THE VEGETATION, ECOLOGY AND CONSERVATION OF THE LOUGH OUGHTER LAKE SYSTEM, CO. CAVAN

December 1999

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ABSTRACT

The lakes of the Lough Oughter system constitute the best-developed area of inter-drumlin lakes in the country. The system is essentially a continuation of the Erne system of Co. Fermanagh and consists of numerous, narrow, interlinked waterbodies which are separated by elongate chains of low hills derived from glacial material. These lakes are one of the most important coarse angling fisheries in the country and attract thousands of anglers from Britain and continental Europe each year. In addition to the recreational and tourism value of the site, the lakes and their flooded margins are an important natural history resource, supporting well-developed communities of plants and animals. The composition and ecology of many of these plant communities are described in this report.

The semi-natural and natural vegetation associated with the margins of lakes was investigated at 56 locations within the survey area. Although many of the plant communities recorded are common and widespread throughout Ireland a number of communities that are either rare or underreported have been identified. One particularly noteworthy vegetation type is a species-rich fen community dominated by *Juncus inflexus*, which does not appear to have been formally recorded in Ireland until now. In addition to the description of plant communities, stations for a number of nationally rare plant species such as *Prunus padus, Equisetum variegatum* and *Epipactis palustris* were located.

Undoubtedly the most serious threat facing the site at present is the reduction in water quality in many of the lakes within the site. This reduction in water quality has been taking place for at least the last 30 years and is primarily due to the intensive cattle-based agricultural activities in the surrounding land. Unless the problem of eutrophication is addressed, this pollution will continue to have a negative effect on the aquatic plant and animal communities within the site.

ACKNOWLEDGEMENTS

This study would not have been possible without the generous funding of a Wildlife Grant from the Heritage Council. Much credit is due to the Council for its fostering and support of research into the rich natural heritage of Ireland. Particular thanks are due to Dr. Liam Lysaght for the overseeing and encouragement the study. I am also indebted to my family, Karen and Liam, for their constant support and assistance throughout the year.

CHAPTER 1

INTRODUCTION TO THE SURVEY

1.1 Introduction

The Lough Oughter Lake Complex is a very important area of lakes and wetlands situated in Co. Cavan. Up until recently the natural history of the site has received little study and this is especially true of the vegetation of the site. This survey, which was made possible by the funding of a Heritage Council Wildlife Grant, aims to redress this imbalance by documenting the vegetation of the site. The quality and conservation of the site is investigated and this report will also outline ways in which the natural history of the site can be promoted.

1.2 Location and extent of the survey area

Lough Oughter (Grid ref. H 3 0) and its extensive network of associated lakes, is located in the north of Co. Cavan, close to the border with Co. Fermanagh. The survey area occupies an area of approximately 80 km^2, is diamond-shaped in outline and is delimited by the main roads which connect Cavan to the east, Belturbet to the north and Killeshandra to the west (see Figure 1). For conservation purposes the National Parks and Wildlife Service, Dúchas have grouped most of the lakes in this area into one large site and have named it The Lough Oughter Complex, a name that will be used frequently throughout this report. The Lough Oughter Complex is essentially a continuation of the extensive Upper Lough Erne and comprises a landscape dominated by low hills and lakes. Many of these lakes are interconnected by narrow channels and/or slow-flowing rivers (Plate 1). In addition to the serpentine Lough Oughter, other moderately sized lakes occurring within the survey area include Lough Inchin, Inishmuck Lake, Annagh Lough, Derrybrick Lough and Drumanny Lake.

1.3 Geology, topography and soils

Sedimentary rocks largely dominate the bedrock geology of the survey area. Throughout most of the survey area limestone and shale of the Ballysteen formation is the dominant bedrock (Geraghty, 1997), while mudstones and shales are dominant in the northeast of the survey area, to the west and

