Syrphus ribesii	Speight (2002), Speight & Gittings (2020)
Syrphus vitripennis	Speight (2002)
Trichopsomyia flavitarsis	Speight (2002), Speight & Gittings (2020)
Tropidia scita	Speight (2002)
Volucella bombylans	Speight (2002), Speight & Gittings (2020)

Xylota segnis	Speight (2002), Speight & Gittings (2020)
Xylota sylvarum	Speight & Gittings (2020)
Sciomyzidae	
Limnia paludicola	Speight (1982)
Psacadina verbekei	Speight *et al.* (1992)
Psychodidae	
Atrichobrunettia angustipennis	Withers & O'Connor (1992)
Feuerborniella obscura	Withers & O'Connor (1992)
Mormia satchelli	Withers & O'Connor (1992)
Panimerus albifacies	Withers & O'Connor (1992)
Panimerus goodi	Withers & O'Connor (1992)
Paramormia decipiens	Withers & O'Connor (1992)
Paramormia ustulata	Withers & O'Connor (1992)
Pericoma fuliginosa	Withers & O'Connor (1992)
Pericoma tonnoiri	Withers & O'Connor (1992)
Pericoma trivialis	Withers & O'Connor (1992)
Philosepedon humeralis	Withers & O'Connor (1992)
Psychoda albipennis	Withers & O'Connor (1992)
Psychoda brevicornis	Withers & O'Connor (1992)
Psychoda grisescens	Withers & O'Connor (1992)
Psychoda lobata	Withers & O'Connor (1992)
Psychoda phalaenoides	Withers & O'Connor (1992)
Psychoda trinodulosa	Withers & O'Connor (1992)
Sycorax silacea	Withers & O'Connor (1992)
Telmatoscopus consors	Withers & O'Connor (1992)
Telmatoscopus labeculosus	Withers & O'Connor (1992)
Threticus lucifugus	Withers & O'Connor (1992)
Tonnoiriella pulchra	Withers & O'Connor (1992)
Tipulidae	
Tipula paludosa	Ashe *et al*. (2007a)
Tipula lateralis	Ashe *et al*. (2007a)
Limoniidae	
Cheilotrichia cinerascens	Ashe *et al*. (2007b)
Dicranophragma nemorale	Ashe *et al*. (2005)
Erioconopa trivialis	Ashe *et al*. (2007b)
Molophilus griseus	Ashe *et al*. (2007b)
Molophilus obscurus	Ashe *et al*. (2007b)
Ormosia hederae	Ashe *et al*. (2007b)
Pediciidae	
Tricyphona immaculata	Ashe *et al*. (1995)
Sphaeroceriidae	
Apteromyia claviventris	Nash *et al*. (2001)
Pseudocollinella humida	Nash *et al*. (2001)
Spelobia bifrons	Nash *et al*. (2001)
Rhagionidae	
Chrysopilus cristatus	O'Connor & Chandler (2000)

LEPIDOPTERA	
Argyresthiidae	
Argyresthia pygmaeella	Bond (1991)
Blastobasidae	
Blastobasis adustella	Bond (1991)
Choreutidae	
Anthophila fabriciana	Bond (1991)
Coleophoridae	
Coleophora alticolella	Bond (1991)
Coleophora deauratella	Bond (1991)
Coleophora glaucicolella	Bond (1991)
Coleophora tamesis	Bond (1991)
Cosmopterigidae	
Cosmopterix lienigiella	Bond (1991)
Cosmopterix orichalcea	Bond (1991)
Crambidae	
Agriphila straminella	Bond (1991)
Agriphila tristella	Bond (1991)
Anania fuscalis	Bond (1991)
Cataclysta lemnata	Bond (1991)
Catoptria margaritella	Bond (1991)
Chrysoteuchia culmella	Bond (1991)
Crambus lathoniellus	Bond (1991)
Crambus perlella	Bond (1991)
Dipleurina lacustrata	Bond (1991)
Eudonia pallida	Bond (1991)
Pleuroptya ruralis	Bond (1991)
Scoparia ambigualis	Bond (1991)
Scoparia subfusca	Bond (1991)
Udea lutealis	Bond (1991)
Drepanidae	
Cilix glaucata	Bond (1991)
Elachistidae	
Cosmiotes consortella	Bond (1991)
Elachista albidella	Bond (1991)
Elachista albifrontella	Bond (1991)
Elachista apicipunctella	Bond (1991)
Elachista argentella	Bond (1991)
Elachista atricomella	Bond (1991)
Elachista luticomella	Bond (1991)
Elachista rufocinerea	Bond (1991)
Elachista subnigrella	Bond (1991)
Elachista triatomea	Bond (1991)
Elachista utonella	Bond (1991)
Erebidae	
Euclidia glyphica	Bond (1991)
Hypena proboscidalis	Bond (1991)

Phragmatobia fuliginosa	Bond (1991)
Rivula sericealis	Bond (1991)
Spilosoma lutea	Bond (1991)
Thumatha senex	Bond (1991)
Tyria jacobaeae	Bond (1991)
Gelechiidae	
Brachmia rufescens	Bond (1991)
Bryotropha terrella	Bond (1991)
Geometridae	
Abraxas grossulariata	Bond (1991)
Camptogramma bilineata	Bond (1991)
Colostygia pectinataria	Bond (1991)
Earophila badiata	Bond (1991)
Epirrhoe alternata	Bond (1991)
Eulithis testata	Bond (1991)
Eupithecia absinthiata	Bond (1991)
Eupithecia icterata	Bond (1991)
Eupithecia subumbrata	Bond (1991)
Eupithecia tenuiata	Bond (1991)
Gandaritis pyraliata	Bond (1991)
Idaea aversata	Bond (1991)
Idaea biselata	Bond (1991)
Lomaspilis marginata	Bond (1991)
Ourapteryx sambucaria	Bond (1991)
Perizoma alchemillata	Bond (1991)
Pseudoterpna pruinata	Bond (1991)
Scotopteryx chenopodiata	Bond (1991)
Semiothisa clathrata	Bond (1991)
Xanthorhoe ferrugata	Bond (1991)
Xanthorhoe montanata	Bond (1991)
Glyphipterigidae	
Glyphipterix schoenicolella	Bond (1991)
Glyphipterix simpliciella	Bond (1991)
Glyphipterix thrasonella	Bond (1991)
Orthotaelia sparganella	Bond (1991)
Gracillariidae	
Gracillaria syringella	Bond (1991)
Parornix torquillella	Bond (1991)
Phyllonorycter nigrescentella	Bond (1991)
Hepialidae	
Hepialus fusconebulosa	Bond (1991)
Incurvariidae	
Incurvaria praelatella	Bond (1991)
Lasiocampidae	
Lasiocampa quercus	Bond (1991)
Lycaenidae	
Lycaena phlaeas	Bond (1991), NBDC (2020d)

Polyommatus icarus	Bond (1991), NBDC (2020c; 2020d)
Lyonetiidae	
Lyonetia clerkella	Bond (1991)
Micropterigidae	
Micropterix aruncella	Bond (1991)
Micropterix calthella	Bond (1991)
Nepticulidae	
Stigmella hybnerella	Bond (1991)
Noctuidae	
Abrostola triplasia	Bond (1991)
Acronicta rumicis	Bond (1991)
Apamea lithoxylea	Bond (1991)
Apamea monoglypha	Bond (1991)
Apamea remissa	Bond (1991)
Autographa bractea	Bond (1991)
Autographa gamma	Bond (1991)
Autographa jota	Bond (1991)
Autographa pulchrina	Bond (1991)
Callistege mi	Bond (1991)
Deltote uncula	Bond (1991)
Diachrysia chrysitis	Bond (1991)
Mesapamea secalis	Bond (1991)
Mythimna ferrago	Bond (1991)
Mythimna impura	Bond (1991)
Mythimna pudorina	Bond (1991)
Mythimna straminea	Bond (1991)
Noctua janthina	Bond (1991)
Noctua pronuba	Bond (1991)
Ochropleura plecta	Bond (1991)
Oligia fasciuncula	Bond (1991)
Photedes minima	Bond (1991)
Photedes pygmina	Bond (1991)
Plusia festucae	Bond (1991)
Xestia sexstrigata	Bond (1991)
Xestia triangulum	Bond (1991)
Nymphalidae	
Aglais io	Bond (1991), NBDC (2020c; 2020d)
Aglais urticae	Bond (1991), NBDC (2020c; 2020d)
Aphantopus hyperantus	Bond (1991), NBDC (2020c; 2020d)
Coenonympha pamphilus	Bond (1991), NBDC (2020c; 2020d)
Euphydryas aurinia	Bond (1991)
Lasiommata megera	Bond (1991)
Maniola jurtina	Bond (1991), NBDC (2020c; 2020d)
Pararge aegeria	Bond (1991), NBDC (2020c; 2020d)
Vanessa atalanta	Bond (1991), NBDC (2020c; 2020d)
Vanessa cardui	NBDC (2020c; 2020d)
Oecophoridae	

Borkhausenia fuscescens	Bond (1991)
Opostegidae	
Opostega crepusculella	Bond (1991)
Peleopodidae	
Carcina quercana	Bond (1991)
Pieridae	
Anthocharis cardamines	Bond (1991), NBDC (2020c; 2020d)
Gonepteryx rhamni	Bond (1991), NBDC (2020d)
Leptidea sinapis	Bond (1991), NBDC (2020d)
Pieris brassicae	Bond (1991), NBDC (2020d)
Pieris napi	Bond (1991), NBDC (2020c; 2020d)
Pieris rapae	NBDC (2020c; 2020d)
Plutellidae	
Plutella xylostella	Bond (1991)
Pterophoridae	
Adaina microdactyla	Bond (1991)
Platyptilia gonodactyla	Bond (1991)
Stenoptilia bipunctidactyla	Bond (1991)
Tineidae	
Tinea trinotella	Bond (1991)
Tortricidae	
Aethes cnicana	Bond (1991)
Agapeta zoegana	Bond (1991)
Ancylis badiana	Bond (1991)
Aphelia paleana	Bond (1991)
Bactra lancealana	Bond (1991)
Celypha lacunana	Bond (1991)
Clepsis consimilana	Bond (1991)
Cnephasia asseclana	Bond (1991)
Cnephasia incertana	Bond (1991)
Cochylidia rupicola	Bond (1991)
Cydia jungiella	Bond (1991)
Cydia ulicetana	Bond (1991)
Dichrorampha alpinana	Bond (1991)
Dichrorampha petiverella	Bond (1991)
Endothenia marginana	Bond (1991)
Epiblema cirsiana	Bond (1991)
Epiblema sticticana	Bond (1991)
Eucosma campoliliana	Bond (1991)
Eucosma cana	Bond (1991)
Grapholita compositella	Bond (1991)
Hedya nubiferana	Bond (1991)
Lozotaenia forsterana	Bond (1991)
Notocelia cynosbatella	Bond (1991)
Pandemis cerasana	Bond (1991)
Pandemis heparana	Bond (1991)
Phiaris micana	Bond (1991)

Pseudargyrotoza conwagana	Bond (1991)
Yponomeutidae	
Yponomeuta sp.	Bond (1991)
Zelleria hepariella	NMI (2020)
Zygaenidae	
Zygaena filipendulae	Bond (1991)
TRICHOPTERA	
Beraeidae	
Beraea pullata	O'Connor (2015), O'Connor & O'Connor (2019)
Beraea maurus	O'Connor (2015), O'Connor & O'Connor (2019)
Hydropsychidae	
Cheumatopsyche lepida	NBDC (O'Connor (2015) addendum)
Hydroptilidae	
Hydroptila angulata	O'Connor (2015)
Hydroptila martini	O'Connor & O'Connor (2013; 2019), O'Connor (2015)
Hydroptila valesiaca	O'Connor & O'Connor (2013; 2019)
Oxyethira frici	O'Connor & O'Connor (2019)
Oxyethira simplex	O'Connor (2015)
Glossosomatidae	
Agapetus fuscipes	O'Connor & O'Connor (2019)
Lepidostomatidae	
Crunoecia irrorata	O'Connor & O'Connor (2019)
Leptoceridae	
Adicella reducta	O'Connor (2015)
Athripsodes aterrimus	O'Connor (2015)
Ceraclea albimacula	O'Connor (2015)
Leptocerus tineiformis	O'Connor *et al.* (1990)
Mystacides azurea	O'Connor (2015)
Mystacides longicornis	O'Connor (2015)
Oecetis lacustris	O'Connor (2015)
Limnephilidae	
Anabolia nervosa	O'Connor (2015)
Halesus radiatus	O'Connor (2015)
Limnephilus decipiens	O'Connor & O'Connor (2019)
Limnephilus flavicornis	O'Connor (2015)
Limnephilus fuscinervis	O'Connor (2015)
Limnephilus hirsutus	O'Connor & O'Connor (2019)
Limnephilus lunatus	O'Connor (2015)
Limnephilus marmoratus	O'Connor (2015)
Limnephilus pati	O'Connor *et al.* (2019)
Limnephilus rhombicus	O'Connor (2015)
Limnephilus sparsus	O'Connor (2015)
Micropterna lateralis	O'Connor (2015)
Micropterna sequax	O'Connor (2015), O'Connor & O'Connor (2019)
Phryganeidae	
Agrypnia obsoleta	O'Connor (2015)
Polycentropodidae	

Plectrocnemia conspersa	O'Connor & O'Connor (2019)
Plectrocnemia geniculata	O'Connor (2015), O'Connor & O'Connor (2019)
Polycentropus flavomaculatus	NBDC (O'Connor (2015) addendum)
Psychomyiidae	
Lype phaeopa	O'Connor & O'Connor (2019)
Sericostomatidae	
Sericostoma personatum	O'Connor & O'Connor (2019)
COLEOPTERA	
Carabidae	
Agonum muelleri	Lott & Foster (1990)
Elaphrus riparius	Lott & Foster (1990)
Coccinellidae	
Adalia bipunctata	NBDC (2020f)
Coccinella septempunctata	NBDC (2020f)
Psyllobora vigintiduopunctata	NBDC (2020f)
Hydrophilidae	
Hydrobius fuscipes	Balfour Browne Club (2020)
Staphylinidae	
Acrotona aterrima	Good (2005)
Acrotona obfuscata	Good (2005)
Acrotona parvula	Good (2005)
Acrotona pygmaea	Good (2005)
Aleochara cuniculorum	Good (2005)
Aleochara lanuginosa	Good (2005)
Aleochara sparsa	Good (2005)
Alianta incana	Good (2005)
Aloconota gregaria	Good (2005)
Aloconota sulcifrons	Good (2005)
Amischa analis	Good (2005)
Amischa decipiens	Good (2005)
Anotylus rugosus	Good (2005)
Anotylus tetracarinatus	Good (2005)
Atheta aeneicollis	Good (1991)
Atheta amicula	Good (2005)
Atheta amplicollis	Good (2005)
Atheta aquatilis	Good (2005)
Atheta atramentaria	Good (2005)
Atheta britanniae	Good (2005)
Atheta crassicornis-group	Good (2005)
Atheta ebenina	Good (2005)
Atheta eremita	Good (2005)
Atheta graminicola	Good (2005)
Atheta harwoodi	Good (2005)
Atheta ischnocera	Good (2005)
Atheta laticollis	Good (2005)
Atheta liliputana	Good (1994), Good (2005)
Atheta longicornis	Good (2005)

Atheta macrocera	Good (2005)
Atheta nigricornis	Good (2005)
Atheta nigripes	Good (2005)
Atheta occulta	Good (2005)
Atheta orphana	Good (2005)
Atheta rivularis	Good (2005)
Atheta strandiella	Good (2005)
Atheta triangulum	Good (2005)
Atheta zosterae	Good (2005)
Bisnius fimetarius	Good (2005)
Bisnius puella	Good (2005)
Callicerus obscurus	Good (2005)
Carpelimus corticinus	Good (2005)
Carpelimus rivularis	Good (2005)
Carpelimus subtilicornis	Good (2005)
Cypha punctum	Good (2005)
Datomicra celata	Good (2005)
Dilacra luteipes	Good (2005)
Dinaraea aequata	Good (2005)
Erichsonius cinerascens	Good (2005)
Euaesthetus bipunctatus	Good (2005)
Euaesthetus ruficapillus	Good (2005)
Eusphalerum luteum	Good (2005)
Gabrius appendiculatus	Good (2005)
Gabrius breviventer	Good (2005)
Gabrius nigritulus	Good (2005)
Gabrius trossulus	Good (2005)
Gymnusa brevicollis	Good (2005)
Gyrohypnus angustatus	Good (2005)
Habrocerus capillaricornis	Good (2005)
Haploglossa nidicola	Good (2005)
Hygronoma dimidiata	Good (2005)
Ilyobates nigricollis	Good (2005)
Lathrobium brunnipes	Good (2005)
Lathrobium fulvipenne	Good (2005)
Lathrobium quadratum	Good (2005)
Lesteva punctata	Good (2005)
Lesteva sicula	Good (2005)
Lordithon thoracicus	Good (2005)
Mocyta clientula	Good (2005)
Mocyta fungi	Good (2005)
Mycetoporus angularis	Good (2005)
Mycetoporus lepidus	Good (2005)
Mycetoporus longulus	Good (2005)
Mycetoporus nigricollis	Good (2005)
Mycetoporus punctus	Good (2005)
Mycetoporus rufescens	Good (2005)