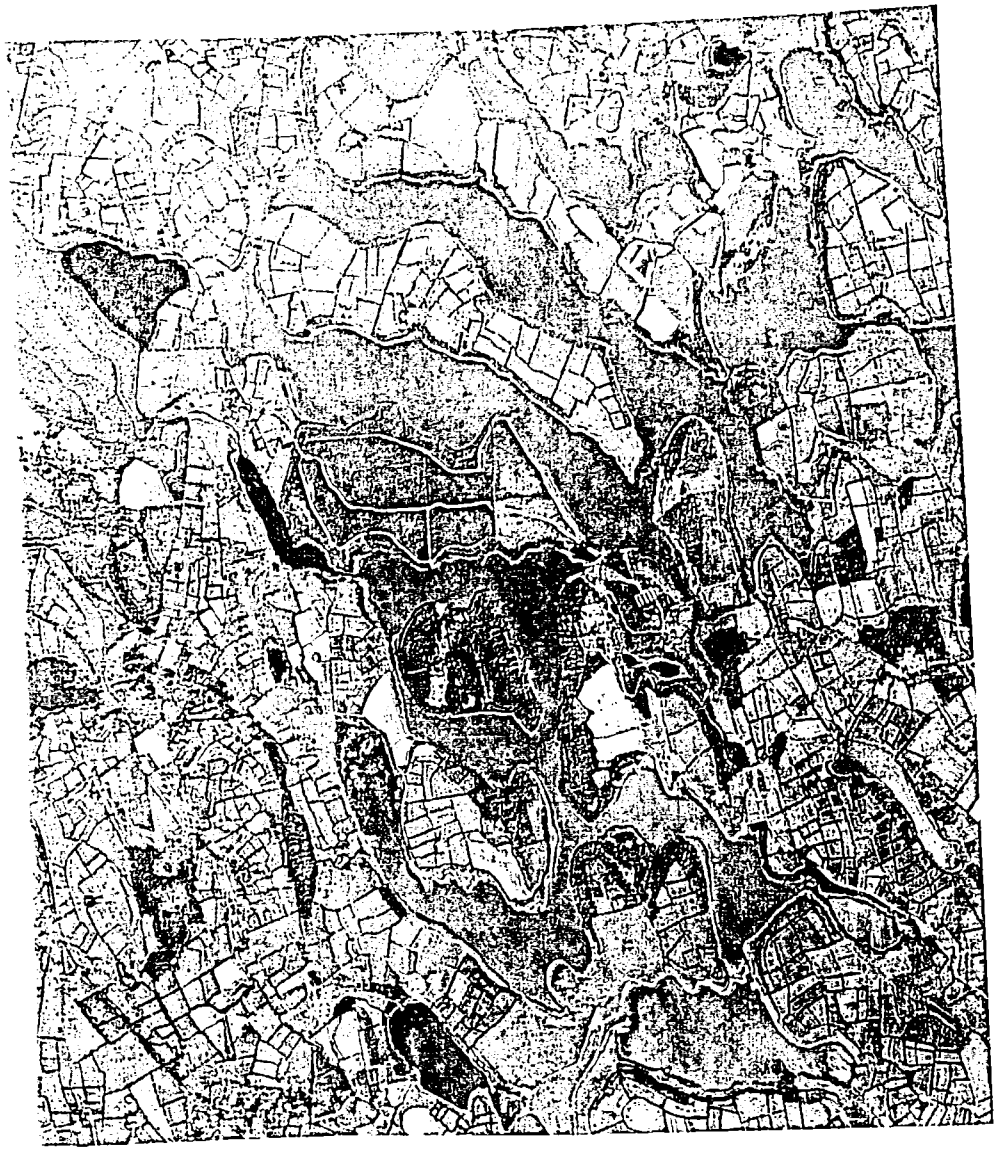

Plate 1. An aerial photograph of the southern section of the site near Killykeen, taken from a height of approximately 6700 metres. Note the interconnection of the many lakes in the photograph.

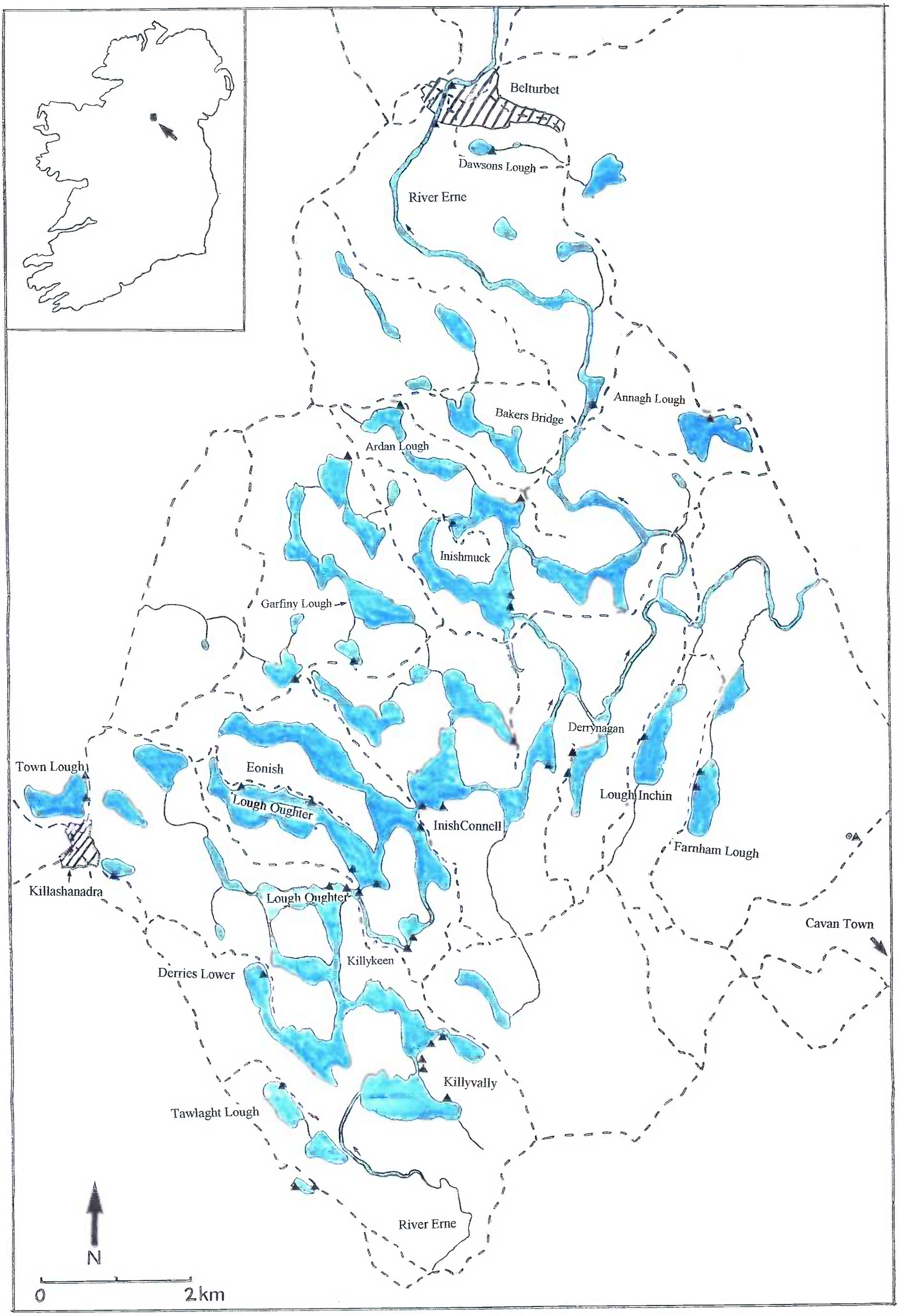

Figure 1. A map of the survey area showing the extensive network of interconnected lakes. Vegetation sampling sites are indicated by the solid triangles. Not all roads are shown.

north of Butlersbridge. As ice-sheets retreated from the area after the last glaciation large amounts of glacial till were deposited and this process has given rise to an undulating landscape of large drumlins and moraines. These glacial deposits now typically form low elongate hills, the summits of which reach an altitude of between 70 and 90 metres, a mere 30 to 50 metres above the level of the intervening lakes. An extensive network of lakes and rivers of which Lough Oughter is the most prominent now occupies the inter-drumlin hollows. The soil of the study area can be described as a clayey till (Geraghty, *op. cit.*) which, at least on the better-drained slopes, has given rise to relatively good quality agricultural land.

1.4 Climate

In the context of the island of Ireland the climate of the study area can be summarised as relatively dry with warm summers and cool winters. The closest weather station to the site is situated at Clones, a mere 25km to the northeast. The mean January temperature at Clones (1951 to 1980) was 3.7^0C, while the mean July temperature (1951 to 1980) was 14.4^0 C (Rohan, 1986). In comparison to other areas of the country air frosts are common at Clones occurring, on average, 47 days per annum. The average yearly rainfall at Clones in the period 1951 to 1980 was 917mm per annum, falling on 164 days of the year, with April and December being the driest and wettest months respectively. Wind at Clones comes mostly from a southwesterly or southerly direction and the mean average wind speed is 4.4 metres per second, which is typical of midland areas of Ireland.

1.5 Land use

Although the overall impression of the site is one of a flooded drumlin/moraine landscape, the soils which cover the low hills provide good quality agricultural land. At present cattle rearing (both dairy and drystock) is the dominant agricultural activity and many of the fields within the survey area are utilised for silage production. Tillage is very rare in the central Cavan area (Personal observation). The comparatively recent onset of intensive production of silage for cattle feeding has undoubtedly lead to an increase in the frequency and amount of manure and fertiliser spread within the catchment of the lakes. This has, in turn, been largely responsible for the recent reduction in the water quality in lakes within the survey area.

Located at the centre of the study area, Killykeen Forest Park is an area of mature coniferous forestry, owned by Coillte, covering approximately 240 hectares. The park also contains a holiday chalet scheme owned and managed by Coillte and a riding school.

The large number of shallow, enclosed lakes within the site make the area a very popular coarse angling venue and it is especially popular with British anglers who constitute the most common group of tourists to the Cavan area. Lough Oughter is considered to be one of the most important

coarse angling venues in the country. Lakes in the area are particularly noted for their good stocks of bream, roach, perch and pike.

1.6 Importance of the site

From the point of view of natural history the site is of considerable importance for a variety reasons. Up until recently however the area has received comparatively little study. There are a number of reasons for this lack of study, most notably the general perception that the natural history interest of the area has been diminished by intensive agriculture. Recently however, the natural heritage value of the area has been recognised and this has resulted in the establishment of the Lough Oughter Complex proposed Natural Heritage Area (No. 7), which comprises most of the lakes in the survey area. At the time of the compilation of this report (November 1999) the ground survey of this site was being carried out by Dúchas personnel (Dr. N. Lockhart pers. comm.). The site is also being considered as a proposed Special Area of Conservation, because it contains good examples of Natural eutrophic lakes with Magnopotamion or Hydrocharition – type vegetation. This habitat is listed under Annex 2 of the Habitats Directive (Ramão, 1996) and thus there is a legal obligation on the state to protect sites which contain the habitat. In addition to the proposed NHA and SAC status, many of the waterbodies within the survey area have been designated as a Special Protection Area (Hickie, 1997), in which shooting is not allowed.

The lakes and associated wetlands within the study area are known to provide habitat for a variety of bird species. There has been some recent work on the wildfowl which frequent the area and, as a result, the site is now regarded as an Internationally Important wildfowl site (Sheppard, 1993). The Lough Oughter complex provides habitat for Internationally Important numbers of Whooper Swan, Nationally Important number of Cormorant and Tufted Duck and Regionally Important numbers of Great Crested Grebe, White-Fronted Goose, Wigeon, Teal, Mallard, Pochard and Goldeneye (Sheppard, *op. cit*). The mean peak numbers of wildfowl from the site are as follows (Data from Sheppard, 1993):

<u>Species with Internationally Important numbers</u>

Whooper Swan - 165

<u>Species with Nationally Important Numbers</u>

Cormorant - 130

Tufted Duck - 247

Species with Regionally/Locally important numbers

Great Crested Grebe - 42
White-fronted Goose - 48
Wigeon - 990
Teal - 237
Mallard - 270
Pochard - 171
Goldeneye - 65

Common Terns are frequently seen throughout the site and they appear to breed on a small island in Farnham Lough. Common species of woodland birds occurring throughout the site include Blackcap, Pheasant and Jay (An Foras Forbatha, 1977). Animals of note which have been recorded from within the study area include Crayfish, Frog, Red Squirrel and Hare.

Throughout most of the survey area improved agricultural fields extend right down to the lake shore, however there are occasionally areas of lake shore where a wide band of semi-natural vegetation remains. These areas of lake shore support a variety of wetland vegetation types, the composition of which are outlined in this report. Published work on the plant life within the survey area appears to be somewhat limited. Praeger (1934) reported the occurrence of a number of rare and unusual species from the vicinity of Lough Oughter, including *Cardamine amara*[1] (a legally protected species), *Thelypteris palustris* and *Hydrocharis morsus-ranae*. A list of rare plant species previously recorded from the Lough Oughter area is outlined in Table 1.

In addition to the ecological interest of the site there are also numerous sites of archaeological interest in the area (Archaeology Ireland, 1999). A megalithic court tomb, dating from the neolithic, is situated on the Gartnanoul Peninsula. Many of the lakes within the Lough Oughter system contain small islands which are thought to have been used as crannogs up until the Middle Ages. Clogh Oughter Castle, a circular castle dating from the thirteenth century, is built on a small island in Lough Oughter just north of Inishconnell. This castle has recently been partially restored.

[1] Nomenclature in this report follows Smith (1978) for mosses, Smith (1990) for liverworts and Stace (1991) for higher plants.

Table 1. List of rare plant species previously reported from the Lough Oughter region.

Species	Status	Source
Cardamine amara	This legally protected species is confined to wet woods and ditches. The species is confined to the north of the island where it has only been recorded from 11k 10 squares (Perring and Walters, 1962).	Praeger (1934)
Carex strigosa	A rare species of damp or shady places, only known from 37 10k squares (Perring and Walters, 1962). Many of these records have not been confirmed since 1930.	An Foras Forbatha (1977)
Lathraea squamaria	This species of woodland on base-rich soils is largely confined to the east and south of the country, where it has only been noted from 58 10k squares (Perring and Walters, 1962).	An Foras Forbatha (1977)
Thelypteris palustris	A rare species of marshes, only recorded from 37 10k squares (Perring and Walters, 1962), many of which have not been confirmed since 1930.	Praeger, 1934
Carex acuta	A very local species of lake margins in Ireland, which has previously only been recorded from 63 10k squares (Preston and Croft, 1997). Most common around the shores of Lough Neagh.	An Foras Forbatha (1977)
Sium latifolium	This is a rare species of marshes and riverbanks in the centre of the country. The species has only been recorded from 27 10k squares (Perring and Walters, 1962).	An Foras Forbatha (1977)
Hydrocharis morsus-ranae	A very local species of shallow mesotrophic waters in Ireland, which is only occasionally found in parts of the east and centre. Previously recorded from only 54 10k squares of which 22 are based on pre-1930 records (Preston and Croft, 1997).	Dr. N. Lockhart pers. comm.
Prunus padus	A Scarce plant species of wet woods and riverbanks. Recorded from only 49 10k squares (Perring and Walters, 1962). At some of these locations the species is known to have been introduced.	An Foras Forbatha (1977)
Stratiotes aloides	Known in Ireland only from the Erne Basin and Cork. Occurs in only 10 10k squares (Preston and Croft, 1997).	Dr. N. Lockhart pers. comm.
Butomus umbellatus	A rare species of rivers canals and lakes. Previously recorded from 63 10k squares on the island of which 12 are based on pre-1930 records (Preston and Croft, 1997). Most of the sites for the species lie within Northern Ireland.	Dr. N. Lockhart pers. comm.