Myllaena brevicornis	Good (2005)
Myllaena dubia	Good (2005)
Myllaena infuscata	Good (2005)
Myllaena intermedia	Good (2005)
Myllaena minuta	Good (2005)
Neobisnius lathrobioides	Good (2005)
Neobisnius procerulus	Good (2005)
Ochthephilum fracticorne	Good (2005)
Ocyusa picina	Good (2005)
Oligota inflata	Good (2005)
Olophrum fuscum	Good (2005)
Olophrum piceum	Good (2005)
Omalium rivulare	Good (2005)
Othius punctulatus	Good (2005)
Oxypoda elongatula	Good (2005)
Oxypoda opaca	Good (2005)
Paederus riparius	Good (2005)
Philhygra debilis	Good (2005)
Philhygra elongatula	Good (2005)
Philhygra hygrotopora	Good (2005)
Philhygra luridipennis	Good (2005)
Philhygra malleus	Good (2005)
Philhygra marginatus	Good (2005)
Philhygra melanocera	Good (2005)
Philhygra palustris	Good (2005)
Philonthus carbonarius	Good (2005)
Philonthus cognatus	Good (2005)
Philonthus fumarius	Good (2005)
Philonthus furcifer	Good (2005)
Philonthus laminatus	Good (2005)
Philonthus nigrita	Good (2005)
Philonthus quisquiliarius	Good (2005)
Philonthus sanguinolentus	Good (2005)
Philonthus succicola	Good (2005)
Philonthus umbratilis	Good (2005)
Philorinum sordidum	Good (2005)
Platystethus arenarius	Good (2005)
Proteinus ovalis	Good (2005)
Quedius boopoides	Good (2005)
Quedius cinctus	Good (2005)
Quedius curtipennis	Good (2005)
Quedius fuliginosus	Good (2005)
Quedius fumatus	Good (2005)
Quedius humeralis	Good (2005)
Quedius maurorufus	Good (2005)
Quedius semiaeneus	Good (2005)
Rugilus erichsonii	Good (2005) (As. *R. erichsoni*)

Rugilus similis	Good (2005)
Sepedophilus littoreus	Good (2005)
Staphylinus dimidiaticornis	Good (2005)
Staphylinus erythropterus	Lott & Foster (1990)
Stenus bifoveolatus	Lott & Foster (1990), Good (2005)
Stenus bimaculatus	Good (2005)
Stenus binotatus	Lott & Foster (1990)
Stenus boops	Lott & Foster (1990), Good (2005)
Stenus brevipennis	Good (2005)
Stenus brunnipes	Good (2005)
Stenus cicindeloides	Good (2005)
Stenus clavicornis	Good (2005)
Stenus flavipes	Good (2005)
Stenus fornicatus	Lott & Foster (1990)
Stenus fulvicornis	Good (2005)
Stenus fuscipes	Good (2005)
Stenus impressus	Good (2005)
Stenus incrassatus	Good (2005)
Stenus juno	Good (2005)
Stenus latifrons	Lott & Foster (1990)
Stenus melanarius	Good (2005)
Stenus nanus	Good (2005)
Stenus nitens	Good (2005)
Stenus nitidiusculus	Good (2005)
Stenus pallitarsis	Good (2005)
Stenus palustris	Good (2005)
Stenus picipennis	Good (2005)
Stenus picipes	Good (2005)
Stenus pubescens	Good (2005)
Stenus pusillus	Good (2005)
Stenus similis	Good (2005)
Tachinus laticollis	Good (2005)
Tachinus marginellus	Good (2005)
Tachinus signatus	Good (2005)
Tachyporus chrysomelinus	Good (2005)
Tachyporus dispar	Good (2005)
Tachyporus hypnorum	Good (2005)
Tachyporus nitidulus	Good (2005)
Tachyporus obtusus	Good (2005)
Tachyporus pallidus	Good (2005)
Tinotus morion	Good (2005)
Zyras collaris	Good (2005)
HEMIPTERA	
HETEROPTERA	
Acanthosomatidae	
Acanthosoma haemorrhoidale	Nelson (2020)
Anthocoridae	

Anthocoris nemoralis	Nelson (2020)
Anthocoris nemorum	Nelson (2020)
Cymidae	
Cymus glandicolor	Nelson (2020)
Gerridae	
Gerris lateralis	Nelson (2020)
Hebridae	
Hebrus ruficeps	Nelson (2020)
Miridae	
Apolygus spinolae	Nelson (2020)
Deraeocoris scutellaris	Aukema *et al*. (2007)
Heterotoma planicornis	Nelson (2020)
Pithanus maerkelii	Nelson (2020)
Stenodema calcarata	Nelson (2020)
Nabidae	
Nabis flavomarginatus	Nelson (2020)
Nepidae	
Nepa cinerea	Nelson (2020)
Pentatomidae	
Pentatoma rufipes	Nelson (2020)
Picromerus bidens	Nelson (2020)
HOMOPTERA	
Cicadellidae	
Idiocerus stigmaticalis	De Courcy Williams (1989)
ODONATA	
Aeshnidae	
Aeshna grandis	NBDC (2020e)
Aeshna juncea	NBDC (2020e)
Brachytron pratense	NBDC (2020e)
Coenagrionidae	
Coenagrion puella	NBDC (2020e)
Coenagrion pulchellum	CEDaR (2020)
Enallagma cyathigerum	CEDaR (2020)
Ischnura elegans	NBDC (2020e)
Ischnura pumilio	CEDaR (2020)
Pyrrhosoma nymphula	NBDC (2020e)
Lestidae	
Lestes sponsa	NBDC (2020e)
Libellulidae	
Libellula quadrimaculata	NBDC (2020e)
Orthetrum coerulescens	CEDaR (2020)
Sympetrum danae	NBDC (2020e)
Sympetrum sanguineum	NBDC (2020e)
Sympetrum striolatum	NBDC (2020e)
HYMENOPTERA	
Andrenidae	
Andrena bicolor	NBDC (2020b)

Andrena haemorrhoa	NBDC (2020b)
Apidae	
Apis mellifera	NBDC (2020b)
Bombus lapidarius	NBDC (2020b)
Bombus lucorum	NBDC (2020b)
Bombus muscorum	NBDC (2020b)
Bombus pascuorum	NBDC (2020b)
Bombus pratorum	NBDC (2020b)
Bombus terrestris	NBDC (2020b)
Eulophidae	
Chrysocharis pubicornis	O'Connor & Thuróczy (2009)
Pnigalio pectinicornis	O'Connor & Thuróczy (2009)
Sympiesis sericeicornis	O'Connor & Thuróczy (2009)
Eumenidae	
Symmorphus bifasciatus	Ronayne & O'Connor (2003)
Ichneumonidae	
Endromopoda arundinator	O'Connor *et al.* (2007b)
Scambus nigricans	O'Connor *et al.* (2007b)
Platygastridae	
Platygaster orcus	Buhl & O'Connor (2010)
Synopeas ciliatum	Buhl & O'Connor (2008), O'Connor & Buhl (2016)
Pteromalidae	
Coelopisthia extenta	Thuróczy & O'Connor (2009)
Stictomischus groschkei	O'Connor & Thuróczy (2009)
Tenthredinidae	
Dolerus aericeps	O'Connor *et al.* (1997)
Dolerus bimaculatus	O'Connor *et al.* (1997)
Dolerus liogaster	O'Connor *et al.* (1997)
Empria pallimacula	O'Connor *et al.* (1997)
Nematus oligospilus	O'Connor *et al.* (1997)
Nematus papillosus	O'Connor *et al.* (1997)
Platycampus luridiventris	O'Connor *et al.* (1997)
Pontania pedunculi	O'Connor *et al.* (1997)
Pontania vesicator	O'Connor *et al.* (1997)
Pontania viminalis	O'Connor *et al.* (1997)
Priophorus morio	O'Connor *et al.* (1997)
Torymidae	
Torymus hederae	O'Connor & Thuróczy (2009)
PSOCOPTERA	
Chrysopidae	
Graphopsocus cruciatus	Smithers & O'Connor (1991)
NEUROPTERA	
Chrysoperla carnea	Barnard *et al*. (1991)
Cunctochrysa albolineata	Barnard *et al*. (1991)
Hemerobius lutescens	Barnard *et al*. (1991)
Hemerobius stigma	IBS (2020b)
Micromus angulatus	Barnard *et al*. (1991)

Psectra diptera	Withers (1992)

Scragh Bog

SCIENTIFIC NAME	SOURCE
HIRUDINEA	
Erpobdellidae	
Erpobdella octoculata	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Erpobdella testacea	Anderson *et al*. (2017)
Glossiphoniidae	
Glossiphonia complanata	Hannigan & Kelly-Quinn (2012)
Alboglossiphonia heteroclita	Hannigan & Kelly-Quinn (2012)
Helobdella stagnalis	Hannigan & Kelly-Quinn (2012)
Haemopidae	
Haemopis sanguisuga	Anderson *et al*. (2017)
MOLLUSCA	
GASTROPODA	
Acroloxidae	
Acroloxus lacustris	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Agriolimacidae	
Deroceras invadens	Anderson *et al*. (2017)
Deroceras laeve	Anderson *et al*. (2017)
Arionidae	
Arion ater	Anderson *et al*. (2017)
Arion distinctus	Anderson *et al*. (2017)
Bithyniidae	
Bithynia tentaculata	Anderson *et al*. (2017)
Cochlicopidae	
Cochlicopa lubrica	Anderson *et al*. (2017)
Euconulidae	
Euconulus alderi	Anderson *et al*. (2017)
Gastrodontidae	
Nesovitrea hammonis	Anderson *et al*. (2017)
Zonitoides nitidus	Anderson *et al*. (2017)
Limacidae	
Limax maximus	Anderson *et al*. (2017)
Lymnaeidae	
Galba truncatula	Anderson *et al*. (2017)
Stagnicola palustris	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Radix balthica	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Planorbidae	
Bathyomphalus contortus	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Hippeutis complanatus	Anderson *et al.* (2017)
Planorbis crista	Hannigan & Kelly-Quinn (2012)
Planorbis planorbis	Hannigan & Kelly-Quinn (2012)
Punctidae	
Punctum pygmaeum	Anderson *et al*. (2017)
Succineidae	

Oxyloma elegans	Anderson *et al*. (2017)
Succinea sp.	Hannigan & Kelly-Quinn (2012)
Valvatidae	
Valvata cristata	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Vertiginidae	
Vertigo antivertigo	Anderson *et al.* (2017), Moorkens (2004)
BIVALVIA	
Sphaeriidae	
Pisidium personatum	Anderson *et al*. (2017)
Pisidium pseudosphaerium	Moorkens (2004)
Sphaerium nucleus	Anderson *et al*. (2017)
CRUSTACEA	
ISOPODA	
Asellidae	
Asellus aquaticus	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Oniscidae	
Oniscus asellus	Anderson *et al*. (2017)
Philosciidae	
Philoscia muscorum	Anderson *et al*. (2017)
Trichoniscidae	
Trichoniscus pusillus	Anderson *et al*. (2017)
ARACHNIDA	
ARANEAE	
Araneidae	
Araniella cucurbitina	Anderson *et al.* (2017), Van Helsdingen (1998)
Larinioides cornutus	Anderson *et al.* (2017), Van Helsdingen (1998)
Neriene montana	Van Helsdingen (1998)
Nuctenea umbratica	Anderson *et al*. (2017)
Clubionidae	
Clubiona comta	Anderson *et al*. (2017)
Clubiona diversa	Anderson *et al*. (2017)
Clubiona phragmitis	Anderson *et al*. (2017)
Clubiona reclusa	Anderson *et al*. (2017), Van Helsdingen (1998)
Clubiona stagnatilis	Anderson *et al*. (2017), Van Helsdingen (1998)
Dictynidae	
Argyroneta aquatica	Anderson *et al*. (2017)
Dictyna arundinacea	Anderson *et al*. (2017), Van Helsdingen (1998)
Gnaphosidae	
Drassodes cupreus	Anderson *et al*. (2017)
Haplodrassus signifer	Anderson *et al.* (2017)
Hahniidae	
Antistea elegans	Anderson *et al.* (2017), Van Helsdingen (1998)
Linyphiidae	
Agyneta cauta	Anderson *et al*. (2017)
Agyneta subtilis	Anderson *et al*. (2017)
Aphileta misera	Anderson *et al*. (2017), Van Helsdingen (1998)
Araeoncus crassiceps	Anderson *et al*. (2017), Van Helsdingen (1998)

Baryphyma gowerense	Anderson *et al*. (2017)
Baryphyma trifrons	Van Helsdingen (1998)
Bathyphantes approximatus	Anderson *et al*. (2017), Van Helsdingen (1998)
Bathyphantes gracilis	Anderson *et al*. (2017), Van Helsdingen (1998)
Bathyphantes parvulus	Anderson *et al*. (2017), Van Helsdingen (1998)
Bathyphantes setiger	Anderson *et al*. (2017)
Carorita limnaea	Anderson *et al*. (2017), Van Helsdingen (1998)
Centromerus arcanus	Anderson *et al*. (2017)
Centromerus dilutus	Anderson *et al*. (2017)
Ceratinella brevipes	Anderson *et al*. (2017)
Ceratinella scabrosa	Anderson *et al*. (2017)
Dicymbium nigrum	Anderson *et al*. (2017)
Diplocephalus picinus	Anderson *et al*. (2017)
Diplocephalus permixtus	Van Helsdingen (1998)
Dismodicus bifrons	Anderson *et al*. (2017)
Drepanotylus uncatus	Anderson *et al*. (2017), Van Helsdingen (1998)
Erigone atra	Anderson *et al*. (2017)
Erigone dentipalpis	Van Helsdingen (1998)
Erigonella ignobilis	Van Helsdingen (1998)
Gnathonarium dentatum	Anderson *et al*. (2017), Van Helsdingen (1998)
Gonatium rubens	Anderson *et al*. (2017)
Gongylidiellum vivum	Anderson *et al*. (2017)
Hypomma bituberculatum	Anderson *et al*. (2017), Van Helsdingen (1998)
Hypomma fulvum	Anderson *et al*. (2017)
Kaestneria pullata	Anderson *et al*. (2017), Van Helsdingen (1998)
Palliduphantes ericaeus	Anderson *et al*. (2017), Van Helsdingen (1998)
Lepthyphantes leprosus	Anderson *et al*. (2017)
Leptorhoptrum robustum	Anderson *et al*. (2017)
Lophomma punctatum	Anderson *et al*. (2017), Van Helsdingen (1998)
Maso sundevalli	Anderson *et al*. (2017), Van Helsdingen (1998)
Metopobactrus prominulus	Anderson *et al*. (2017)
Micrargus herbigradus	Van Helsdingen (1998)
Microlinyphia impigra	Van Helsdingen (1998)
Microlinyphia pusilla	Anderson *et al*. (2017)
Minyriolus pusillus	Anderson *et al*. (2017)
Monocephalus fuscipes	Anderson *et al*. (2017)
Neriene clathrata	Anderson *et al*. (2017), Van Helsdingen (1998)
Neriene peltata	Van Helsdingen (1998)
Oedothorax gibbosus	Anderson *et al*. (2017), Van Helsdingen (1998)
Oedothorax gibbosus f. tuberosus	Anderson *et al*. (2017)
Oedothorax retusus	Van Helsdingen (1998)
Oryphantes angulatus	Anderson *et al*. (2017)
Palliduphantes pallidus	Anderson *et al*. (2017)
Pocadicnemis juncea	Anderson *et al*. (2017)
Pocadicnemis pumila	Anderson *et al*. (2017), Van Helsdingen (1998)
Porrhomma oblitum	Van Helsdingen (1998)

Porrhomma pygmaeum	Anderson *et al*. (2017)
Satilatlas britteni	Anderson *et al*. (2017)
Silometopus elegans	Anderson *et al*. (2017)
Silometopus reussi	Anderson *et al*. (2017)
Tallusia experta	Anderson *et al*. (2017)
Tapinocyba pallens	Anderson *et al*. (2017)
Taranucnus setosus	Anderson *et al*. (2017), Van Helsdingen (1998)
Tenuiphantes alacris	Anderson *et al*. (2017)
Tenuiphantes flavipes	Anderson *et al*. (2017)
Tenuiphantes mengei	Anderson *et al*. (2017)
Tenuiphantes tenuis	Anderson *et al*. (2017)
Trichopterna thorelli	Anderson *et al*. (2017)
Walckenaeria acuminata	Anderson *et al*. (2017)
Walckenaeria atrotibialis	Anderson *et al*. (2017)
Walckenaeria nudipalpis	Anderson *et al*. (2017)
Walckenaeria vigilax	Anderson *et al*. (2017)
Liocranidae	
Agroeca proxima	Anderson *et al*. (2017)
Lycosidae	
Alopecosa pulverulenta	Anderson *et al*. (2017)
Pardosa amentata	Anderson *et al*. (2017)
Pardosa pullata	Anderson *et al*. (2017), Van Helsdingen (1998)
Pirata hygrophilus	Anderson *et al*. (2017), Van Helsdingen (1998)
Pirata piraticus	Anderson *et al*. (2017), Van Helsdingen (1998)
Pirata piscatorius	Anderson *et al*. (2017), Van Helsdingen (1998)
Pirata tenuitarsis	Anderson *et al*. (2017)
Trochosa ruricola	Anderson *et al*. (2017)
Trochosa spinipalpis	Anderson *et al*. (2017)
Trochosa terricola	Anderson *et al*. (2017)
Mimetidae	
Ero cambridgei	Anderson *et al*. (2017), Van Helsdingen (1998)
Miturgidae	
Zora spinimana	Anderson *et al*. (2017)
Philodromidae	
Philodromus aureolus	Van Helsdingen (1998)
Tibellus maritimus	Van Helsdingen (1998)
Pisauridae	
Dolomedes fimbriatus	Anderson *et al.* (2017), Van Helsdingen (1998)
Salticidae	
Neon reticulatus	Anderson *et al*. (2017), Van Helsdingen (1998)
Salticus cingulatus	Anderson *et al*. (2017)
Sitticus caricis	Anderson *et al*. (2017), Van Helsdingen (1998)
Tetragnathidae	
Metellina mengei	Anderson *et al*. (2017), Van Helsdingen (1998)
Metellina merianae	Anderson *et al*. (2017)
Pachygnatha clercki	Anderson *et al*. (2017), Van Helsdingen (1998)
Tetragnatha extensa	Anderson *et al*. (2017), Van Helsdingen (1998)

Tetragnatha montana	Van Helsdingen (1998)
Tetragnatha obtusa	Anderson *et al*. (2017)
Theridiidae	
Enoplognatha ovata	Anderson *et al*. (2017), Van Helsdingen (1998)
Robertus lividus	Anderson *et al*. (2017)
Rugathodes instabilis	Van Helsdingen (1998)
Paidiscura pallens	Anderson *et al*. (2017)
Phylloneta sisyphia	Anderson *et al*. (2017), Van Helsdingen (1998)
Thomisidae	
Misumena vatia	Anderson *et al*. (2017), Van Helsdingen (1998)
Ozyptila trux	Anderson *et al*. (2017), Van Helsdingen (1998)
Xysticus cristatus	Anderson *et al*. (2017)
Xysticus ulmi	Anderson *et al*. (2017), Van Helsdingen (1998)
OPILIONES	
Nemastomatidae	
Nemastoma bimaculatum	Anderson *et al*. (2017)
Phalangiidae	
Platybunus triangularis	Anderson *et al*. (2017)
DIPTERA	
Ceratopogonidae	
Palpomyia spinipes	Ashe *et al*. (2012)
Chamaemyiidae	
Acrometopia wahlbergi	Speight & Cogan (1979), Speight & Legrand (1984), NPWS (2015)
Chaoboridae	
Chaoborus crystallinus	Hannigan & Kelly-Quinn (2012)
Cylindrotomidae	
Phalacrocera replicata	Hannigan & Kelly-Quinn (2012)
Dolichopodidae	
Dolichopus pennatus	Speight & Legrand (1984)
Limoniidae	
Helius flavus	Ashe *et al*. (1991b)
Ptychopteridae	
Ptychoptera minuta	Speight & Legrand (1984)
Scathophagidae	
Cordilura albipes	Speight & Legrand (1984)
Cordilura pudica	Speight & Legrand (1984)
Norellisoma lituratum	Speight & Legrand (1984)
Pogonota barbata	Speight & Legrand (1984)
Scathophaga inquinata	Speight & Legrand (1984)
Sciaridae	
Schwenckfeldina carbonaria	Menzel *et al.* (2006)
Sciara humeralis	Menzel *et al.* (2006)
Sciomyzidae	
Dictya umbrarum	Speight & Legrand (1984)
Elgiva cucularia	Speight & Legrand (1984)
Ilione lineata	Speight & Legrand (1984)
Limnia paludicola	Speight & Legrand (1984)

Pherbellia schoenherri	Speight & Legrand (1984)
Pherbina coryleti	Speight & Legrand (1984)
Renocera striata	Speight & Legrand (1984)
Sepedon spinipes	Speight & Legrand (1984)
Tetanocera arrogans	Speight & Legrand (1984)
Tetanocera ferruginea	Speight & Legrand (1984)
Tetanocera freyi	Speight & Legrand (1984), NPWS (2015)
Tetanocera robusta	Speight & Legrand (1984)
Tetanocera unicolor	Speight & Legrand (1984)
Stratiomyiidae	
Beris vallata	Speight & Legrand (1984)
Chloromyia formosa	Speight & Legrand (1984)
Oplodontha viridula	Speight & Legrand (1984)
Syrphidae	
Anasimyia lineata	Speight & Legrand (1984)
Anasimyia lunulata	Speight & Legrand (1984)
Chalcosyrphus nemorum	Speight & Gittings (2020)
Cheilosia albitarsis	Speight & Legrand (1984)
Cheilosia antiqua	Speight & Legrand (1984)
Cheilosia illustrata	Speight & Legrand (1984)
Cheilosia pagana	Speight & Legrand (1984)
Cheilosia variabilis	Speight & Legrand (1984)
Cheilosia vernalis	Speight & Legrand (1984)
Chrysogaster cemiteriorum	Speight & Legrand (1984)
Melanogaster hirtella	Speight & Legrand (1984)
Chrysogaster solstitialis	Speight & Legrand (1984), Speight & Gittings (2020)
Chrysogaster virescens	Speight & Legrand (1984)
Epistrophe grossulariae	Speight & Legrand (1984)
Eristalis arbustorum	Speight & Legrand (1984), Speight & Gittings (2020)
Eristalis horticola	Speight & Legrand (1984), Speight & Gittings (2020)
Eristalis interrupta	Speight & Legrand (1984)
Eristalis intricaria	Speight & Legrand (1984), Speight & Gittings (2020)
Eristalis pertinax	Speight & Legrand (1984)
Helophilus hybridus	Speight & Legrand (1984)
Helophilus pendulus	Speight & Legrand (1984)
Lejogaster metallina	Speight & Legrand (1984), Speight & Gittings (2020)
Leucozona glaucia	Speight & Legrand (1984)
Leucozona laternaria	Speight & Legrand (1984)
Leucozona lucorum	Speight & Legrand (1984), Speight & Gittings (2020)
Melangyna arctica	Speight & Legrand (1984), Speight & Gittings (2020)
Melangyna umbellatarum	Speight & Legrand (1984), Speight & Gittings (2020)
Melanostoma mellinum	Speight & Legrand (1984), Speight & Gittings (2020)
Melanostoma scalare	Speight & Legrand (1984), Speight & Gittings (2020)
Myathropa florea	Speight & Gittings (2020)
Neoascia meticulosa	Speight & Legrand (1984), Speight & Gittings (2020)
Neoascia podagrica	Speight & Legrand (1984)
Neoascia tenur	Speight & Legrand (1984), Speight & Gittings (2020)

Parhelophilus consimilis	Speight & Legrand (1984), Speight & Gittings (2020)
Pipizella viduata	Speight & Legrand (1984)
Platycheirus albimanus	Speight & Legrand (1984), Speight & Gittings (2020)
Platycheirus clypeatus	Speight & Legrand (1984)
Platycheirus granditarsus	Speight & Legrand (1984), Speight & Gittings (2020)
Platycheirus immarginatus	Speight & Legrand (1984)
Platycheirus manicatus	Speight & Legrand (1984), Speight & Gittings (2020)
Platycheirus occultus	Speight & Gittings (2020)
Platycheirus peltatus	Speight & Legrand (1984)
Platycheirus perpallidus	Speight & Legrand (1984), NPWS (2015), Speight & Gittings (2020)
Rhingia campestris	Speight & Legrand (1984)
Riponnensia splendens	Speight & Gittings (2020)
Sericomyia silentis	Speight & Legrand (1984), Speight & Gittings (2020)
Sphaerophoria interrupta	Speight & Gittings (2020)
Sphaerophoria menthastri	Speight & Legrand (1984)
Syritta pipiens	Speight & Legrand (1984), Speight & Gittings (2020)
Syrphus ribesii	Speight & Legrand (1984), Speight & Gittings (2020)
Trichopsomyia flavitarsis	Speight & Gittings (2020)
Psychodidae	
Panimerus maynei	Withers & O'Connor (1992)
Tabanidae	
Chrysops sepulcralis	Speight & Legrand (1984), NPWS (2015)
Haematopota pluvialis	Speight & Legrand (1984)
Ulidiidae	
Herina oscillans	Speight & Legrand (1984)
LEPIDOPTERA	
Crambidae	
Acentria ephemerella	Hannigan & Kelly-Quinn (2012)
Cataclysta lemnata	Hannigan & Kelly-Quinn (2012)
Elophila nymphaeata	Hannigan & Kelly-Quinn (2012)
Parapoynx stratiotata	Hannigan & Kelly-Quinn (2012)
Nymphalidae	
Aphantopus hyperantus	NBDC (2020d)
Lasiommata megera	NBDC (2020d)
Maniola jurtina	NBDC (2020d)
Pararge aegeria	NBDC (2020d)
Pieridae	
Anthocharis cardamines	NBDC (2020c)
Pieris brassicae	NBDC (2020d)
Pieris napi	NBDC (2020d)
Pieris rapae	NBDC (2020d)
Tortricidae	
Epiblema cirsiana	NMI (2020)
TRICHOPTERA	
Hydroptilidae	
Tricholeiochiton fagesii	Hannigan & Kelly-Quinn (2012)
Leptoceridae	

Erotesis baltica	Hannigan & Kelly-Quinn (2012), Hannigan *et al*. (2009), O'Connor (2015)
Limnephilidae	
Anabolia brevipennis	Hannigan & Kelly-Quinn (2012), Hannigan *et al*. (2009), O'Connor (2015)
Limnephilus binotatus	Hannigan & Kelly-Quinn (2012)
Limnephilus decipiens	Hannigan & Kelly-Quinn (2012)
Limnephilus flavicornis	Hannigan & Kelly-Quinn (2012), O'Connor & Nelson (2012)
Limnephilus fuscinervis	Hannigan & Kelly-Quinn (2012)
Limnephilus ignavus	Hannigan & Kelly-Quinn (2012), Hannigan *et al*. (2009), O'Connor (2015)
Limnephilus lunatus	Hannigan & Kelly-Quinn (2012)
Limnephilus luridus	Hannigan & Kelly-Quinn (2012)
Limnephilus marmoratus	Hannigan & Kelly-Quinn (2012)
Limnephilus nigriceps	Hannigan & Kelly-Quinn (2012)
Limnephilus stigma	Hannigan & Kelly-Quinn (2012)
Polycentropodidae	
Holocentropus dubius	Hannigan & Kelly-Quinn (2012)
Plectrocnemia conspersa	Hannigan & Kelly-Quinn (2012)
Plectrocnemia geniculata	Hannigan & Kelly-Quinn (2012)
COLEOPTERA	
Byrrhidae	
Cytilus sericeus	Lott & Bilton (1991), Owen (1997)
Carabidae	
Agonum fuliginosum	Owen (1997)
Agonum thoreyi	Lott & Bilton (1991), Owen (1997)
Pterostichus strenuus	Lott & Bilton (1991)
Chrysomelidae	
Altica oleracea	Owen (1997), Balfour Browne Club (2020)
Prasocuris phellandrii	Owen (1997), Balfour Browne Club (2020)
Curculionidae	
Bagous collignensis	Owen (1997)
Bagous frit	Balfour Browne Club (2020)
Hydaticus seminiger	Hannigan & Kelly-Quinn (2012), Owen (1997), Balfour Browne Club (2020)
Dryopidae	
Dryops luridus	Balfour Browne Club (2020)
Dytiscidae	
Agabus affinis	Hannigan & Kelly-Quinn (2012), Balfour Browne Club (2020)
Agabus bipustulatus	Hannigan & Kelly-Quinn (2012)
Agabus melanocornis	Owen (1997)
Liopterus haemorrhoidalis	Hannigan & Kelly-Quinn (2012)
Graptodytes bilineatus	Balfour Browne Club (2020)
Graptodytes granularis	Owen (1997)
Hydroporus angustatus	Hannigan & Kelly-Quinn (2012), Owen (1997), Balfour Browne Club (2020)
Hydroporus erythrocephalus	Hannigan & Kelly-Quinn (2012)
Hydroporus glabriusculus	Bilton (1992), NPWS (2015)
Hydroporus memnonius	Hannigan & Kelly-Quinn (2012)
Hydroporus nigrita	Hannigan & Kelly-Quinn (2012)
Hydroporus palustris	Hannigan & Kelly-Quinn (2012)

Hydroporus scalesianus	Hannigan & Kelly-Quinn (2012), Owen (1997), NPWS (2015), Balfour Browne Club (2020)
Hydroporus tristis/umbrosus	Hannigan & Kelly-Quinn (2012)
Hygrotus inaequalis	Hannigan & Kelly-Quinn (2012)
Ilybius ater	Balfour Browne Club (2020)
Ilybius guttiger	Owen (1997), Balfour Browne Club (2020)
Ilybius montanus	Balfour Browne Club (2020)
Ilybius quadriguttatus	Hannigan & Kelly-Quinn (2012)
Laccornis oblongus	Owen (1997), NPWS (2015), Balfour Browne Club (2020)
Liopterus haemorrhoidalis	Balfour Browne Club (2020)
Rhantus grapii	Hannigan & Kelly-Quinn (2012), Owen (1997), Balfour Browne Club (2020)
Suphrodytes dorsalis	Hannigan & Kelly-Quinn (2012), Balfour Browne Club (2020)
Helophoridae	
Helophorus aequalis	Hannigan & Kelly-Quinn (2012)
Helophorus brevipalpis	Hannigan & Kelly-Quinn (2012)
Hydraenidae	
Hydraena riparia	Hannigan & Kelly-Quinn (2012)
Limnebius truncatellus	Hannigan & Kelly-Quinn (2012), Owen (1997), Balfour Browne Club (2020)
Ochthebius minimus	Hannigan & Kelly-Quinn (2012)
Hydrophilidae	
Anacaena limbata	Hannigan & Kelly-Quinn (2012), Owen (1997), Balfour Browne Club (2020)
Cercyon convexiusculus	Hannigan & Kelly-Quinn (2012)
Cercyon tristis	Hannigan & Kelly-Quinn (2012)
Coelostoma orbiculare	Hannigan & Kelly-Quinn (2012)
Enochrus affinis	Hannigan & Kelly-Quinn (2012)
Enochrus coarctatus	Hannigan & Kelly-Quinn (2012)
Enochrus ochropterus	Hannigan & Kelly-Quinn (2012)
Enochrus testaceus	Hannigan & Kelly-Quinn (2012)
Hydrobius fuscipes	Hannigan & Kelly-Quinn (2012)
Noteridae	
Noterus crassicornis	Hannigan & Kelly-Quinn (2012)
Scirtidae	
Cyphon coarctatus	Owen (1997), Balfour Browne Club (2020)
Cyphon hilaris	Lott & Foster (1990), Lott & Bilton (1991), Balfour Browne Club (2020)
Cyphon variabilis	Lott & Bilton (1991), Balfour Browne Club (2020)
Staphylinidae	
Aleochara lanuginosa	Lott & Foster (1990)
Anotylus rugosus	Owen (1997)
Deubelia picina	Lott & Foster (1990), Lott & Bilton (1991), Owen (1997)
Drusilla canaliculata	Lott & Foster (1990)
Erichsonius cinerascens	Owen (1997)
Euconnus hirticollis	Owen (1997)
Gymnusa brevicollis	Lott & Foster (1990), Lott & Bilton (1991)
Gyrohypnus fracticornis	Owen (1997)
Hygronoma dimidiata	Lott & Foster (1990)
Lathrobium brunnipes	Lott & Foster (1990), Owen (1997)
Lathrobium terminatum	Lott & Bilton (1991)

Lesteva heeri	Lott & Foster (1990)
Myllaena dubia	Lott & Foster (1990), Owen (1997)
Ochthephilum fracticorne	Lott & Bilton (1991)
Olophrum fuscum	Lott & Foster (1990)
Paederus riparius	Lott & Foster (1990), Lott & Bilton (1991)
Philonthus fumarius	Lott & Bilton (1991)
Philonthus furcifer	Owen (1997)
Philonthus nigrita	Lott & Bilton (1991)
Platystethus nodifrons	Owen (1997)
Quedius boopoides	Lott & Foster (1990)
Quedius fuliginosus	Lott & Bilton (1991), Owen (1997)
Quedius maurorufus	Lott & Foster (1990), Lott & Bilton (1991)
Rybaxis longicornis	Owen (1997)
Staphylinus erythropterus	Lott & Bilton (1991)
Stenus cicindeloides	Lott & Bilton (1991)
Stenus glabellus	Lott & Foster (1990), Lott & Bilton (1991), Owen (1997)
Stenus impressus	Lott & Foster (1990), Lott & Bilton (1991)
Stenus juno	Lott & Foster (1990)
Stenus latifrons	Lott & Foster (1990), Lott & Bilton (1991)
Stenus nitidiusculus	Lott & Bilton (1991), Owen (1997)
Stenus palustris	Owen (1997)
Trissemus impressus	Owen (1997)
HEMIPTERA	
HETEROPTERA	
Acanthosomatidae	
Acanthosoma haemorrhoidale	Nelson (2020)
Anthocoridae	
Anthocoris nemoralis	Anderson *et al*. (2017), Nelson (2020)
Anthocoris nemorum	Anderson *et al*. (2017), Nelson (2020)
Aphrophoridae	
Aphrophora alni	Speight & Legrand (1984)
Corixidae	
Hesperocorixa linnaei	Anderson *et al*. (2017)
Hesperocorixa moesta	Anderson *et al*. (2017)
Hesperocorixa sahlbergi	Hannigan & Kelly-Quinn (2012)
Sigara fossarum	Anderson *et al*. (2017)
Cymidae	
Cymus glandicolor	Anderson *et al*. (2017), Nelson (2020)
Gerridae	
Gerris lacustris	Anderson *et al*. (2017), Nelson (2020)
Hebridae	
Hebrus ruficeps	Anderson *et al*. (2017), Nelson (2020)
Hydrometridae	
Hydrometra stagnorum	Anderson *et al*. (2017), Nelson (2020)
Miridae	
Dicyphus stachydis	Anderson *et al*. (2017), Nelson (2020)
Hallodapus rufescens	Anderson *et al*. (2017)