1.7 Structure of the report

This report is structured as follows:

Chapter 1 – Introduction

Chapter 2 – Methods

The methods involved in the collecting and processing of vegetation data are outlined.

Chapter 3 – Vegetation description

This chapter deals mainly with the documentation of plant communities recorded within the survey area (sections 3.1 to 3.7). The composition and habitat of plant communities are described and compared with those noted in previous vegetation studies undertaken in Ireland and Britain. An overview is also given of the flora of the site and the presence of rare species is outlined (section 3.8). During the survey a number of locations which support well developed or unusual vegetation types were identified and the location of these and their special attributes are outlined (section 3.9)

Chapter 4 – Environmental problems and possible conservation measures

In this chapter the main problem facing the site at present, i.e. poor water quality, is investigated and measures to improve the situation are discussed. This chapter also explores briefly how information on the natural history of the site may be circulated to, and utilised by, a wider audience.

It is hoped that this survey will serve as something of a model for the future study and conservation of lake and wetland areas in the country. Furthermore, in addition to the Heritage Council, it is hoped that the results of this study will be of interest to a variety of interested parties such as the National Parks and Wildlife Service, Cavan County Council, local schools and visitors to the area.

Plate 2. The river Erne, looking north from Bakers Bridge. For much of its course the river is fringed with a luxuriant growth of trees and bushes which is in itself a valuable wildlife habitat. The most common species are Ash (*Fraxinus excelsior*), Willow (*Salix* spp.) and Alder (*Alnus glutinosa*).

Plate 3. Swan mussels were noted at only one location within the survey area, however they are likely to be more widespread. They are generally confined to alkaline waters and the specimen shown above is approximately 12cm long.

Plate 4. Guelder rose (*Viburnum opulus*) is an attractive, red-berried shrub of hedgerows and lake margins. It is relatively abundant within the survey area.

Plate 5. Bird Cherry (*Prunus padus*) was recorded from only one location within the survey area. The species is restricted to a flooded lake margin and is considered to be a nationally scarce species.

CHAPTER 2

METHODS

2.1 Vegetation recording and mapping

Fieldwork for this survey was carried out between May and September of 1999. During the survey the semi-natural vegetation of lakeshores was sampled at 56 locations within the Lough Oughter Complex and in nearby lakes. The approximate location of these sampling points is outlined in Figure 1 and a full list of sites with grid reference is presented in Appendix 1 of this report. These sampling points were specifically chosen in order to demonstrate the range of natural and semi-natural lake-margin vegetation within the site. Quadrats were described along transects which run from land to water. These transects are useful in that they demonstrate the zonation of vegetation in response to different habitat conditions, most notably water level. Vegetation was sampled according to the Zurich-Montpellier approach (Mueller-Dombois and Ellenberg, 1979). The cover abundance of plants present within quadrats was estimated according to the Braun-Blanquet scale of cover abundance outlined below.

+ = 1 or 2 individual plants present, cover less than 1%
1 = Numerous individuals present, cover between 1 and 5%
2 = Cover between 6 and 25%.
3 = Cover between 26 and 50%.
4 = Cover between 51 and 75%.
5 = Cover between 75 and 100%.

In addition to species presence and cover, the following parameters were noted for each quadrat:

(1) Size
(2) Percentage cover of vegetation, bare soil, water and rock.
(3) Percentage cover and height of the different vegetation layers, i.e. tree, shrub, dwarf shrub, herb and bryophyte.
(4) Soil type and depth.
(5) Height of water table in relation to the soil surface.
(6) Movement of surface water.

(7) Slope and aspect.

(8) Additional details, such as the composition of the surrounding vegetation, degree of grazing, disturbance.

The size of the quadrat depended on the type of vegetation being sampled. The approximate range of quadrat size is as follows:

Aquatic, reedswamp and grassland vegetation - $2m^2$ to $4m^2$
Woodland and scrub vegetation - $64m^2$ to $100m^2$

In addition to describing the vegetation of the site, a total species list for the sites visited was compiled and is presented in Appendix 2, located at the back of this report.
Colour photographs of the vegetation encountered were taken during fieldwork and a selection of these are presented in the text to illustrate the community descriptions. Mosses, liverworts and higher plants not identified in the field were collected and keyed out at a later date using the appropriate keys. After the quadrat data was collected, the processing and classification of data was achieved by subjective sorting. Quadrats were firstly sorted into the main habitat categories, e.g. species-poor swamp, base-rich fen etc. and entered into an Excel spreadsheet. Once inputted, the order of the quadrats and species were rearranged in order to group the quadrats into distinct communities. Once a satisfactory classification of the communities was achieved, a constancy table of the community was then produced. These constancy tables show the frequency of a particular plant species in a given community or sub-community in accordance with the table below:

I = species present in between 1 and 20% of the quadrats
II = species present in between 21 and 40% of the quadrats
III = species present in between 41 and 60% of the quadrats
IV = species present in between 61 and 80% of the quadrats
V = species present in between 81 and 100% of the quadrats

The constancy tables are presented in the text, usually directly after the vegetation tables.

CHAPTER 3

VEGETATION DESCRIPTION

3.1 Introduction

In this chapter the vegetation communities encountered within the study area are described. For ease of presentation, the vegetation communities are grouped into sections. Each community is described under the following headings:

Community name

An informal community name is given to each vegetation type. Communities are generally named after one or two of the characteristic constant plant species, e.g. the *Juncus inflexus – Ranunculus acris* community. Communities may be further subdivided into sub-communities, thus mirroring the classification approach adopted by the National Vegetation Classification Scheme in Britain (Rodwell, 1991-1995). The main advantages of this approach is that the community name forms an immediate impression of the vegetation type in the mind, while also facilitating the quick recognition of the vegetation type in the field.