Leptopterna dolabrata	Anderson *et al*. (2017)
Lygus rugulipennis	Anderson *et al*. (2017), Nelson (2020)
Miris striatus	Anderson *et al*. (2017)
Polymerus palustris	Anderson *et al*. (2017)
Stenodema calcarata	Anderson *et al*. (2017), Nelson (2020)
Stenodema holsata	Anderson *et al*. (2017), Nelson (2020)
Stenodema laevigata	Anderson *et al*. (2017), Nelson (2020)
Nepidae	
Nepa cinerea	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017), Nelson (2020)
Notonectidae	
Notonecta glauca	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017)
Notonecta maculata	Hannigan & Kelly-Quinn (2012)
Pentatomidae	
Picromerus bidens	Anderson *et al*. (2017)
Zicrona caerulea	Anderson *et al*. (2017), Nelson (2020)
Rhyparochromidae	
Drymus brunneus	Anderson *et al*. (2017), Nelson (2020)
Drymus sylvaticus	Anderson *et al*. (2017)
Pachybrachius fracticollis	Anderson *et al*. (2017), Nelson (2020)
Saldidae	
Chartoscirta cincta	Nelson (2020)
Tingidae	
Acalypta parvula	Anderson *et al*. (2017)
Veliidae	
Microvelia pygmaea	Hannigan & Kelly-Quinn (2012)
Microvelia reticulata	Hannigan & Kelly-Quinn (2012), Anderson *et al*. (2017), Nelson (2020)
Velia caprai	Anderson *et al*. (2017)
EPHEMEROPTERA	
Baetidae	
Cloeon dipterum	Hannigan & Kelly-Quinn (2012)
Leptophlebiidae	
Leptophlebia vespertina	Hannigan & Kelly-Quinn (2012)
ODONATA	
Aeshna grandis	Speight & Legrand (1984), CEDaR (2020)
Aeshna juncea	CEDaR (2020)
Brachytron pratense	Anderson *et al*. (2017), Speight & Legrand (1984), CEDaR (2020)
Coenagrionidae	
Coenagrion lunulatum	Speight & Legrand (1984), NPWS (2015), CEDaR (2020)
Coenagrion puella	Speight & Legrand (1984), CEDaR (2020)
Coenagrion pulchellum	Anderson *et al*. (2017), Speight & Legrand (1984), NBDC (2020e), CEDaR (2020)
Enallagma cyathigerum	Anderson *et al*. (2017), Speight & Legrand (1984), CEDaR (2020)
Ischnura elegans	Hannigan & Kelly-Quinn (2012), Speight & Legrand (1984), CEDaR (2020)
Ischnura pumilio	Speight & Legrand (1984), CEDaR (2020)
Pyrrhosoma nymphula	Anderson *et al.* (2017), Speight & Legrand (1984), CEDaR (2020)
Lestidae	
Lestes sponsa	Speight & Legrand (1984), CEDaR (2020)

Libellulidae	
Libellula quadrimaculata	Anderson *et al*. (2017), Speight & Legrand (1984), CEDaR (2020)
Sympetrum sanguineum	Speight & Legrand (1984), CEDaR (2020)
Sympetrum striolatum	Anderson *et al*. (2017), Speight & Legrand (1984), CEDaR (2020)
HYMENOPTERA	
Apidae	
Bombus muscorum	Speight & Legrand (1984)
Argidae	
Arge ustulata	Speight & Legrand (1984)
Cimbicidae	
Abia sericea	Speight & Legrand (1984)
Crabronidae	
Ectemnius continuus	Ronayne (2006)
Tenthredinidae	
Allantus calceatus	Speight & Legrand (1984)
Brachythops flavens	Speight & Legrand (1984)
Tenthredo moniliata	Speight & Legrand (1984)
NEUROPTERA	
Chrysopidae	
Chrysoperla carnea	Speight & Legrand (1984), Barnard *et al*. (1991)
Hemerobiidae	
Hemerobius micans	Barnard *et al.* (1991)
Sisyridae	
Sisyra sp.	Hannigan & Kelly-Quinn (2012)
MEGALOPTERA	
Sialidae	
Sialis lutaria	Hannigan & Kelly-Quinn (2012)
CHILOPODA	
Lithobiidae	
Lithobius borealis	Anderson *et al*. (2017)
DIPLOPODA	
Julidae	
Ommatoiulus sabulosus	Anderson *et al*. (2017)
Ophyiulus pilosus	Anderson *et al*. (2017)
Polydesmidae	
Polydesmus angustus	Anderson *et al*. (2017)
Blaniulidae	
Proteroiulus fuscus	Anderson *et al*. (2017)
Julidae	
Tachypodoiulus niger	Anderson *et al*. (2017)
DERMAPTERA	
Forficulidae	
Forficula auricularia	Anderson *et al*. (2017)

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SCIENTIFIC NAME	SOURCE
MOLLUSCA	
GASTROPODA	
Aciculidae	
Acicula fusca	Moorkens & Killeen (2011)
Bithyniidae	
Bithynia tentaculata	Moorkens (1998)
Cochlicopidae	
Cochlicopa lubrica	Moorkens & Killeen (2011), Moorkens (1998)
Ellobiidae	
Carychium minimum	Moorkens & Killeen (2011), Moorkens (1998)
Euconulidae	
Euconulus alderi	Moorkens & Killeen (2011), Moorkens (1998)
Euconulus fulvus	Moorkens (1998)
Euconulus praticola	Moorkens & Killeen (2011)
Gastrodontidae	
Nesovitrea hammonis	Moorkens & Killeen (2011), Moorkens (1998)
Zonitoides nitidus	Moorkens & Killeen (2011), Moorkens (1998)
Helicidae	
Cepaea sp.	Moorkens & Killeen (2011)
Lauriidae	
Leiostyla anglica	Moorkens & Killeen (2011), Moorkens (1998)
Lymnaeidae	
Galba truncatula	Moorkens & Killeen (2011), Moorkens (1998)
Lymnaea stagnalis	Moorkens (1998)
Radix balthica	Moorkens (1998)
Stagnicola fuscus	Moorkens & Killeen (2011)
Planorbidae	
Bathyomphalus contortus	Moorkens & Killeen (2011), Moorkens (1998)
Pristilomatidae	
Vitrea crystallina	Moorkens & Killeen (2011)
Punctidae	
Punctum pygmaeum	Moorkens & Killeen (2011), Moorkens (1998)
Succineidae	
Oxyloma elegans	Moorkens & Killeen (2011)
Oxyloma pfeifferi	Moorkens & Killeen (2011)
Succinea putris	Moorkens (1998)
Tateidae	
Potamopyrgus antipodarum	Moorkens & Killeen (2011), Moorkens (1998)
Truncatellinidae	
Columella aspera	Moorkens & Killeen (2011), Moorkens (1998)
Columella edentula	Moorkens & Killeen (2011)
Valloniidae	

Vallonia pulchella	Moorkens & Killeen (2011), Moorkens (1998)
Vertiginidae	
Vertigo antivertigo	Moorkens & Killeen (2011), Moorkens (1998)
Vertigo geyeri	Moorkens & Killeen (2011), Long & Brophy (2019), Moorkens (1998)
Vertigo moulinsiana	Moorkens & Killeen (2011), Long & Brophy (2019)
Vertigo pygmaea	Moorkens (1998)
Vertigo substriata	Moorkens & Killeen (2011), Moorkens (1998)
BIVALVIA	
Pisidium casertanum	Moorkens & Killeen (2011)
Pisidium personatum	Moorkens & Killeen (2011), Moorkens (1998)
Pisidium obtusale	Moorkens & Killeen (2011)
CRUSTACEA	
AMPHIPODA	
Gammarus duebeni	O'Hanrahan (1987) in Tubridy (1988)
DIPTERA	
Syrphidae	
Anasimyia contracta	Speight & Gittings (2020)
Anasimyia lineata	Speight & Gittings (2020)
Anasimyia lunulata	Speight & Gittings (2020)
Cheilosia albitarsis	Speight & Gittings (2020)
Eristalinus sepulchralis	Speight & Gittings (2020)
Eristalis abusivus	Speight & Gittings (2020)
Eristalis arbustorum	Speight & Gittings (2020)
Eristalis intricaria	Speight & Gittings (2020)
Eristalis pertinax	Speight & Gittings (2020)
Eristalis tenax	Speight & Gittings (2020)
Helophilus hybridus	Speight & Gittings (2020)
Lejogaster metallina	Speight & Gittings (2020)
Melanogaster aerosa	Speight & Gittings (2020)
Melanogaster hirtella	Speight & Gittings (2020)
Neoascia tenur	Speight & Gittings (2020)
Parhelophilus versicolor	Speight & Gittings (2020)
Platycheirus angustatus	Speight & Gittings (2020)
Platycheirus clypeatus	Speight & Gittings (2020)
Platycheirus fulviventris	Speight & Gittings (2020)
Platycheirus perpallidus	NPWS (2013)
Rhingia campestris	Speight & Gittings (2020)
Sericomyia silentis	Speight & Gittings (2020)
Syritta pipiens	Speight & Gittings (2020)
Trichopsomyia flavitarsis	Speight & Gittings (2020)
Tropidia scita	Speight & Gittings (2020)
Volucella bombylans	Speight & Gittings (2020)
LEPIDOPTERA	
Cosmopterigidae	
Limnaecia phragmitella	Bond (1989)
Crambidae	
Agriphila straminella	Bond (1989)

Agriphila tristella	Bond (1989)
Nomophila noctuella	Bond (1989)
Erebidae	
Rivula sericealis	Bond (1989)
Gelechiidae	
Hypatima rhomboidella	Bond (1989)
Geometridae	
Chloroclysta truncata	Bond (1989)
Orthonama vittata	Bond (1989)
Scotopteryx mucronata	Bond (1989)
Glyphipterigidae	
Glyphipterix simpliciella	Bond (1989)
Glyphipterix thrasonella	Bond (1989)
Hesperiidae	
Erynnis tages	Bond (1989)
Lasiocampidae	
Euthrix potatoria	J.T. Brophy pers. obs.
Lycaenidae	
Polyommatus icarus	Bond (1989)
Momphidae	
Mompha locupletella	Bond (1989)
Nepticulidae	
Stigmella betulicola	Bond (1989)
Stigmella continuella	Bond (1989)
Stigmella lapponica	Bond (1989)
Noctuidae	
Autographa gamma	Bond (1989)
Noctua comes	Bond (1989)
Nymphalidae	
Aglais io	M. Long pers. obs.
Aglais urticae	Bond (1989)
Aphantopus hyperantus	Bond (1989)
Coenonympha pamphilus	Bond (1989)
Hipparchia semele	Bond (1989)
Lasiommata megera	Bond (1989)
Maniola jurtina	Bond (1989)
Pieridae	
Anthocharis cardamines	M. Long pers. obs.
Pieris brassicae	Bond (1989)
Pieris napi	J.T. Brophy pers. obs.
Tortricidae	
Acleris aspersana	Bond (1989)
Acleris variegana	Bond (1989)
Aethes cnicana	Bond (1989)
Clepsis senecionana	Bond (1989)
Cochylimorpha straminea	Bond (1989)
Cydia ulicetana	Bond (1989)

Epiblema scutulana	Bond (1989)
Eucosma campoliliana	Bond (1989)
TRICHOPTERA	
Apataniidae	
Apatania muliebris	O'Hanrahan (1987) in Tubridy (1988)
Glossosomatidae	
Agapetus fuscipes	O'Hanrahan (1987) in Tubridy (1988)
Limnephilidae	
Limnephilus binotatus	O'Connor (2015)
Limnephilus lunatus	O'Hanrahan (1987) in Tubridy (1988)
Hydroptilidae	
Tricholeiochiton fagesii	O'Connor & O'Hanrahan (1988), O'Connor (2015)
COLEOPTERA	
Carabidae	
Panagaeus cruxmajor	J.T. Brophy pers. obs.
Hydrophilidae	
Laccobius minutus	O'Hanrahan (1987) in Tubridy (1988)
Staphylinidae	
Stenus palustris	Good (1989)
Stenus picipes	Good (1987) in Tubridy (1988)
Stenus similis	Good (1987) in Tubridy (1988)
Hygronoma dimidiata	Good (1987) in Tubridy (1988)
Lathrobium longulum	Johnson & Halbert (1902)
Lathrobium terminatum	Johnson & Halbert (1902)
Paederus riparius	Good (1987) in Tubridy (1988)
Tachyporus dispar	Good (1987) in Tubridy (1988)
HEMIPTERA	
HETEROPTERA	
Corixidae	
Arctocorisa germari	O'Hanrahan (1987) in Tubridy (1988)
Callicorixa praeusta	Nelson (2020)
Cymatia bonsdorffii	Nelson (2020), O'Hanrahan (1987) in Tubridy (1988)
Hesperocorixa sahlbergi	Nelson (2020)
Sigara distincta	Nelson (2020)
Sigara falleni	Nelson (2020)
Sigara fossarum	Nelson (2020)
Sigara semistriata	Nelson (2020)
Hebridae	
Hebrus ruficeps	Nelson (2020)
Pentatomidae	
Zicrona caerulea	J.T. Brophy pers. obs.
ODONATA	
Coenagrionidae	
Coenagrion puella	CEDaR (2020)
Coenagrion pulchellum	CEDaR (2020)
Enallagma cyathigerum	CEDaR (2020)
Ischnura elegans	CEDaR (2020)

Pyrrhosoma nymphula	M. Long pers. obs., CEDaR (2020)
Lestidae	
Lestes sponsa	CEDaR (2020)
HYMENOPTERA	
Cephidae	
Calameuta pallipes	O'Connor *et al*. (1997)
Andrenidae	
Andrena barbilabris	NBDC (2020b)
Tenthredinidae	
Dolerus aericeps	O'Connor *et al*. (1997)

Lough Garr

SCIENTIFIC NAME	SOURCE
TRICHOPTERA	
Hydroptilidae	
Tricholeiochiton fagesii	Brophy & O'Connor (2020)

This species was found during the Pilot Fen Survey 2019-2020. It is only the second adult record of *T. fagesii* for Ireland and the first male specimen (Brophy & O'Connor, 2020).

Lough Owel

SCIENTIFIC NAME	SOURCE
MOLLUSCA	
GASTROPODA	
Vertiginidae	
Vertigo moulinsiana	Moorkens & Killeen (2011), Long & Brophy (2019)
DIPTERA	
Syrphidae	
Cheilosia chrysocoma	Speight & Gittings (2020)
Eristalis arbustorum	Speight & Gittings (2020)
Eristalis pertinax	Speight & Gittings (2020)
Helophilus hybridus	Speight & Gittings (2020)
Helophilus pendulus	Speight & Gittings (2020)
Lejogaster metallina	Speight & Gittings (2020)
Melanostoma mellinum	Speight & Gittings (2020)
Melanostoma scalare	Speight & Gittings (2020)
Neoascia meticulosa	Speight & Gittings (2020)
Neoascia podagrica	Speight & Gittings (2020)
Neoascia tenur	Speight & Gittings (2020)
Platycheirus albimanus	Speight & Gittings (2020)
Platycheirus granditarsus	Speight & Gittings (2020)
Platycheirus manicatus	Speight & Gittings (2020)
Platycheirus rosarum	Speight & Gittings (2020)
Rhingia campestris	Speight & Gittings (2020)
Syrphus ribesii	Speight & Gittings (2020)
Tropidia scita	Speight & Gittings (2020)
LEPIDOPTERA	
Pieridae	
Anthocharis cardamines	NBDC (2020c)
Pieris napi	NBDC (2020c)
TRICHOPTERA	
Hydroptilidae	
Hydroptila pulchricornis	O'Connor (2015)
Lepidostomatidae	
Lepidostoma hirtum	O'Connor (2015)
Leptoceridae	
Athripsodes aterrimus	O'Connor (2015)
Athripsodes cinereus	O'Connor (2015)
Mystacides azurea	O'Connor (2015)
Mystacides longicornis	O'Connor (2015)
Oecetis furva	O'Connor (2015)
Limnephilidae	
Anabolia nervosa	O'Connor (2015)
Limnephilus lunatus	O'Connor (2015)
Limnephilus marmoratus	O'Connor (2015)

Limnephilus nigriceps	O'Connor (2015)
Limnephilus vittatus	O'Connor (2015)
Potamophylax latipennis	O'Connor (2015)
Phryganeidae	
Agrypnia obsoleta	O'Connor (2015)
Agrypnia varia	O'Connor (2015)
Phryganea bipunctata	O'Connor (2015)
Phryganea grandis	O'Connor (2015)
Polycentropodidae	
Cyrnus trimaculatus	O'Connor (2015)
Plectrocnemia conspersa	O'Connor (2015)
Polycentropus flavomaculatus	O'Connor (2015)
Psychomyiidae	
Lype phaeopa	O'Connor (2015)
Metalype fragilis	O'Connor (2015)
Tinodes waeneri	O'Connor (2015)
Sericostomatidae	
Sericostoma personatum	O'Connor (2015)
COLEOPTERA	
Chrysomelidae	
Donacia obscura	Balfour Browne Club (2020)
Donacia simplex	Balfour Browne Club (2020)
Phyllotreta flexuosa	Balfour Browne Club (2020)
Plateumaris sericea	Balfour Browne Club (2020)
Dytiscidae	
Agabus affinis	Balfour Browne Club (2020)
Agabus bipustulatus	Balfour Browne Club (2020)
Colymbetes fuscus	Balfour Browne Club (2020)
Hydroporus angustatus	Balfour Browne Club (2020)
Hydroporus gyllenhalii	Balfour Browne Club (2020)
Hydroporus palustris	Balfour Browne Club (2020)
Hydroporus striola	Balfour Browne Club (2020)
Hydroporus tessellatus	Balfour Browne Club (2020)
Ilybius fuliginosus	Balfour Browne Club (2020)
Ilybius guttiger	Balfour Browne Club (2020)
Ilybius quadriguttatus	Balfour Browne Club (2020)
Laccornis oblongus	Balfour Browne Club (2020)
Suphrodytes dorsalis sensu lato	Balfour Browne Club (2020)
Elmidae	
Oulimnius tuberculatus	Balfour Browne Club (2020)
Gyrinidae	
Gyrinus distinctus	Balfour Browne Club (2020)
Gyrinus marinus	Balfour Browne Club (2020)
Gyrinus paykulli	Balfour Browne Club (2020)
Gyrinus substriatus	Balfour Browne Club (2020)
Haliplidae	