Synonymous vegetation types

The communities recorded are compared with previously described communities and associations in Ireland and the most similar recorded vegetation type is outlined. The main sources of comparison available in the literature include Kelly and Kirby (1982), O' Sullivan (1982), White and Doyle (1982), O' Connell, Ryan and MacGowran (1984), Mooney and O' Connell (1990) and Kelly and Iremonger (1997). The study/review in which the synonymous vegetation type was recorded is given in brackets after the name of the association/community. The most similar community outlined in the British National Vegetation Classification scheme (Rodwell, 1991a, 1991b, 1992, 1995) is also indicated.

Constant species

Species that occur in more than 60% of the quadrats within a given community are listed.

Vegetation

In this section the species composition of the community is briefly described. Attention is paid to the most important species and the presence of any rare species. Variables such as vegetation height, degree of species-richness and height and cover of various vegetation layers may also be outlined.

Habitat

In this section various aspects of the habitat associated with the community outlined. Important environmental parameters include type and depth of soil, water level and presence/absence of grazing.

Distribution

The distribution and the relative abundance of the community both within the site and nationally is outlined.

Zonation

This section outlines the position of the community with respect to distance from lake edge and also indicates the neighbouring plant communities, into which the community grades.

Each community description is accompanied by a vegetation table and photographs, if available. In addition to the presence and cover of species, the vegetation tables display additional data such as, the number of species per quadrat and the percentage cover of the different vegetation layers. In most cases a number of communities are arranged on the same table, which illustrates the relationships and/or differences between the communities.

3.2 Aquatic and species-poor swamp communities

This section outlines the variation in aquatic and species-poor reedswamp communities recorded within the survey area. These communities either occur in open water or are subject to flooding for a considerable period of the year. A total of 18 communities (2 aquatic and 16 swamp) were recorded and it was observed that there can be a degree of floristic overlap, particularly in some of the more species-poor swamp communities. Most of the communities encountered contain an average of less than 5 species in an area of $4m^2$, however a species-rich sub-community of the *Phragmites australis* community is also included in this section.

3.2.1 *Potamogeton lucens* community

Column 1 in Table 2

Synonymy

Previous Irish Studies – Potametum lucentis (in White and Doyle (1982))

National Vegetation Classification Scheme – None apparent

Number of species per quadrat = 3

Vegetation

This aquatic community is dominated by the large pondweed *Potamogeton lucens*. *Nuphar lutea* and *Sparganium emersum* are the only other closely associated species, however occasional plants of *Sparganium erectum* and *Rumex hydrolapthum* occur close-by. In general, aquatic vegetation dominated by *Potamogeton* spp. appears to be very rare within the survey area and this is due to the relatively poor water quality.

Habitat

The vegetation is rooted in soft mud along the edges of a wide river channel (the river Erne) and occurs at water depths, which range from 50 to approximately 90cm. Some rather sluggish water movement was discernible.

Distribution

This appears to be a very rare community within the survey area which was only recorded from the river Erne to the northeast of Bakers Bridge (Site 32). On a national scale it is likely that the vegetation type is relatively widespread, especially in the centre of the country where the species is most common (Preston, 1995), however up until now detailed accounts of the community have been lacking.

Zonation

The community occurs in relatively deep water, in front of a 1 to 3m wide zone of *Rumex hydrolapathum* swamp.

Table 2 - Vegetation table for aquatic and species-poor reedswamp communities

Column number	1	2	3	3a	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65
Quadrat code	32B	30D	30E	22D	15B	53C	14D	38A	11E	18C	10E	21Y	22C	25B	36D	38B	4B	6E	16F	52E	18E	34G	12C	34F	13C	14C	8B	40C	41B	20E	23B	1D	2D	26A	26B	27C	28C	32A	33C	6H	6D	21E	6C	7C	14B	37B	6F	28X	18B	52D	54A	54B	54C	15A	28B	17D	51D	25A	32X	56B	33D	33A	56A	34B	33B	34E
Quadrat size (m^2)	4	2	2	4	9	4	9	4	9	4	9	9	4	4	4	4	9	4	4	4	4	4	9	4	9	6	4	4	4	4	4	9	16	4	4	4	4	4.5	4	4	4	4	4	4	9	4	4	4	4	4	4	4	4	4	9	4	4	4	4	3	4	4	4	4	4	4	4	2
Vegetation cover (%)	95	35	45	30	15	30	35	80	35	70	40	70	80	70	60	60	10	25	35	80	30	80	100	65	80	55	15	75	50	50	80	30	20	65	70	40	85	75	90	100	75	70	80	80	70	75	60	95	70	75	100	100	100	90	80	40	90	75	70	90	85	95	100	100	95	40
Open water (%)	100	0	0	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	95	95	50	60	100	70	80	40	0	100	100	0	100	100	100	0	80	100	100	0	0	0	10	0	100	100	100	90	100	95	0	95	0	0	0
Bare rock (%)	0	70	40	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	20	0	0	0	5	0	20	0	0	60	0	0	0	50	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bare soil (%)	0	15	30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Herb cover (%)	95	35	45	30	15	35	35	80	35	70	40	70	80	70	60	60	10	25	35	80	30	80	60	65	80	55	15	75	50	100	80	30	20	65	70	40	85	75	90	100	75	70	80	80	70	75	60	95	70	75	80	90	95	90	80	40	90	75	70	90	85	95	100	100	95	40
Moss cover (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	95	90	90	0	0	0	0	0	0	0	5	0	20	70
Height of vegetation (cm)	10	<5	<5	<5	40	60	0-40	0-50	150	200	200	250	170	250	180	130	100	100	100	170	60	200	100	50	30	0-40	40	150	60	40	130	40-50	40	90	90	170	90	120	160	50	170	250	170	250	200	170	70	300	160	190	220	200	210	140	140	50	210	150	70	60	90	90	70	100	30	40
No. of species	3	5	4	1	2	3	2	2	2	2	2	3	4	3	3	3	1	1	2	3	6	4	3	2	2	3	1	4	5	2	5	2	2	2	4	3	5	5	3	5	2	2	3	3	3	3	4	4	5	7	17	17	16	6	5	4	4	3	5	3	4	3	3	10	5	6

Potamogeton lucens community
Potamogeton lucens 5

Littorella uniflora - Juncus articulatus community
Littorella uniflora 3 3
Juncus articulatus 2 2

Nuphar lutea community
Nuphar lutea 1 3 2 2 3 4 2 3 2 2 2 2 2 2

Schoenoplectus lacustris community
Schoenoplectus lacustris 2 3 3 4 4 4 4 4 2 3 3 4 2 3 2 2 3 1 2 1 2 1 2 3 1 2