Haliplus fulvus	Balfour Browne Club (2020)
Haliplus immaculatus	Balfour Browne Club (2020)
Helophoridae	
Helophorus brevipalpis	Balfour Browne Club (2020)
Helophorus obscurus	Balfour Browne Club (2020)
Hydraenidae	
Hydraena riparia	Balfour Browne Club (2020)
Hydrophilidae	
Anacaena globulus	Balfour Browne Club (2020)
Anacaena limbata	Balfour Browne Club (2020)
Anacaena lutescens	Balfour Browne Club (2020)
Enochrus testaceus	Balfour Browne Club (2020)
Hydrobius fuscipes	Balfour Browne Club (2020)
Noteridae	
Noterus clavicornis	Balfour Browne Club (2020)
HEMIPTERA	
HETEROPTERA	
Corixidae	
Cymatia bonsdorffi	Nelson (2020)
Sigara distincta	Nelson (2020)
Gerridae	
Gerris argentatus	Nelson (2020)
Nepidae	
Nepa cinerea	Nelson (2020)
Notonectidae	
Notonecta glauca	Nelson (2020)
Saldidae	
Saldula saltatoria	Nelson (2020)
ODONATA	
Aeshnidae	
Aeshna grandis	CEDaR (2020)
Brachytron pratense	CEDaR (2020)
Coenagrionidae	
Enallagma cyathigerum	CEDaR (2020)
HYMENOPTERA	
Apidae	
Bombus lapidarius	NBDC (2020b)
Halictidae	
Lasioglossum albipes	NBDC (2020b)
ORTHOPTERA	
Acrididae	
Omocestus viridulus	NBDC (2020a)
Tetrigidae	
Tetrix subulata	NBDC (2020a)

River Moy (Island lake)

SCIENTIFIC NAME	SOURCE
MOLLUSCA	
GASTROPODA	
Cochlicopidae	
Cochlicopa lubrica	Moorkens & Killeen (2011)
Ellobiidae	
Carychium minimum	Moorkens & Killeen (2011)
Euconulidae	
Euconulus alderi	Moorkens & Killeen (2011)
Gastrodontidae	
Aegopinella pura	Moorkens & Killeen (2011)
Nesovitrea hammonis	Moorkens & Killeen (2011)
Zonitoides nitidus	Moorkens & Killeen (2011)
Helicidae	
Cepaea sp.	Moorkens & Killeen (2011)
Hygromiidae	
Trochulus hispidus	Moorkens & Killeen (2011)
Lymnaeidae	
Galba truncatula	Moorkens & Killeen (2011)
Physidae	
Aplexa hypnorum	Moorkens & Killeen (2011)
Pristilomatidae	
Vitrea crystallina	Moorkens & Killeen (2011)
Punctidae	
Punctum pygmaeum	Moorkens & Killeen (2011)
Succineidae	
Oxyloma elegans	Moorkens & Killeen (2011)
Truncatellinidae	
Columella aspera	Moorkens & Killeen (2011)
Columella edentula	Moorkens & Killeen (2011)
Valloniidae	
Vallonia pulchella	Moorkens & Killeen (2011)
Vertiginidae	
Vertigo antivertigo	Moorkens & Killeen (2011)
Vertigo geyeri	Holyoak (2005), Moorkens & Killeen (2011)
Vertigo pygmaea	Moorkens & Killeen (2011)
Vertigo substriata	Moorkens & Killeen (2011)
BIVALVIA	
Sphaeriidae	
Pisidium personatum	Moorkens & Killeen (2011)
COLEOPTERA	
Carabidae	
Bembidion assimile	Regan & Anderson (2004)
Bembidion doris	Regan & Anderson (2004)

Dryopidae	
Dryops luridus	Balfour Browne Club (2020)
Dytiscidae	
Agabus bipustulatus	Balfour Browne Club (2020)
Agabus nebulosus	Balfour Browne Club (2020)
Agabus sturmii	Balfour Browne Club (2020)
Colymbetes fuscus	Balfour Browne Club (2020)
Dytiscus circumcinctus	Balfour Browne Club (2020)
Graptodytes bilineatus	Balfour Browne Club (2020)
Graptodytes granularis	Balfour Browne Club (2020)
Hydroporus erythrocephalus	Balfour Browne Club (2020)
Hydroporus memnonius	Balfour Browne Club (2020)
Hydroporus palustris	Balfour Browne Club (2020)
Hygrotus inaequalis	Balfour Browne Club (2020)
Ilybius fuliginosus	Balfour Browne Club (2020)
Ilybius guttiger	Balfour Browne Club (2020)
Ilybius quadriguttatus	Balfour Browne Club (2020)
Laccophilus minutus	Balfour Browne Club (2020)
Rhantus grapii	Balfour Browne Club (2020)
Rhantus suturellus	Balfour Browne Club (2020)
Gyrinidae	
Gyrinus substriatus	Balfour Browne Club (2020)
Haliplidae	
Haliplus ruficollis	Balfour Browne Club (2020)
Haliplus sibiricus	Balfour Browne Club (2020)
Helophoridae	
Helophorus flavipes	Balfour Browne Club (2020)
Hydrophilidae	
Anacaena limbata	Balfour Browne Club (2020)
Laccobius minutus	Balfour Browne Club (2020)
Staphylinidae	
Carpelimus corticinus	Regan & Anderson (2004)
Carpelimus rivularis	Regan & Anderson (2004)
Hygronoma dimidiata	Regan & Anderson (2004)
Lesteva sicula	Regan & Anderson (2004)
Ocyusa picina	Regan & Anderson (2004)
Stenus boops	Regan & Anderson (2004)
Stenus fuscipes	Regan & Anderson (2004)
Stenus impressus	Regan & Anderson (2004)
Stenus juno	Regan & Anderson (2004)
Stenus latifrons	Regan & Anderson (2004)
Stenus nitidiusculus	Regan & Anderson (2004)
HEMIPTERA	
HETEROPTERA	
Corixidae	
Hesperocorixa sahlbergi	Nelson (2020)
Sigara distincta	Nelson (2020)

Sigara limitata	Nelson (2020)
Sigara scotti	Nelson (2020)
Nepidae	
Nepa cinerea	Nelson (2020)
Notonectidae	
Notonecta glauca	Nelson (2020)
ODONATA	
Aeshnidae	
Aeshna juncea	CEDaR (2020)

Appendix 6 Summary of WETMECs (adapted from Wheeler *et al.*, 2009a, b).

An additional WETMEC (WETMEC 21) proposed by Kimberley & Coxon (2013) is included in the table below: WETMEC 21 describes the discrete karst/conduit flow input which is characteristic of some Irish wetlands

WETMEC Group: OMBROGENOUS BOGS AND RELATED MIRES Includes ombrogenous surfaces that are more or less exclusively fed by precipitation (WETMECs 1 and 2), and some topogenous surfaces exposed to only weakly minerotrophic telluric (WETMEC 3) and some drained surfaces (in both bogs and fens) that are (now) mostly fed exclusively by precipitation (WETMEC 4). Although the latter has, for convenience, been grouped within the 'ombrotrophic' WETMEC group, it is of interest that the clustering dendrogram suggests that its closest affinities are with 'surface water-fed floodplains', of which it represents a particularly dry example.	
WETMEC 1: Domed Ombrogenous Surfaces ('raised bog' *sensu stricto*)	Domed surfaces mostly fed exclusively by precipitation. Includes classic raised bogs and 'ridge-raised' ('intermediate' bogs), and also solid ombrogenous surfaces within basins, and residual baulks of uncut peat within some peat-cutting complexes.
WETMEC 2: Buoyant Ombrogenous Surfaces (quag bogs) ***WETMEC 2a:*** *Ombrogenous Quag* ***WETMEC 2b:*** *Ombrogenous Quag (GW-Fed Basin)* ***WETMEC 2c:*** *Ombrogenous Quag (SW-Fed Basin)*	More or less flat, buoyant surfaces more or less exclusively fed by precipitation. Includes bogs in (usually small) basins (basin bogs), but also surfaces in wet depressions within some peat-cutting complexes. Sub-types reflect nature of any significant inflows of telluric water into the basins; these do not feed the mire surface but may support it, or otherwise influence the hydrodynamics of the basin as a whole. ***Terms: Quag*** *Quaking, often buoyant, surfaces within wetlands. Shakes or yields when walked on.*
WETMEC 3: Buoyant Weakly Minerotrophic Surfaces ('transition bogs') ***WETMEC 3a:*** *Bog-Transition Quag (± closed basin)* ***WETMEC 3b:*** *Bog-Transition Quag (± open basin)*	More or less flat, buoyant surfaces of basins and hollows, fed in part by telluric water, but with surface largely fed by precipitation (because of buoyant character) and/or telluric water weakly minerotrophic. Sub-types relate to the apparent absence of significant water inflows/outflows in the basin, or to their presence (especially outflows) ***Terms: Quag*** *Quaking, often buoyant, surfaces within wetlands. Shakes or yields when walked on.*
WETMEC 4: Drained Ombrotrophic Surfaces (in bogs and fens) ***WETMEC 4a:*** *Drained Ombrogenous Bog* ***WETMEC 4b:*** *Drained Ombrotrophic Fen*	Drained, more or less solid peat surfaces, often flat, with low water tables. Precipitation is more or less exclusive water source to surface or near-surface, but in the case of WETMEC 4b this is because of disruption of former mechanisms of telluric water supply.
WETMEC Group: SURFACE WATER-FED FLOODPLAINS Includes floodplain sites in which telluric water is derived from adjoining watercourses (either by episodic flooding (WETMEC 5) or lateral flow through peat (WETMEC 6)). May be supplemented by minor rain-generated run-off or land-drainage, or groundwater outflow.	
WETMEC 5: Summer-Dry Floodplains ***WETMEC 5a:*** *Rarely Flooded Floodplain* ***WETMEC 5b:*** *Alluvial Floodplain* ***WETMEC 5c:*** *Winter-Flooded Floodplain* ***WETMEC 5d:*** *Floodplain Sump*	Floodplain sites fed mainly by episodic flooding from watercourse, though some examples are uncoupled from this. Precipitation often dominates hydrodynamics and may be more or less the exclusive supply to wetland surface during summer or low-flow conditions. Sub-types largely reflect incidence of flooding and retention of surface water (such as in depressions). ***Terms: Sump*** *Small shallow depression within wetland*

WETMEC 6: Surface Water Percolation Floodplains ***WETMEC 6a:*** *Solid SW Percolation Surface* ***WETMEC 6b:*** *Grounded SW Percolation Quag* ***WETMEC 6c:*** *SW Percolation 'Boils'* ***WETMEC 6d:*** *Swamped SW Percolation Surface* ***WETMEC 6e:*** *Wet SW Percolation Quag* ***WETMEC 6f:*** *SW Percolation Water Fringe*	Surfaces partly fed in dry conditions by lateral flow of water from proximate water bodies, through transmissive near-surface layers of peat (most usually the infill of reflooded turbaries), driven by an evapotranspiration-induced hydraulic gradient. In wet conditions hydraulic gradient may be reversed and surfaces drain towards water bodies. May also be subject to episodic inundation. Sub-types mainly relate to stability and elevation of peat surface and to degree of connection to water bodies. ***Terms: Percolation*** *Used to refer to diffuse water flow through a typically topogenous wetland deposit* ***Terms: Quag*** *Quaking, often buoyant, surfaces within wetlands. Shakes or yields when walked on*
WETMEC Group: GROUNDWATER FLOODPLAINS A poorly defined unit containing samples from floodplain contexts, about which little information is generally available. Requires further examination, especially to establish better the relationships to 'groundwater bottoms'	
WETMEC 7: Groundwater Floodplains ***WETMEC 7a:*** *Groundwater-Fed River Fringe* ***WETMEC 7b:*** *Groundwater Floodplain* ***WETMEC 7c:*** *Groundwater Floodplain on Aquitard*	A poorly defined unit containing a small number of floodplain surfaces alongside groundwater-fed watercourses, with water levels apparently related to the piezometric head of the source aquifer. Degree and mechanism of any groundwater supply to adjoining mire surface is often uncertain (they are frequently located over complex, and often low-permeability, alluvial sequences). In some cases, natural hydraulic relationships between the watercourse and mire have been dislocated, especially by lowering of river levels and other forms of water management. Sub-types relate to proximity to watercourse and to apparently permeability of underlying material. ***Terms: Aquitard*** *Zone of low hydraulic conductivity where flow of groundwater between aquifers is restricted. If completely impermeable, it is called an aquiclude*
WETMEC Group: **GROUNDWATER BOTTOMS** Mire surfaces in topogenous contexts (basins, troughs and former river floodplains) with some apparent groundwater supply from aquifer, either from the margins across an aquitard (WETMEC 8) or more generally across the 'bottom' (WETMEC 9). Permeability of the wetland infill is often quite low and/or groundwater head is sub-surface, so most of surface is not apparently fed by groundwater (cf. WETMEC 13), but this may support other sources, especially precipitation. Relationship of examples on (former) floodplains to 'groundwater floodplains' requires clarification (a main separating difference in the current analysis is that the depth of peat is often considerably greater in groundwater bottoms than in groundwater floodplains).	
WETMEC 8: Groundwater-Fed Bottoms with Aquitard ***WETMEC 8a:*** *Groundwater Percolation Bottom* ***WETMEC 8b:*** *Groundwater-Distributed Bottom*	Basins, troughs and small floodplains with (often quite deep) peat over a laterally extensive aquitard formed from the wetland infill (such as marl, gyttja) or from underlying material (such as till), so that groundwater outflow into the mire is largely restricted to the margins. Water supply to much of the surface may be dominated by precipitation, but telluric water may be close to surface in places, especially in depressions or alongside drains. Sub-types reflect presence or absence of dykes and drains that may intercept/ distribute marginal groundwater outflows. ***Terms: Aquitard*** *Zone of low hydraulic conductivity where flow of groundwater between aquifers is restricted. If completely impermeable, it is called an aquiclude* ***Terms: Percolation*** *Used to refer to diffuse water flow through a typically topogenous wetland deposit*
WETMEC 9: Groundwater-Fed Bottoms ***WETMEC 9a:*** *Wet Groundwater Bottom* ***WETMEC 9b:*** *Part-Drained Groundwater Bottom*	Similar to WETMEC 8, but lacking a laterally extensive aquitard (though patchy aquitards sometimes occur). Can sometimes form a zone separating WETMEC 8 from the upland margin. Many examples are now drier than was once the case, because of over-deepening of watercourses or a lowering of groundwater levels in the connected mineral aquifer. Sub-types

	effectively reflect degree of wetness of system. Wet examples of WETMEC 9a are transitional to WETMEC 13 and can be difficult to distinguish from this.
WETMEC Macro-Group: GROUNDWATER-FED SURFACES This macro-grouping of WETMECs includes systems that can be considered to be seepages *sensu lato,* that is, systems where there is groundwater outflow at, or very close to, the surface, either permanently or episodically. In this respect they differ from 'groundwater bottoms' in which groundwater outflow rarely irrigates the surface of the wetland, though the two categories undoubtedly intergrade. A primary distinction is made between seepages (surfaces irrigated by direct groundwater outflow) and flushes (surfaces over aquitards fed indirectly by groundwater outflow at the margins). Seepages are subdivided broadly on topography into 'seepage slopes' (essentially soligenous systems, with shallow peat, which are typically (but not always) sloping and where the high water table is maintained primarily by groundwater outflow); and into 'seepage basins and bottoms', which are effectively rheo-topogenous systems (with a high water table maintained both by occupying topographical hollows and by groundwater outflow).	
WETMEC Group: **SEEPAGE SLOPES** Outflows of groundwater, typically on slopes but occasionally on more or less flat ground where there is water outflow. The high water table is maintained in what is essentially an unfavourable topographical context (sloping) by high rates of groundwater outflow (they are soligenous systems). Groundwater outflow varies from more or less permanent (WETMEC 10) to intermittent (WETMEC 11), though in some examples of the latter the water table is consistently sub-surface. Examples of WETMEC 12 are conceptually transitional between 'seepage slopes' and 'seepage basins'.	
WETMEC 10: Permanent Seepage Slopes ***WETMEC 10a:*** *Localised Strong Seepage* ***WETMEC 10b:*** *Diffuse Seepage*	Seepage surfaces developed at, and sometimes below, the point of groundwater discharge. Sub-types reflect the strength and localisation of the outflows.
WETMEC 11: Intermittent and Part-Drained Seepages ***WETMEC 11a:*** *Permeable Partial Seepage* ***WETMEC 11b:*** *Slowly Permeable Partial Seepage*	Intermittent seepage surfaces, or partly drained former seepages where the water table is now consistently sub-surface. A widespread and heterogeneous unit, developed on slopes or fairly flat surfaces. Low water levels may be due to low aquifer water tables and/or to resistance to water upflow caused by a fairly low-permeability top-layer deposit (WETMEC 11b).
WETMEC Group: SEEPAGE BASINS AND BOTTOMS Rheo-topogenous seepage systems developed in various topographical contexts, usually with lateral water flow, probably mainly through the surface layer, except for WETMEC 12 which is characterised by quite strong vertical water levels fluctuations, rather than lateral flow, and which is not always closely coupled to the mineral aquifer. WETMEC 13 is characteristically topogenous, whereas examples of WETMEC 14 can range from visually flat to sloping; the latter have conceptual and (often) spatial affinities with WETMEC 10. Concentrations of surface flow are particularly characteristic of WETMEC 14 (though are not exclusive to it) and form a separate unit (WETMEC 15).	
WETMEC 12: Fluctuating Seepage Basins ***WETMEC 12a:*** *Fluctuating Seepage Basins with permanent standing water* ***WETMEC 12b:*** *Fluctuating Seepage Basins with winter standing water, summer water table sub-surface or near surface* ***WETMEC 12c:*** *Fluctuating Seepage Basins with shallow winter standing water, summer water table sub-surface or near surface* ***WETMEC 12d:*** *Fluctuating Seepage Basins, winter 'wet', summer 'dry'* ***WETMEC 12e:*** *Fluctuating Seepage Basins with winter standing water, 'dry' by early summer*	This unit is conceptually intermediate between more or less flat 'seepage slopes' and 'seepage basins and bottoms'. In effect, it represents a WETMEC 11 mechanism within a shallow depression, where the topography permits the accumulation of surface water, which can sometimes persist year-round. Sub-types are informal units that have not been derived by multivariate analyses.
WETMEC 13: Seepage Percolation Basins ***WETMEC 13a:*** *Seepage Percolation Surface*	Groundwater-fed basins, typically with a buoyant surface and a transmissive surface layer, often with a quite strong outflow from the basins. Water is thought to flow primarily through the surface layer. Accumulating deposits of marl and gyttja may

WETMEC 13b: *Seepage Percolation Quag* ***WETMEC 13c:*** *Seepage Percolation Water Fringe* ***WETMEC 13d:*** *Distributed Seepage Percolation Surface*	constrain groundwater upflow and help confine outflow to the margins of the basins. Sub-types reflect buoyancy of surface and proximity to groundwater outflow. ***Terms: Quag*** *Quaking, often buoyant, surfaces within wetlands. Shakes or yields when walked on.* ***Terms: Percolation*** *Used to refer to diffuse water flow through a typically topogenous wetland deposit*
WETMEC 14: Seepage Percolation Troughs	Peat-filled troughs, more or less flat to gently sloping, fed by groundwater outflow directly from underlying deposits or flanking slopes (WETMEC 10). Water flow often becomes focussed into axial Flow Tracks (WETMEC 15). Embedded sumps may support WETMEC 13.
WETMEC 15: Seepage Flow Tracks ***WETMEC 15a:*** *Topogenous Seepage Flow Tracks* ***WETMEC 15b:*** *Sloping Seepage Flow Tracks*	Water flow tracks, mostly narrow and treacherous, sourced primarily by groundwater outflow, but sometimes with a surface run-off component. May be some direct groundwater outflow (especially WETMEC 15b), but much water is derived from flanking groundwater-fed WETMECs (especially WETMECs 10 and 14). Sub-types reflect slope, topography, peat depth and permeability of underlying mineral material. As variation in these components does not entirely coincide, the two sub-types must be seen to some as composite entities.
WETMEC Group: GROUNDWATER-FLUSHED BOTTOMS Groundwater-Flushed Bottoms effectively represent a flat(-tish) version of Groundwater-Flushed. Slopes and are broadly analogous to Seepage Percolation Troughs (WETMEC 14), differing primarily in being underlain by a continuous, extensive aquitard, so that groundwater outflows occur mainly at the mire margin and flow laterally across the mire.	
WETMEC 16: Groundwater-Flushed Bottoms ***WETMEC 16a:*** *GW-Flushed Bottom* ***WETMEC 16b:*** *GW-Flushed Bottom + watercourse inputs* ***WETMEC 16c:*** *GW-Overflow Bottom*	This WETMEC is a flushed analogue of WETMEC 14, and some examples are more or less indistinguishable from this except in terms of the groundwater flushing mechanism. However, peat depth is often considerably shallower in WETMEC 16; the surfaces tend to become drier (at least in summer) with distance from the margins; and flow tracks are generally much less evident (note that flow tracks sampled all clustered within WETMEC 15). Sub-types reflect inflows from axial surface-water sources (WETMEC 16b) or disconnection from the groundwater outflow source (WETMEC 16c).
WETMEC Group: GROUNDWATER-FLUSHED SLOPES Groundwater-Flushed Slopes are analogous to seepage slopes (WETMECs 10 and 11), differing primarily in being underlain by a continuous aquitard, so that groundwater outflows occur mainly along the top edge of the mire (as a seepage face) and flow downslope through WETMEC 17.	
WETMEC 17: Groundwater-Flushed Slopes ***WETMEC 17a:*** *Groundwater-Flushed Slopes* ***WETMEC 17b:*** *Weakly Groundwater-Flushed Slopes* ***WETMEC 17c:*** *Distributed Groundwater-Flushed Slopes* ***WETMEC 17d:*** *Groundwater-Flushed Flow Tracks*	WETMEC 17 is a distinctive but heterogeneous unit, with sub-types that are broadly comparable with seepage-based WETMECs (WETMEC 17a with 10; 17b with 11; and 17d with 15). A strong case could be made for elevating the WETMEC 17 sub-types to independent WETMEC status, but ideally these would be based on more samples than were available in the current analysis.
WETMEC Group: TROUGHS, BASINS AND BOTTOMS WITH LIMITED OR INDETERMINATE GROUNDWATER SUPPLY (OR NONE) WETMECs 18 to 20 are analogues of the groundwater-fed WETMECs 14, 15 and 13 (respectively), and differ from these primarily in groundwater supply being apparently much less important, or absent, or in some cases not known. These WETMECs mainly occur over low permeability, and surface water sources (primarily rain-generated run-off) make a proportionately greater contribution of telluric water. Because of their broad geological characteristics, it was initially thought likely that these sites received little or no groundwater, but it has since become apparent that many occupy locations where there may be groundwater outflow from a superficial aquifer in fracture systems within the rocks. The hydrological importance of such groundwater outflow is generally not known, but it may have	

hydrochemical effects (especially localised base enrichment) disproportionate to its quantitative contribution. A corollary of this is that in this study, few sites were found in which it was certain that groundwater outflow made no contribution to the mire.	
WETMEC 18: Percolation Troughs	An analogue of WETMEC 14, recorded mainly in North-West England and Wales in valleyheads and troughs, some of which have developed over former lake basins (or from WETMEC 20), thereby obscuring the underlying basin topography. Water flow through the peat often becomes focussed into Flow Tracks (WETMEC 19). ***Terms: Percolation*** *Used to refer to diffuse water flow through a typically topogenous wetland deposit*
WETMEC 19: Flow Tracks	An analogue of WETMEC 15, recorded mainly in North-West England and Wales. Most often embedded within WETMEC 18, but can occur in other WETMECs (for example, 20) or even as an independent entity.
WETMEC 20: Percolation Basins ***WETMEC 20a:*** *Percolation Quag* ***WETMEC 20b:*** *Percolation Water Fringe*	An analogue of WETMEC 13, recorded mainly in North-West England and Wales. The status (with respect to groundwater supply) of some examples is uncertain, and some are transitional with WETMEC 13. Some have undoubtedly been dug for underlying clay and the possibility that some examples are largely artificial in origin cannot be discounted. ***Terms: Percolation*** *Used to refer to diffuse water flow through a typically topogenous wetland deposit* ***Terms: Quag*** *Quaking, often buoyant, surfaces within wetlands. Shakes or yields when walked on*
WETMEC 21: Inflow from karst conduits **(unknown if this is a new WETMEC Group)**	This is an additional WETMEC proposed in an EPA STRIVE report (Kimberley & Coxon, 2013) to describe discrete karst/conduit flow input, which is characteristic of some Irish wetlands and not covered in Wheeler *et al.* (2009a)

Appendix 7 Review of County Fen Distribution and Data Sources

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Carlow	• British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2011-2012)	• Co. Carlow wetland mapping (2014) (WSI online map)	30 (Alkaline fen)	No	Currently a low number of mapped fen sites, but this is not a fen-rich county. There are no county wetland field survey data available, but there was a desktop review by WSI in 2014 (data not included in Article 17 mapping). Bryophyte data for the county limited. Likely to be additional smaller sites which have not been identified, in addition to the sites requiring further information to assess. This would increase the number and range of fen sites mapped.	High
Cavan	• Marsh Fritillary site survey (2015) • British Bryological Society Atlas dataset (2014) • National Survey of Upland Habitats (Cuilcagh-Anierin, 2012-2013) • Irish Semi-natural Grasslands Survey (2009) • Habitat Mapping of Habitats in Co. Cavan (2010)	• Co. Cavan wetland mapping (2015) (WSI online map) • Cavan Wetland Survey (2008)	311 (Alkaline fen, Poor fen, Transition mire)	Yes	A relatively fen-rich county, in particular basin fens on limestone and transition mire around small loughs. However, there are limited wetland field survey data and the mapped Article 17 distribution is focused in the north-west of the county. Current mapped fen distribution likely to be an underestimate. A large number of potential additional fen sites identified in the desktop review by WSI in 2015 (data not included in Article 17 mapping). Likely to be additional smaller sites which have not been identified, in addition to the sites requiring further information to assess. This would increase the number and range of fen sites mapped. The NSUH data could also be checked for Poor fen sites as these would not have been included in the Article 17 review.	High
Clare	• Marsh Fritillary site survey (2015) • British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2013) • Clare Habitat Mapping Study (2008) • Co. Clare Wetlands Survey (2008)	• Co. Clare wetland mapping (2016) • Clare Habitat Mapping Study (2010) • Clare Habitat Mapping Study (2009)	246 (Alkaline fen)	No, but there have been a number of habitat mapping studies	Clare has large areas of limestone and wetlands. Turloughs and calcareous springs are frequent, but fen habitats also well represented. Article 17 data focused in central N-S area of county (in vicinity of M18), with fewer sites to the east and west. The additional MIW sites are distributed throughout the county and would increase the fen distribution if found to support fen habitats. In addition, as there has been no dedicated county wetland survey, there are likely to be additional smaller sites which have not been identified.	High

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Cork	• British Bryological Society Atlas dataset (2014) • National Survey of Upland Habitats (Caha Mountains, 2013-2014) • Irish Bryophyte Group bryophyte meeting (2012) • British Bryological Society bryophyte meeting (2009) • Irish Semi-natural Grasslands Survey (2008)	• Co. Cork wetland mapping (2015)	199 (Alkaline fen, Poor fen, Transition mire)	No	The geology in County Cork is largely non-calcareous rock and alkaline fens are not frequent. Article 17 fen mapping has few sites for this county. However, non-Annex poor fens are likely to be under-represented as they are frequent in upland areas in the western counties. The additional MIW sites are distributed throughout the county and would increase the fen distribution if found to support fen habitats (but they require survey to assess). In addition, as there has been no dedicated county wetland survey, there are likely to be additional smaller sites (particularly Poor fen and Transition mire) which have not yet been identified. The NSUH data could also be checked for Poor fen sites as these would not have been included in the Article 17 review.	High
Donegal	• British Bryological Society Atlas dataset (2014) • National Survey of Upland Habitats (Slieve League, 2012-2013)	• Co. Donegal wetland mapping (2016) • British Bryological Society bryophyte meeting (2016)	411 (Alkaline fen, Transition mire)	No	Away from coastal sites, the geology and climate in Donegal leads to a dominance of non-calcareous and peaty habitats. The Article 17 fen mapping has few sites for this county. There has been no dedicated county wetland survey, but there are a large number of additional MIW sites to be checked from a desktop review. Most of these require survey to assess if they support fen habitats. The NSUH data could also be checked for Poor fen sites as these would not have been included in the Article 17 review. The 2016 BBS bryophyte meeting data may highlight more potential fen sites.	High
Dublin	• DLRCC Bryophyte surveys (2017-2018) • British Bryological Society Atlas dataset (2014) • DLRCC Glencullen Ecological surveys (2013) • DLRCC Bride's Glen Ecological surveys (2012) • DLRCC Two Rock Mountain Annex I habitat survey (2011) • Irish Semi-natural Grasslands Survey (2010) • Cherrywood SDZ Botanical surveys (2010)	• Dún-Laoghaire-Rathdown habitat mapping review (2020) • Howth bryophyte survey (2019) • DLRCC Petrifying spring surveys (2019)	0	No	County Dublin has underlying limestone geology in many areas, but also has a large area of urban habitat. There has been no dedicated county wetland survey. However, the county is well known botanically and there have been a number of other habitat surveys, particularly in the southern part of the county where fens and flushes are more frequent. There were no additional MIW sites to check and it is considered that most areas of fen habitat will have been mapped. Poor fen in the Dublin Mountains may be underestimated, but data for much of the relevant areas are available for checking if required. Little additional survey work is required for the identification of fen sites but recent fen condition may not be known.	Low

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Galway	• Marsh Fritillary site survey (2015) • British Bryological Society Atlas dataset (2014) • Irish Bryophyte Group bryophyte recording (2014) • Irish Bryophyte Group bryophyte recording (2011) • Irish Semi-natural Grasslands Survey (2013)	• Galway City Transport Project (2018-2019 data) • Co. Galway wetland mapping (2016)	513 (Alkaline fen, *Cladium* fen, Poor fen, Transition mire)	No	County Galway has both limestone and upland wet peaty habitats and supports good examples of all fen target types. There has been no dedicated county wetland survey and fen habitat mapping is patchy. Article 17 data tend to be focused around Lough Corrib and upland areas which have been the subject of various surveys. A high number of fen bryophyte points have been reviewed. However, there are many MIW points not included in the Article 17 mapping. These would increase the range of fen mapping in the county. Calcareous fen habitats in the limestone region likely have reasonable coverage, but transition mire and poor fen in the upland/ blanket bog areas are likely to be under-represented.	High
Kerry	• Marsh Fritillary site survey (2015) • Co. Kerry Wetland Survey (2015) • Co. Kerry Wetland Survey (2014) • National Survey of Upland Habitats (Caha Mountains, 2013-2014) • National Upland Survey of Upland Habitats (Slieve Mish, 2014) • British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2013) • National Survey of Upland Habitats (Brandon, 2011-2012) • British Bryological Society bryophyte meeting (2009)	• British Bryological Society bryophyte meeting (2019) • Killarney National Park Upland Survey (2011)	35 (Alkaline fen, Poor fen)	Yes	Kerry is largely dominated by acidic rocks and is not a fen-rich county. However, there has been a county wetland field survey and numerous additional data resources, so survey effort is relatively high compared to the likely number of fen sites in the county. Most potential fen sites are therefore likely to have been identified, but there may be additional unmapped smaller sites. There are only a few MIW sites which require further information to assess. The Article 17 data are very localised (*e.g.,* from NSUH surveys) and the additional potential sites cover a wider range of the county. In particular poor fen and transition mire are likely to be under-represented. The NSUH data could be re-checked for poor fen sites as these would not have been included in the Article 17 review.	Low
Kildare	• British Bryological Society Atlas dataset (2014) • Co. Kildare Wetland Survey III (2014) • Co. Kildare Wetland Survey II (2013) • Co. Kildare Wetland Survey I (2012) • Heritage Council Kildare bryophyte survey (2012) • Irish Semi-natural Grasslands Survey (2010)	n/a	200 (no habitat information)	Yes	County Kildare is a relatively fen-rich county with limestone bedrock and calcareous alluvial deposits (*e.g.,* Pollardstown Fen aquifer). There are data from dedicated county wetland fen survey and desktop review, a county bryophyte survey and incidental fen data from the ISGS survey. Therefore, most potential fen sites likely to have been identified. There are 200 MIW points to check but these have no habitat data associated with them and it is not clear if they represent potential fen habitat. Poor fen and transition mire are possibly under-represented, but are not common in Co. Kildare.	Low

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Kilkenny	• British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2011-2012)	• Kilkenny Wetland Survey 2020	21 (Alkaline fen)	No	There are few Article 17 fen data for County Kilkenny. This is not likely to be a fen-rich county but is still likely to be very under-recorded. There has been no county wetland field survey and there are limited additional data. There are only 21 MIW sites to check but it is likely that there are additional fen sites which have not been mapped. There is a desktop review of wetlands in preparation (2020) which will help to identify sites for survey.	High
Laois	• British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2011-2012) • Co. Laois Habitats Survey (Phase V) (2009)	• Co. Laois wetland mapping (2014)	37 (Alkaline fen, Poor fen)	No	Laois is not a fen-rich county but there are areas of calcareous flushing/springs on peatlands that create local areas of fen habitat (*e.g.,* Slieve Blooms and Abbeyleix Bog). There has been no dedicated county wetland survey. Most of the potential fen sites in the MIW data require survey to assess. It is likely that there are additional sites which have not been identified, particularly on cutover bog.	High
Leitrim	• Marsh Fritillary site survey (2015) • British Bryological Society Atlas dataset (2014) • National Survey of Upland Habitats (Cuilcagh-Anieran, 2012-2013) • National Survey of Upland Habitats (Arroo, 2012-2013) • Irish Semi-natural Grasslands Survey (2009)	• Leitrim Wetland Survey (2019)	168 (Alkaline fen, Poor fen, Transition mire)	No	Leitrim has a large area of upland limestone in the NW of and centre of the county and this has good coverage in the Article 17 dataset (from NSUH datasets). However, the fen data outside of the upland areas is relatively sparse. There are a large number of additional potential fen sites in the MIW data, which cover a wider range of the county. These require survey to assess. The 2019 Leitrim Wetland survey is a desktop review which may have additional information on some of these sites. There has been no dedicated county wetland field survey to date. The NSUH data could be re-checked for poor fen sites as these would not have been included in the Article 17 review.	High
Limerick	• British Bryological Society Atlas dataset (2014) • Irish Bryophyte Group bryophyte meeting (2012) • Irish Semi-natural Grasslands Survey (2013)	• Limerick Wetland Survey (2015)	94 (Alkaline fen, *Cladium* fen, Poor fen, Transition mire)	No	County Limerick has a relatively low number of fen sites recorded in the Article 17 dataset. There are fen habitats associated with the Shannon floodplain, but the section within County Limerick is tidal and fen may be less frequent. There are also some upland data from the Galtees and a moderate number of bryophyte records. However, there have been no dedicated county wetland field surveys and fen habitats are likely to be under-recorded. There are a large number of sites in the MIW which require further survey to assess and these would give wider fen coverage if confirmed. In addition, there are likely to be additional smaller sites which have not been identified.	High