Persicaria amphibium community
Persicaria amphibium 3 3 4 3

Menyanthes trifoliata community
Menyanthes trifoliata 5 3

Equisteum fluviatile community
Equisteum fluviatile 1 2 1 1 1 1 1 + 2 1 2 1 1 3 3 3

Rumex hydrolapathum community
Rumex hydrolapathum 2 2 4 3 2 4 2 1 2 2 4 4 4 4 4 5 3 2 2 1 1 2 2

Lychnis flos-cuculi - Lysmachia vulgaris community
Lychnis flos-cuculi 2
Lysmachia vulgaris 4 2

Phragmites australis community
Phragmites australis 1 1 1 2 1 1 2 1 1 4 3 4 4 4 4 3 5 3 4 4 4 5

Rhytidiadelphus aquarrosus - Succisa pratensis sub-community
Rhytidiadelphus aquarrosus
Succisa pratensis
Filipendula ulmaria
Calliergon cuspidatum 2
Potentilla palustris
Juncus acutiflorus
Angelica sylvestris
Vicia cracca
Epilobium palustre
Vicia sepium
Holcus lanatus
Potentilla erecta

4 5 5
2 + 2
2 1 2
2 1 1
1 1 2
1 1 1
1 + 1
1 + +
+ + +
1 1
2 1
+ +

Carex elata community
Carex elata

Carex rostrata community
Carex rostrata 4 4

Typha latifolia community
Typha latifolia 1 1 2 1 4 3

Sparganium erectum - Alisma plantago-aquatica community
Sparganium erectum 2 2 2 1 4 4
Alisma plantago-aquatica 1

Glyceria maxima community
Glyceria maxima 1 2 2 4 5 5
2 2

Glyceria fluitans community
Glyceria fluitans 5 5 3

Eleocharis acicularis community
Eleocharis acicularis 5

Companion species
Caltha palustris 3
Galium palustre +
Carex vesicaria 1 2
Phalaris arundinacea 1 + 1
Eleocharis palustris 1 1 2 2 2
Lythrum salicaria 2 2 2
Mentha aquatica 2 1 2 1 1 1
Potentilla anserina 1 1 1 1 1
Ranunculus repens +
Myosotis scorpioides 1
Carex nigra 1 1 2 +
Rorippa amphibia 2
Agrostis stolonifera 1 1
Lemna minor 2 2 2
Cicuta virosa 1 + 1 + 1 2 1 3
Potamogeton natans 1 2 1 2 2 1 2 4 + 1 1
Utricularia vulgaris 1 1
Sparganium emersum 2 1
Ranunculus flammula + 1 1 1
Berula erecta 2
Elodea canadensis +
Lemna trisulca 2
Iris pseudacorus 1
Carex remota 2 + 1

3.2.2 *Littorella uniflora-Juncus articulatus* community

Columns 2 and 3 in Table 2

Synonymy

Previous Irish Studies – Baldellio-Littorelletum (in White and Doyle (1982))

National Vegetation Classification Scheme – *Littorella uniflora-Lobelia dortmanna* community (A22)

Constant species

Littorella uniflora, Juncus articulatus, Ranunculus flammula, Carex nigra.

Mean number of species per quadrat (range) = 4.5 (4-5)

Vegetation

Littorella uniflora is the dominant species in this low-growing plant community. The species typically covers 20 to 30% of the ground and the main associated species are *Carex nigra, Juncus articulatus* and *Ranunculus flammula.*

Habitat

This species-poor community is characteristic of stony lake shores, just above the summer lake water level. At the one site where the community was recorded the vegetation was rooted in a fine, lake-edge gravel (see accompanying plate).

Distribution

Only recorded along the southern shore of Eonish Island (Site 30) and thus the community appears to be relatively rare within the survey area. The community is however widespread throughout western Ireland, where it is characteristic of stony oligotrophic lake edges (Personal observation).

Zonation

The community occupies a zone of lake shore, approximately 1 metre in width, which fronts a wider zone of vegetation dominated by the *Carex nigra – Potentilla anserina* community.

3.2.3 *Nuphar lutea* community

Columns 3a to 8 in Table 2

Synonymy

Previous Irish Studies – *Scirpus lacustris* - *Nuphar lutea* – *Potamogeton lucens* community pro. parte (Caffrey 1990).

National Vegetation Classification Scheme – *Nuphar lutea* community (A8)

Constant species

Nuphar lutea, Equisetum fluviatile.

Mean number of species per quadrat (range) = 2 (1-3)

Vegetation

This distinctive floating aquatic community is characterised by the dominance of the yellow water lily, *Nuphar lutea* (see Plate 7). *Equisetum fluviatile* is the only other constant species in the community occurring in 66% of the quadrats, however its cover is generally below 5%. *Typha latifolia* occurs very sparingly.

Habitat

The community is characteristic of sheltered lake waters in excess of 1 metre in depth and can occasionally be encountered in deep water up to 30 metres from the lake shore.

Distribution

The community is very common in lakes within the survey area and is especially well developed in the smaller, more sheltered lakes. Vegetation characterised by a dominance of *Nuphar lutea* is frequent in Ireland and has been recorded in a number of studies in other parts of the island, e.g. Lough Corrib (Mooney and O' Connell, 1990).

Zonation

The *Nuphar lutea* community is most often found in front of areas of *Schoenoplectus lacustris* reedswamp and indeed the two communities frequently intergrade with each other. This intergradation is demonstrated in the transitional vegetation grouping (columns 8 and 9 in Table 2).

Plate 6. The *Littorella uniflora – Juncus articulatus* community growing on the lake-shore at Eonish Island (Site 30). Note the very stony nature of the substrate.

Plate 7. A general view of the *Nuphar lutea* community at Inishmuck (Site 38)

3.2.4 *Schoenoplectus lacustris* community

Columns 10 to 20 in Table 2

Synonymy

Previous Irish Studies – Scirpetum lacustris (O' Connell *et al.*, 1984)

National Vegetation Classification Scheme – *Scirpus lacustris* swamp (S8).

Constant species

Schoenoplectus lacustris

Mean number of species per quadrat (range) = 3 (1-6)

Vegetation

This species-poor reedswamp community is characterised by the dominant, though often sparse, cover of *Schoenoplectus lacustris* which can reach heights in excess of 2.5 metres. Three sub-communities are evident, a *Nuphar lutea* sub-community (columns 10 to 15), a sub-community characterised by the presence of only *Schoenoplectus lacustris* (columns 16 and 17) and slightly more species-rich sub-community with *Phragmites australis* and *Lemna minor* (columns 18 to 20).