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Longford	• Marsh Fritillary site survey (2016) • British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2009)	• Co. Longford Wetland Field Survey 2019 • Counties Longford & Roscommon Wetland Study 2017	65 (Alkaline fen, Poor fen)	Yes	County Longford has a relatively low number of fen sites recorded in the Article 17 dataset. Mapped fen habitats are focused around Lough Ree and peatlands in the SW of the county. There are 65 sites identified in the MIW which cover a wider range of the county but require further survey to assess. There has been a recent dedicated county wetland survey and desktop review which may provide further information on these sites.	Low
Louth	• Marsh Fritillary site survey (2015) • Co. Louth Wetland Survey III (2014) • Co. Louth Wetland Survey II (2012) • British Bryological Society Atlas dataset (2014) • Louth Wetland Survey (2012) • Irish Semi-natural Grasslands Survey (2011-12) • Louth Wetland Identification Survey (2011) • National Survey of Upland Habitats (Carlingford, 2009-10)	n/a	9 (Alkaline fen, Poor fen, Transition mire)	Yes	Fen habitats in County Louth occur predominantly in the upland areas (*e.g.,* flushes in the Carlingford Mountains) and in basin fens (with transition mire) in lowland areas. The Article 17 fen data shows an upland cluster of fen points in the NE of the county and smaller, mainly lowland clusters in the centre of the county. There is less fen mapped in the southern half of the county and this likely reflects the actual fen distribution. There are good wetland data for the county, including dedicated county wetland survey and review. There are a small number of MIW sites to check. However, the wetland survey data were reviewed for Article 17 reporting and most sites not included were considered not to support Annex I fen habitat. It may be worth re-checking the highlighted sites for non-Annex fen habitat (*e.g.,* poor fen), although these are not likely to be common in Co. Louth.	Low

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Mayo	• Marsh Fritillary site survey (2015) • Irish Semi-natural Grasslands Survey (2013) • N60 upgrade surveys (2012, 2014 & 2016) • British Bryological Society Atlas dataset (2014) • British Bryological Society bryophyte meeting (2012) • National Survey of Upland Habitats (Nephin, 2010-2011) • National Survey of Upland Habitats (Croaghaun/ Slievemore, 2010-2011) • National Survey of Upland Habitats (Mweelrea/Sheeffry/ Erriff, 2010-2011) • National Survey of Upland Habitats (Corraun, 2009-2010) • Mayo Habitats Survey (2008)	• Co. Mayo wetland mapping (2014) • N59 Clifden to Oughterard Blanket bog survey (2013)	40 (Alkaline fen, *Cladium* fen, Poor fen, Transition mire)	No	County Mayo has both limestone and upland wet peaty habitats and supports good examples of most of the 5 target fen types. However, there has been no dedicated county wetland survey and fen habitat mapping is patchy. The Article 17 data are very localised and focused on upland NSUH data and bryophyte data from upland flushes. There has been a desktop review, which will have identified most significant areas of fen. There are 40 MIW points to check and these additional potential sites cover a wider range of the county. It is likely that poor fen in the upland/ blanket bog areas are under-represented and the NSUH data could be re-checked for this habitat.	High
Meath	• Marsh Fritillary site survey (2015) • British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2011-2012) • Meath Wetlands & Coastal Habitats Survey (2010)	• n/a	95 (Alkaline fen, Poor fen, Transition mire)	Yes (limited)	Meath fen habitats mainly occur as basin fens with transition mire, alkaline fen or occasionally *Cladium* fen. There is little upland habitat, and poor fen is likely to be rare, although also under-recorded. The Article 17 mapping has few fen sites for Co. Meath and includes those surveyed in the 2010 wetland survey. There are a large number of MIW sites which require further survey to assess. Most of these have no habitat information available, but aerial photography shows that many are basin peatlands and likely to support transition mire and possible alkaline fen. The small amount of upland areas on peat may have areas of poor fen which have not yet been recorded.	

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Monaghan	• Marsh Fritillary site survey (2015) • British Bryological Society Atlas dataset (2014) • Monaghan Wetland Survey II (2012) • Irish Semi-natural Grasslands Survey (2009)	• Monaghan Wetland Survey (2011) • The County Monaghan Wetlands Map (2010) • Monaghan Fen Survey II (2008) • Co. Monaghan Wetland Survey (2006)	158 (Alkaline fen, Poor fen, Transition mire)	Yes	Wetland habitats are frequent in Monaghan in inter-drumlin hollows/ basin fens and in some areas of cutover peat. Calcareous wetlands predominate (transition mire, *Cladium* fen and alkaline fen), but there are some acid waterbodies and associated poor fen. There have been several dedicated county wetland surveys and data reviews and most potential fen sites are likely to have been identified. There are 158 MIW sites which are not included in the Article 17 mapping. The county wetland reports should be checked to see if these sites can be reviewed without further survey. There are also an additional 421 sites for which there is no habitat information. As there have been 5 wetland surveys/ data reviews, it is considered that these sites are unlikely to represent new fen sites.	
Offaly	• British Bryological Society Atlas dataset (2014)	• Co. Offaly wetland mapping (2016)	124 (Alkaline fen, *Cladium* fen, Poor fen)	No	Offaly is largely a lowland county with a high proportion of raised and cutover bog habitats. Mapped fen habitats are dominated by alkaline fen on cutover peat. There are also some areas of transition mire around loughs (*e.g.,* Fin Lough SAC), generally also associated with raised bog habitat. There has been no dedicated county wetland survey, though a desktop review has been undertaken and 124 MIW sites require further survey and would potentially increase the number of alkaline fen, *Cladium* fen and poor fen sites. There are likely to be additional small sites which have not yet been identified, particularly on cutover bog.	High
Roscommon	• Marsh Fritillary site survey (2016) • British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2007)	• Roscommon Wetland Study (2017)	193 (Alkaline fen, *Cladium* fen, Poor fen, Transition mire)	No	Roscommon is largely a lowland county with a high proportion of raised and cutover bog habitats. Mapped fen habitats are dominated by alkaline fen on cutover peat. There are also some areas of alkaline fen and transition mire around loughs (*e.g.,* Lough Key, the upper Shannon floodplain and many smaller loughs). There has been a desktop review of wetlands in the county and 193 sites require further survey to assess fen habitats. In addition, as there has been no dedicated county wetland survey and there are limited other data, there may be additional sites which have not been identified, particularly on cutover bog.	High

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Sligo	• N16 Lugatober (Drumkilsellagh to Lugnagall) wetland surveys (2016-2019) • N4 Collooney to Castlebaldwin wetland surveys (2012-2013) • National Survey of Upland Habitats (Ben Bulbin, 2012-2013) • National Survey of Upland Habitats (Ox Mountains, 2012-2013) • N15 Sligo to County Boundary surveys (2009-2010) • Irish Semi-natural Grasslands Survey (2010) • Sligo Wetland Survey (2009)	• N59 wetland surveys (2019) • Sligo Wetland Survey (2011) • Sligo Wetland Survey (2010) • Sligo Wetland Survey (2008)	205 (Alkaline fen, *Cladium* fen, Poor fen, Transition mire)	Yes	Sligo is a fen-rich county with upland and lowland limestone, small and large loughs and cutover peat over limestone all developing fen habitats. There have been a number of county wetland surveys and data reviews and larger potential fen sites are likely to have been identified. The Article 17 data however is mainly focused on upland areas and proposed road corridors and there are a large number of MIW points which are not currently included. Some of these will have sufficient information available in one of the county surveys to assess, but 145 require further survey. It is also likely that Poor fen is under-recorded in the county and it would be worth re-checking site information for non-Annex fen habitats that may have been missed. There have been a number of surveys for road schemes which have found new alkaline fen, spring and potential turlough sites. So although this is a well-surveyed county, fen habitats are common and still likely to be under-represented in the current maps.	Medium
Tipperary	• British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2013) • National Survey of Upland Habitats (Galtees, 2011-2012) • Irish Bryophyte Group meeting (2012)	n/a	117 (Alkaline fen, Poor fen, Transition mire)	No	Fen habitats in Tipperary include upland alkaline fen / flush and alkaline fen / transition mire in lowland basin fens and on cutover peat. Distribution of fen habitats in Article 17 mapping is focused on the upland fens with a small number of lowland sites. A large number of MIW points require further information to assess; they would increase the mapped range of the fen habitats in the county. As there has been no dedicated county wetland survey and other data are limited, there are likely to be additional smaller sites which have not been identified, particularly on cutover bog.	High
Waterford	• Co. Waterford Wetland Survey (2015) • British Bryological Society Atlas dataset (2014) • National Survey of Upland Habitats (Comeraghs, 2009-2010) • Irish Semi-natural Grasslands Survey (2008) • Waterford Wetland Survey (2006)	n/a	125 (Alkaline fen, Transition mire)	Yes (limited)	The Article 17 data for Waterford are very localised and mainly focused on upland areas (Comeragh Mountains). There has been a limited county wetland survey (35 sites surveyed). Ten MIW points require further survey to assess and may support additional fen habitats. There are also 173 potential sites which contain no habitat information. Some of these are obvious ponds and not likely to support fen habitats but 114 could be reviewed, and this would potentially increase the number and range of mapped fen habitats. NSUH data could be re-checked for poor fen in the upland/blanket bog areas, which is likely to be under-represented.	Medium

County name	Large-scale datasets assessed for Article 17	Large-scale datasets not assessed for Article 17	Potential new sites from MIW (likely habitats)	CWS field survey	Summary of known fen distribution in county	Level of knowledge gaps
Westmeath	• British Bryological Society Atlas dataset (2014) • Irish Semi-natural Grasslands Survey (2011-2012) • Westmeath Fen Survey (2007)	• Westmeath Desktop Wetland Survey (2020)	165 (Alkaline fen, *Cladium* fen, Poor fen, Transition mire)	Yes (limited)	County Westmeath is a fen-rich midland county with limestone bedrock overlain by peat deposits and with numerous small loughs. Transition mire is particularly well-represented on cutover peat associated with raised bogs and in basin fen systems (*e.g.,* Scragh Bog SAC). The Article 17 data for this county have good coverage of fen sites despite the limited county wetland field surveys. There have been two reviews of desktop data and it is likely that most potential fen sites have been identified. However, there is a large number of potential additional MIW sites which require further survey to assess and which would potentially increase the number of fen sites.	Medium
Wexford	• British Bryological Society Atlas dataset (2014)	n/a	10 (Alkaline fen, Poor fen)	No	There is little fen mapped in County Wexford and there has been no county wetland field survey. There are only a limited number of additional sites to check from the MIW data. This suggests that fens are uncommon in this county. However, there are a number of protected sites which are listed as supporting valley and basin fens, flushes and transition mire. A county desktop review should be undertaken to assess the potential for additional fen habitats requiring field survey. There are excellent botanical data for the county, which should mean that most potential fen sites should be possible to review in a desktop survey.	Medium
Wicklow	• Wicklow bryophyte flora surveys (2018) • Irish Semi-natural Grasslands Survey (2011-2012) • Co. Wicklow Wetland Survey (2012)	• Wicklow bryophyte flora surveys (2019-2020) • Wicklow bryophyte flora surveys (2018) • Co. Wicklow wetland mapping (2016)	66 (Alkaline fen, Poor fen, Transition mire)	Yes (limited)	Much of County Wicklow overlies granite bedrock with acidic soils and there are extensive upland areas with acid peaty soils. Fen habitat is not frequent, but there are some significant areas of transition mire (*e.g.,* Carrigower Bog) and small areas of alkaline fen. In 2020 two new transition mire sites for the Annex II bryophyte species *Hamatocaulis vernicosus* were discovered in Co. Wicklow, showing that there are still unrecorded areas of fen habitat. There are a number of MIW sites to check which require further survey to assess. It is likely that most larger fen sites will have been identified but there may be smaller sites, particularly transition mire and poor fen on cutover peat, which have not yet been mapped.	Medium

Appendix 8 Pressure and Threat (Impact) codes (DG Environment, 2017)

Code		Pressure/threat
A	**A**	**Agriculture**
A01	**A**	Conversion into agricultural land (excluding drainage and burning)
A02	**A**	Conversion from one type of agricultural land use to another (excluding drainage and burning)
A03	**A**	Conversion from mixed farming and agroforestry systems to specialised (*e.g.,* single crop) production
A04	**A**	Changes in terrain and surface of agricultural areas
A05	**A**	Removal of small landscape features for agricultural land parcel consolidation (hedges, stone walls, rushes, open ditches, springs, solitary trees, *etc.*)
A06	**A**	Abandonment of grassland management (*e.g.,* cessation of grazing or of mowing)
A07	**A**	Abandonment of management/use of other agricultural and agroforestry systems (all except grassland)
A08	**A**	Mowing or cutting of grasslands
A09	**A**	Intensive grazing or overgrazing by livestock
A10	**A**	Extensive grazing or undergrazing by livestock
A11	**A**	Burning for agriculture
A12	**A**	Suppression of fire for agriculture
A13	**A**	Reseeding of grasslands and other semi-natural habitats
A14	**A**	Livestock farming (without grazing)
A15	**A**	Tillage practices (*e.g.,* ploughing) in agriculture
A16	**A**	Other soil management practices in agriculture
A17	**A**	Harvesting of crops and cutting of croplands
A18	**A**	Irrigation of agricultural land
A19	**A**	Application of natural fertilisers on agricultural land
A20	**A**	Application of synthetic (mineral) fertilisers on agricultural land
A21	**A**	Use of plant protection chemicals in agriculture
A22	**A**	Use of physical plant protection in agriculture
A23	**A**	Use of other pest control methods in agriculture (excluding tillage)
A24	**A**	Waste management practices in agriculture
A25	**A**	Agricultural activities generating point source pollution to surface or ground waters
A26	**A**	Agricultural activities generating diffuse pollution to surface or ground waters
A27	**A**	Agricultural activities generating air pollution
A28	**A**	Agricultural activities generating marine pollution
A29	**A**	Agricultural activities generating soil pollution
A30	**A**	Active abstractions from groundwater, surface water or mixed water for agriculture
A31	**A**	Drainage for use as agricultural land
A32	**A**	Development and operation of dams for agriculture
A33	**A**	Modification of hydrological flow or physical alternation of water bodies for agriculture (excluding development and operation of dams)
A34	**A**	Introduction and spread of new crops (including GMOs)
A35	**A**	Agricultural crops for renewable energy production
A36	**A**	Agriculture activities not referred to above
B	**B**	**Forestry**
B01	**B**	Conversion to forest from other land uses, or afforestation (excluding drainage)
B02	**B**	Conversion to other types of forests including monocultures
B03	**B**	Replanting with or introducing non-native or non-typical species (including new species and GMOs)
B04	**B**	Abandonment of traditional forest management
B05	**B**	Logging without replanting or natural regrowth
B06	**B**	Logging (excluding clear cutting) of individual trees
B07	**B**	Removal of dead and dying trees, including debris
B08	**B**	Removal of old trees (excluding dead or dying trees)
B09	**B**	Clear-cutting, removal of all trees
B10	**B**	Illegal logging
B11	**B**	Cork extraction and forest exploitation excluding logging.
B12	**B**	Thinning of tree layer
B13	**B**	Burning for forestry
B14	**B**	Suppression of fire for forestry