Habitat

The community grows in waters up to 1 metre in depth and is rarely found growing in places where there is less than 30 cm of standing water.

Distribution

A very common community within the survey area which, in certain lakes, may be the dominant type of reedswamp vegetation. The community has been widely recorded from sluggish rivers and lakes throughout Ireland (Caffrey 1990, Mooney and O' Connell 1990).

Zonation

The community can occasionally occur as pure stands, not associated with any other communities. However, at many locations the community often grades into the *Nuphar lutea* community (which occurs to the front of it) and the *Persicaria amphibium* community, the *Phragmites australis* community and *Rumex hydrolapathum* community (which grow in shallower water behind it).

3.2.5 *Persicaria amphibium* community

Columns 22 and 23 in Table 2

Synonymy

Previous Irish Studies – None apparent

National Vegetation Classification Scheme – *Polygonum amphibium* community (S8)

Constant species

Persicaria amphibium, Equisetum fluviatile.

Mean number of species per quadrat (range) = 2 (2-3)

Vegetation

A species-poor community dominated by the prostrate floating leaves of *Persicaria amphibium*. Associated vegetation is sparse with only *Equisetum fluviatile* and *Schoenoplectus lacustris* co-occurring.

Habitat

This community is largely confined to within 5 metres of the lake edge in water 40 cm in depth or less. The community may also be found occasionally on muddy lake margins which dry out during the summer.

Distribution

Only noted at two sites within the survey area, namely sites 12 and 34. Although *Persicaria amphibium* is a common component of a number of other aquatic vegetation types, e.g. the *Phalaris arundinacea* community, pure stands of the species occurring in shallow water are relatively rare within the survey area. It is likely that the community is widespread in lakes throughout the midlands, however to date there have been few references to the vegetation type in the literature.

Zonation

The community grades into other species-poor swamp vegetation types such as the *Schoenoplectus lacustris* community and the *Equisetum fluviatile* community.

Plate 8. The *Schoenoplectus lacustris* community at Inishmuck (Site 38). The yellow flowers of *Nuphar lutea* are just visible.

Plate 9. *Persicaria amphibium* growing on the lake shore north-west of Carrawtraw bridge (Site 19). The species also grows in shallow water, with the leaves floating on the surface.

3.2.6 *Menyanthes trifoliata* community

Columns 24 and 25 in Table 2

Synonymy

Previous Irish Studies – *Menyanthes trifoliata* community (Mooney and O' Connell, 1990)

National Vegetation Classification Scheme – None evident

Constant species

Menyanthes trifoliata, Equisetum fluviatile.

Mean number of species per quadrat (range) = 2.5 (2-3)

Vegetation

Menyanthes trifoliata is the overwhelming dominant in this low-growing, i.e. <30cm, community. The only other associated species are *Equisetum fluviatile* and *Nuphar lutea*, the cover of which is less than 15%.

Habitat

This distinctive community occurs as floating rafts within 10 metres of the lakeshore. During the survey these floating rafts of *Menyanthes* were observed to be used as nesting sites by Great Crested Grebes. Water depth is probably not much more than 1 metre.

Distribution

A surprisingly rare community within the study area, which was noted at only a one location, the lake shore southwest of Derrynagan (Site 13). One of the few other references to a *Menyanthes trifoliata* community was by Mooney and O'Connell (1990) at Lower Lough Corrib, Co. Galway. The community they described was similarly species-poor, supporting an average of 3 species per quadrat.

Zonation

At the one location from which the community was recorded, there was little associated vegetation apart from a small zone of vegetation dominated by *Phragmites australis*, which lies between the *Menyanthes* community and the lakeshore.

3.2.7 *Equisetum fluviatile* community

Columns 26 to 30 in Table 2

Synonymy

Previous Irish Studies – Equisetetum fluviatile (White and Doyle, 1982)

National Vegetation Classification Scheme – *Equisetum fluviatile* swamp (S10)

Constant species

Equisetum fluviatile.

Mean number of species per quadrat = 3 (range 1-5)

Vegetation

This community is characterised by the dominance of the thin emergent shoots of *Equisetum fluviatile*, which typically attain a height of between 40 and 60cm. Pure stands of the species are frequent along lake-edges (see Plate 10), however the species most commonly grows intermixed with other aquatic species such as *Schoenoplectus lacustris, Potamogeton natans, Nuphar lutea* and *Persicaria amphibium*.

Habitat

The community occurs along lake edges and is rarely found in waters greater than 1 metre in depth.

Distribution

One of the more common swamp communities within the survey area, although extensive areas of the community are generally not observed. The community is widespread throughout Ireland (personal observation), however there has been little formal recognition of its existence in the published literature.

Zonation

The community most frequently occurs in association with the *Schoenoplectus lacustris* community and the *Nuphar lutea* community, however it generally is generally located closer to the lake-shore than either of these.

3.2.8 *Rumex hydrolapathum* community

Columns 32 to 38 in Table 2

Synonymy

Previous Irish Studies – None apparent

National Vegetation Classification Scheme – None apparent

Constant species

Rumex hydrolapthum

Mean number of species per quadrat = 3 (range 2-5)

Vegetation

This striking community is dominated by the robust water dock, *Rumex hydrolapathum*, the shoots of which can reach a height of 180cm in places (see Plate 11). The number of species per quadrat varies between 2 and 5 and the most common associates are *Schoenoplectus lacustris, Menyanthes trifoliata, Typha latifolia* and *Lysmachia vulgaris*.

Habitat

The vegetation frequently occurs along areas of lakeshore which have a thick layer of mud present. It appears that the community is best developed in areas which dry out for substantial periods of time during the summer.

Distribution

Although *Rumex hydrolapthum* is relatively common within the survey area, well-developed stands of the community are relatively rare. A particularly extensive area of the community occurs in Lough Oughter at Derries Lower, where the vegetation type covers an area of approximately 20 hectares.

Zonation

The community is closely associated with other swamp communities which experience some degree of drying out throughout the year such as the *Phalaris arundinacea* community and the *Sparganium erectum-Alisma plantago-aquatica* community.

Plate 10. In many of the more exposed parts of the Lough Oughter shoreline the only emergent vegetation present consists of sparse patches of the *Equisetum fluviatile* community.