Code		Pressure/threat
B15	**B**	Forest management reducing old growth forests.
B16	**B**	Wood transport
B17	**B**	Tillage practices in forestry and other soil management practices in forestry
B18	**B**	Application of natural fertilisers
B19	**B**	Application of synthetic fertilisers in forestry, including liming of forest soils
B20	**B**	Use of plant protection chemicals in forestry
B21	**B**	Use of physical plant protection in forestry, excluding tree layer thinning
B22	**B**	Use of other pest control methods in forestry
B23	**B**	Forestry activities generating pollution to surface or ground waters
B24	**B**	Forestry activities generating air pollution
B25	**B**	Forestry activities generating marine pollution
B26	**B**	Forestry activities generating soil pollution
B27	**B**	Modification of hydrological conditions, or physical alternation of water bodies and drainage for forestry (including dams)
B28	**B**	Forests for renewable energy production
B29	**B**	Other forestry activities, excluding those relating to agro-forestry
C	**C**	**Extraction of resources (minerals, peat, non-renewable energy resources)**
C01	**C**	Extraction of minerals (*e.g.,* rock, metal ores, gravel, sand, shell)
C02	**C**	Extraction of salt
C03	**C**	Extraction of oil and gas, including infrastructure
C04	**C**	Coal mining
C05	**C**	Peat extraction
C06	**C**	Dumping/depositing of inert materials from terrestrial extraction
C07	**C**	Dumping/depositing of dredged materials from marine extraction
C08	**C**	Abandonment or conversion of saltpans
C09	**C**	Geotechnical surveying
C10	**C**	Extraction activities generating point source pollution to surface or ground waters
C11	**C**	Extraction activities generating diffuse pollution to ground or surface waters
C12	**C**	Extraction activities generating marine pollution
C13	**C**	Extraction activities generating noise, light or other forms of pollution
C14	**C**	Abstraction of surface and ground water for resource extraction
C15	**C**	Mining and extraction activities not referred to above
D	**D**	**Energy production processes and related infrastructure development**
D01	**D**	Wind, wave and tidal power, including infrastructure
D02	**D**	Hydropower (dams, weirs, run-off-the-river), including infrastructure
D03	**D**	Solar power, including infrastructure
D04	**D**	Geothermal power generation (including infrastructure)
D05	**D**	Development and operation of energy production plants (including bioenergy plants, fossil and nuclear energy plants)
D06	**D**	Transmission of electricity and communications (cables)
D07	**D**	Oil and gas pipelines
D08	**D**	Energy production and transmission activities generating pollution to surface or ground waters
D09	**D**	Energy production and transmission activities generating air pollution
D10	**D**	Energy production and transmission activities generating marine pollution
D11	**D**	Energy production and transmission activities generating noise pollution
D12	**D**	Energy production and transmission activities generating light, heat or other forms pollution
D13	**D**	Abstraction of surface and ground water for energy production (excluding hydropower)
D14	**D**	Energy production and transmission activities not referred to above
E	**E**	**Development and operation of transport systems**
E01	**E**	Roads, paths, railroads and related infrastructure (*e.g.,* bridges, viaducts, tunnels)
E02	**E**	Shipping lanes and ferry lanes transport operations
E03	**E**	Shipping lanes, ferry lanes and anchorage infrastructure (*e.g.,* canalisation, dredging)
E04	**E**	Flight paths of planes, helicopter and other non-leisure aircrafts
E05	**E**	Land, water and air transport activities generating pollution to surface or ground waters
E06	**E**	Land, water and air transport activities generating air pollution
E07	**E**	Land, water and air transport activities generating marine pollution
E08	**E**	Land, water and air transport activities generating noise, light and other forms of pollution
E09	**E**	Land, water and air transport activities not referred to above
F	**F**	**Development, construction and use of residential, commercial, industrial and recreational infrastructure and areas.**
F01	**F**	Conversion from other land uses to housing, settlement or recreational areas (excluding drainage and modification of coastline, estuary and coastal conditions)

Code		Pressure/threat
F02	**F**	Construction or modification (of *e.g.,* housing and settlements) in existing urban or recreational areas
F03	**F**	Conversions from other land uses to commercial / industrial areas (excluding drainage and modification of coastline, estuary and coastal conditions)
F04	**F**	Construction or modification of commercial / industrial infrastructure in existing commercial / industrial areas
F05	**F**	Creation or development of sports, tourism and leisure infrastructure (outside the urban or recreational areas)
F06	**F**	Development and maintenance of beach areas for tourism and recreation incl. beach nourishment and beach cleaning
F07	**F**	Sports, tourism and leisure activities
F08	**F**	Modification of coastline, estuary and coastal conditions for development, use and protection of residential, commercial, industrial and recreational infrastructure and areas (including sea defence or coast protection works and infrastructures)
F09	**F**	Deposition and treatment of waste/garbage from household/recreational facilities
F10	**F**	Deposition and treatment of waste/garbage from commercial and industrial facilities.
F11	**F**	Pollution to surface or ground water due to urban run-offs
F12	**F**	Discharge of urban waste water (excluding storm overflows and/or urban run-offs) generating pollution to surface or ground water
F13	**F**	Plants, contaminated or abandoned industrial sites generating pollution to surface or ground water
F14	**F**	Other residential and recreational activities and structures generating point pollution to surface or ground waters
F15	**F**	Other industrial and commercial activities and structures generating point pollution to surface or ground waters
F16	**F**	Other residential and recreational activities and structures generating diffuse pollution to surface or ground waters
F17	**F**	Other industrial and commercial activities and structures generating diffuse pollution to surface or ground waters
F18	**F**	Residential and recreational activities and structures generating air pollution
F19	**F**	Industrial and commercial activities and structures generating air pollution
F20	**F**	Residential or recreational activities and structures generating marine pollution (excl. marine macro- and micro-particular pollution)
F21	**F**	Industrial or commercial activities and structures generating marine pollution (excluding marine macro- and micro-particular pollution)
F22	**F**	Residential or recreational activities and structures generating marine macro- and micro-particulate pollution (*e.g.,* plastic bags, Styrofoam)
F23	**F**	Industrial or commercial activities and structures generating marine macro- and micro- particulate pollution (*e.g.,* plastic bags, Styrofoam)
F24	**F**	Residential or recreational activities and structures generating noise, light, heat or other forms of pollution
F25	**F**	Industrial or commercial activities and structures generating noise, light, heat or other forms of pollution
F26	**F**	Drainage, land reclamation and conversion of wetlands, marshes, bogs, *etc.* to settlement or recreational areas
F27	**F**	Drainage, land reclamation or conversion of wetlands, marshes, bogs, *etc.* to industrial/commercial areas
F28	**F**	Modification of flooding regimes, flood protection for residential or recreational development
F29	**F**	Construction or development of reservoirs and dams for residential or recreational development
F30	**F**	Construction or development of reservoirs and dams for industrial or commercial development
F31	**F**	Other modification of hydrological conditions for residential or recreational development
F32	**F**	Other modification of hydrological conditions for industrial or commercial development
F33	**F**	Abstractions of ground and surface waters (including marine) for public water supply and recreational use
F34	**F**	Abstractions of ground and surface waters (including marine) for commercial/industrial use (excluding energy)
G	**G**	**Extraction and cultivation of biological living resources (other than agriculture and forestry)**
G01	**G**	Marine fish and shellfish harvesting (professional, recreational) causing reduction of species/prey populations and disturbance of species
G02	**G**	Marine fish and shellfish processing
G03	**G**	Marine fish and shellfish harvesting (professional, recreational) activities causing physical loss and disturbance of seafloor habitats.
G04	**G**	Marine plant harvesting
G05	**G**	Freshwater fish and shellfish harvesting (professional)

Code		Pressure/threat
G06	**G**	Freshwater fish and shellfish harvesting (recreational)
G07	**G**	Hunting
G08	**G**	Management of fishing stocks and game
G09	**G**	Harvesting or collecting of other wild plants and animals (excluding hunting and leisure fishing)
G10	**G**	Illegal shooting/killing
G11	**G**	Illegal harvesting, collecting and taking
G12	**G**	Bycatch and incidental killing (due to fishing and hunting activities)
G13	**G**	Poisoning of animals (excluding lead poisoning)
G14	**G**	Use of lead ammunition or fishing weights
G15	**G**	Modification of coastal conditions for marine aquaculture
G16	**G**	Marine aquaculture generating marine pollution
G17	**G**	Introduction and spread of species (including GMOs) in marine aquaculture.
G18	**G**	Abandonment of marine aquaculture
G19	**G**	Other impacts from marine aquaculture, including infrastructure
G20	**G**	Abstraction of water, flow diversion, dams and other modifications of hydrological conditions for freshwater aquaculture
G21	**G**	Freshwater aquaculture generating point source pollution to surface or ground waters
G22	**G**	Freshwater aquaculture generating diffuse source pollution to surface or ground waters
G23	**G**	Freshwater aquaculture generating marine pollution
G24	**G**	Introduction and spread of species (including alien species and GMOs) in freshwater aquaculture.
G25	**G**	Abandonment of freshwater aquaculture
G26	**G**	Other impacts from freshwater aquaculture, including infrastructure
G27	**G**	Other activities related to extraction and cultivation of biological living resources not referred to above
H	**H**	**Military action, public safety measures, and other human intrusions**
H01	**H**	Military, paramilitary or police exercises and operations on land
H02	**H**	Military, paramilitary or police exercises and operations in the freshwater and marine environment
H03	**H**	Abandonment of terrestrial military or similar exercises (loss of open habitats)
H04	**H**	Vandalism or arson
H05	**H**	Tree surgery, felling/removal of roadside trees and vegetation for public safety
H06	**H**	Closure or restrictive access to site/habitat
H07	**H**	Intrusive and destructive research and monitoring activities
H08	**H**	Other human intrusions and disturbance not mentioned above
I	**I**	**Alien and problematic species**
I01	**I**	Invasive alien species of Union concern
I02	**I**	Other invasive alien species (other than species of Union concern)
I03	**I**	Plant and animal pathogens and pests
I04	**I**	Problematic native species
J	**J**	**Mixed source pollution**
J01	**J**	Mixed source pollution to surface and ground waters (limnic and terrestrial)
J02	**J**	Mixed source marine water pollution (marine and coastal)
J03	**J**	Mixed source air pollution, air-borne pollutants
J04	**J**	Mixed source soil pollution and solid waste (excluding discharges)
J05	**J**	Mixed source excess energy
K	**K**	**Human-induced changes in water regimes**
K01	**K**	Abstractions from groundwater, surface water or mixed water
K02	**K**	Drainage
K03	**K**	Development and operation of dams
K04	**K**	Modification of hydrological flow
K05	**K**	Physical alteration of water bodies
L	**L**	**Natural processes (excluding catastrophes and processes induced by human activity or climate change)**
L01	**L**	Abiotic natural processes (*e.g.,* erosion, silting up, drying out, submersion, salinization)
L02	**L**	Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices)
L03	**L**	Accumulation of organic material
L04	**L**	Natural processes of eutrophication or acidification
L05	**L**	Reduced fecundity / genetic depression (*e.g.,* inbreeding or endogamy)
L06	**L**	Interspecific relations (competition, predation, parasitism, pathogens,)
L07	**L**	Absence or reduction of interspecific faunal and floral relations (*e.g.,* pollinators)
M	**M**	**Geological events, natural catastrophes**
M01	**M**	Volcanic activity
M02	**M**	Tidal waves, tsunamis

Code		Pressure/threat
M03	**M**	Earthquake
M04	**M**	Avalanche (snow)
M05	**M**	Collapse of terrain, landslide
M06	**M**	Underground collapses (natural processes)
M07	**M**	Storm, cyclone
M08	**M**	Flooding (natural processes)
M09	**M**	Fire (natural)
M10	**M**	Other natural catastrophes
N	**N**	**Climate change**
N01	**N**	Temperature changes (*e.g.,* rise of temperature & extremes) due to climate change
N02	**N**	Droughts and decreases in precipitation due to climate change
N03	**N**	Increases or changes in precipitation due to climate change
N04	**N**	Sea-level and wave exposure changes due to climate change
N05	**N**	Change of habitat location, size, and / or quality due to climate change
N06	**N**	Desynchronisation of biological / ecological processes due to climate change
N07	**N**	Decline or extinction of related species (*e.g.,* food source / prey, predator / parasite, symbiote, *etc.*) due to climate change
N08	**N**	Change of species distribution (natural newcomers) due to climate change
N09	**N**	Other climate related changes in abiotic conditions
X	**X**	**Unknown pressures, no pressures and pressures from outside the Member State**
Xu	**X**	Unknown pressure
Xxp	**X**	No pressures
Xxt	**X**	No threats
Xp	**X**	No information on pressures
Xt	**X**	No information on threats
Xe	**X**	Threats and pressures from outside the EU territory
Xo	**X**	Threats and pressures from outside the Member State

Appendix 9 Site Pack Front Sheet

Date Surveyed: ----------

Surveyed by: ----------

bec CONSULTANTS

Pilot Fen Survey 2019-20

Site no:	«Site_ID»	**Site name:**	**«SITE_NAME», Co. «County»**
Grid ref:	«X_ITM» «Y_ITM»	**Desig. site:**	«Desig_site»
Area (ha):	«Area_ha»		

Landscape type 1 (tick 1)	Basin	Floodplain	Lakeside	Valley-head	Valleyhead trough/basin	Trough (or valley-bottom)	Coastal plain	Plateau-plain	

WETMECs associated with landscape type 1:

Add more landscape types and associated WETMECs on back of sheet if appropriate

Site-level data

Signs of N-deposition (if yes, specify):

No. of plots:

Springs recorded (Y/N):

Additional hydrological information:

Additional information on Drains:

Impact code / description *e.g.,* A04.01 intensive grazing	**Location** inside / outside habitat	**Influence (+/-/0)**	**Intensity (H/M/L)**	**% pop. extent affected** (<1%; 1-25%; 26-50%; 51-75%; 76-99%; 100%)

Survey notes:

Site description:

Other comments, *e.g.,* condition/management, rare species:

Data entry/checking:

Digitised: INITIALS _____ DATE _____

Turboveg checked: INITIALS _____ DATE _____

Photos labelled correctly: INITIALS _____ DATE _____

Data checked & complete: INITIALS _____ DATE _____

Appendix 10 Selection of Field Photographs

Photo 1 Habitat 7140 Transition mires at Scragh Bog (stop 8)

Photo 2 Habitat 7140 Transition mires at Lough Garr (stop 2)

Photo 3 Habitat 7140 Transition mires at Fin Lough (stop 5)

Photo 4 Habitat 7140 Transition mires at Lough Owel (stop 3)

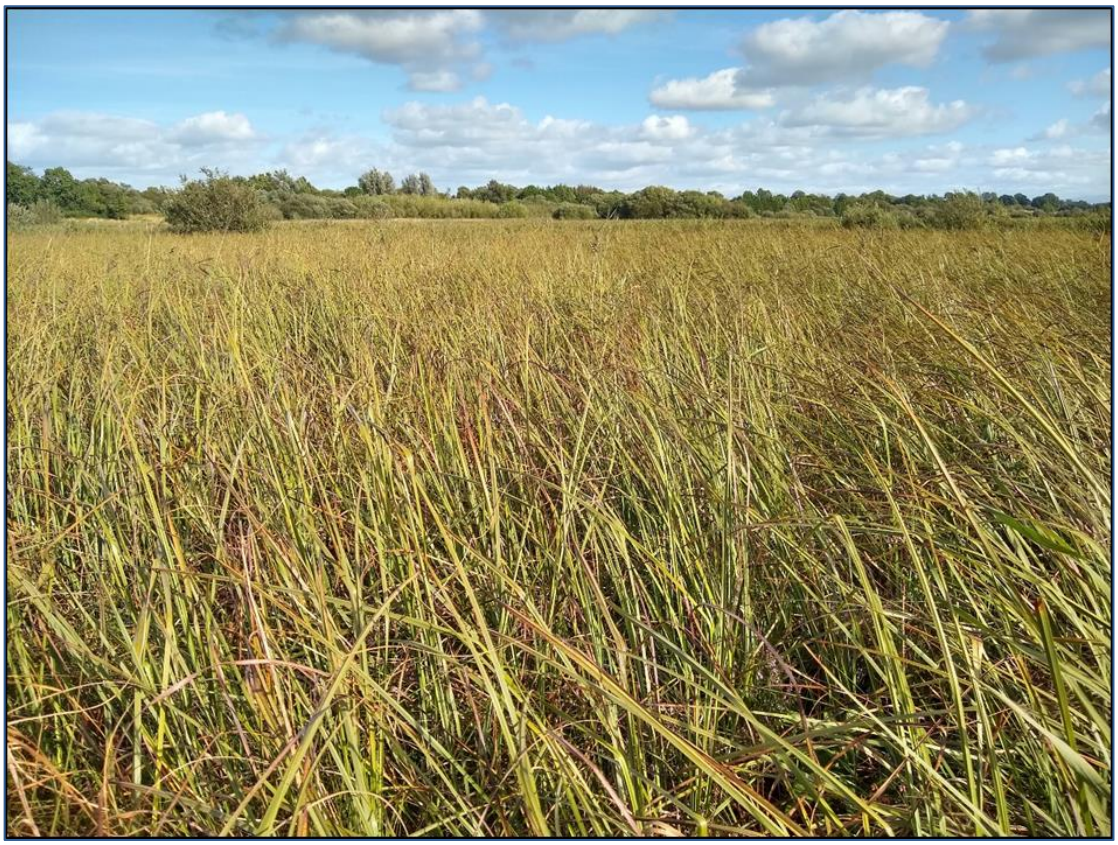

Photo 5 Habitat 7210 *Cladium* fens at Pollardstown Fen (stop 3)

Photo 6 Habitat 7210 *Cladium* fens at Pollardstown Fen (stop 8)

Photo 7 Habitat 7210 *Cladium* fens at Liskeenan Fen (near stop 2)

Photo 8 Habitat 7210 *Cladium* fens at Scragh Bog (stop 7)

Photo 9 Habitat 7230 Alkaline fens at Liskeenan Fen (stop 5)

Photo 10 Habitat 7230 Alkaline fens at River Moy (stop 7)

Photo 11 Habitat 7230 Alkaline fens at Lough Owel (stop 6)

Photo 12 Habitat 7230 Alkaline fens at Scragh Bog (stop 9)

Appendix 11 Template for Text Section of Site Report for the National Fen Survey

Site name		**NFS site number**	
County		**Designations**	
Dates surveyed		**Surveyors**	
X-coord (ITM)		**Y-coord (ITM)**	
Area surveyed (ha)		**Area of habitat 7140 (ha)**	
Area of habitat 7210 (ha)		**Area of habitat 7230 (ha)**	
No. of monitoring stops		**Springs present?**	
Site description			
Drains		**Signs of nutrient enrichment**	
Species of note		**Other hydrological information**	
Wetland Framework		**Irish Vegetation Classification fen communities**	
Water sample data		**Peat depth**	
EC: pH:			
Hydrological information			
Bedrock: **Bedrock aquifer:** **Gravel aquifer:** **Parent material:** **Soils:** **Karst point features:** **Subsoil permeability:** **Groundwater vulnerability:** **Groundwater recharge category (mm/year):**			
Management recommendations			

Annex I habitat	**Area**	**Structure & functions**	**Future prospects**	**Overall status**
7140				
7210				
7230				

Target notes	

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National Parks and Wildlife Service

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