Plate 11. A general view of the *Rumex hydrolapthum* community growing in shallow water along the shores of Town Lough (Site 28). At this location, the main associated species visible are *Schoenoplectus lacustris* and *Typha latifolia*.

3.2.9 *Lychnis flos-cuculi – Lysmachia vulgaris* community

Column 39 in Table 2

Synonymy

Previous Irish Studies – None apparent

National Vegetation Classification Scheme – None apparent

Number of species per quadrat = 5

Vegetation

This colourful community is dominated by *Lychnis flos-cuculi* with *Lysmachia vulgaris* sub-dominant. Other species occurring in the vegetation include *Filipendula ulmaria, Phragmites australis* and *Lythrum salicaria.*

Habitat

The community occurs on rather rocky ground along the lake edge. Judging by the observed position of the vegetation during summer it is considered likely that the area is flooded for most of the winter.

Distribution

Seemingly a very rare community within the survey area, which was only recorded from one site namely the western shore of Farnham Lough (Site 6). The community appears not to have been recorded elsewhere in Ireland.

Zonation

At the one site in which this community was recorded, it occurs as a 2 metre wide zone between *Salix-Almus* bushes and *Phragmites australis* reed swamp.

3.2.10 *Phragmites australis* community

Columns 40 to 52 in Table 2

Synonymy

Previous Irish Studies – Phragmitetum communis (O' Connell *et al.*, 1984)

National Vegetation Classification Scheme – *Phragmites australis* swamp and reed-beds (S4)

Constant species

Phragmites australis

Mean number of species per quadrat (*Phragmites australis* sub-community) = 3.6 (range 2-7)

Mean number of species per quadrat (*Menyanthes – Rhytidiadelphus* sub-community) = 16.7 (range 16-17)

Vegetation

Phragmites australis is a tall swamp species which can reach a height of 3 metres in places. The vegetation dominated by *Phragmites australis* encountered in this survey can be divided into two sub-communities, a species poor one which supports an average of 3.6 species per quadrat and a species-rich one characterised by prominent *Menyanthes trifoliata* and *Rhytidiadelphus squarrosus*. In addition to *Menyanthes* and *Rhytidiadelphus* other common species in the species-rich sub-community include *Filipendula ulmaria, Succisa pratensis, Calliergon cuspidatum, Potentilla palustris, Juncus acutiflorus, Angelica sylvestris, Vicia cracca* and *Vicia sepium. Equisetum fluviatile* is the only species that is relatively common in both sub-communities.

Habitat

The *Phragmites australis* community can occur either rooted in the mud of the lake floor or as a floating raft of vegetation along the edge of open water. In the latter case the raft rises and falls in response to variations in the water level of the lake.

Distribution

A common community found in most of the lakes within the survey area. It must be pointed out however that the community is much better developed in smaller, more sheltered lakes within the survey area, e.g. Derrygid Lough.

Zonation

The community can form a wide (up to 20 metres) fringing band along the margins of lakes, where it generally occurs directly behind more strictly aquatic communities such as the *Schoenoplectus lacustris* community and the *Nuphar lutea* community. The community frequently occurs intermingled with patches of swamp vegetation dominated by *Typha latifolia*.

3.2.11 *Carex elata* community

Columns 53 and 54 in Table 2

Synonymy

Previous Irish Studies – *Caricetum elatae* (O' Connell *et al.*, 1984)

National Vegetation Classification Scheme – *Carex elata* swamp (S1)

Constant species

Carex elata, Equisetum fluviatile.

Mean number of species per quadrat = 6 (range 5-6)

Vegetation

Carex elata is large, tussock-forming sedge, which reaches heights of between 100 and 180cm and typically covers between 50 and 75% of the quadrat. The associated flora is species-poor with the most prominent species being *Equisetum fluviatile, Carex vesicaria, Phalaris arundinacea* and the floating duckweed *Lemna minor.*

Habitat

During the summer months the community is found growing in shallow (<20 cm) water along lake-margins, however it is likely that the community is inundated to a greater depth during the winter months. The substrate is composed of soft lake mud.

Distribution

The community is relatively rare within the study area, being recorded from only two sites namely Town Lough (Site 28) and Sally Lough (Site 15). The Caricetum elatae is a relatively common and widespread vegetation type in Ireland (O' Connell *et al.*, 1984, Mooney and O'Connell 1990), however large expanses of the vegetation type are relatively rare.

Zonation

The *Carex elata* community is generally located along the lake margin, close to the summer water level where it co-occurs with the *Phalaris arundinacea* community and the *Rumex hydrolapathum* community. At Sally Lough the community occurs along the edge of open water dominated by the floating leaves of *Nuphar lutea.*

Plate 12. *Phragmites australis* reedswamp along the northern shores of Annagh Lough (Site 18). When fully grown the shoots of the species can exceed 3 metres in height.

Plate 13. Large tussocks of *Carex elata* growing along the shore of Town Lough (Site 28). A zone of dense *Phalaris arundinacea* reedswamp is visible on the right-hand side of the plate.

3.2.12 *Carex rostrata* community

Column 55 in Table 2

Synonymy

Previous Irish Studies – *Carex rostrata* community (Mooney and O' Connell, 1990)

National Vegetation Classification Scheme – *Carex rostrata* swamp (S9)

Number of species per quadrat = 4

Vegetation

Carex rostrata dominates in this low-growing and species-poor vegetation type (see Plate 14). The species is accompanied by the wetland species *Eleocharis palustris, Potamogeton natans* and *Mentha aquatica*.

Habitat

The community occurs sparingly along the lake-edge in water approximately 30 cm deep. The vegetation is rooted in a soft, peaty lake mud.

Distribution

Carex rostrata appears to be a generally rare species within the survey area and the vegetation type was recorded only at Annagh Lough (Site 17) along the eastern margin of the survey area. *Carex rostrata* appears to be much rarer in the Lough Oughter Complex than in many other Irish lake systems (personal observation).

Zonation

There is little in the way of vegetation zonation at the site, however sparse *Eleocharis palustris* swamp occurs close-by.

3.2.13 *Typha latifolia* community

Columns 56 and 57 in Table 2

Synonymy

Previous Irish Studies – *Typhetum latifoliae* (Mooney and O' Connell 1990)

National Vegetation Classification Scheme – *Typha latifolia* swamp (S12)

Constant species

Typha latifolia

Mean number of species per quadrat = 3.5 (range 3-4)

Vegetation

Vegetation in which *Typha latifolia* is dominant typically reaches heights of between 150 and 210cm. Associated species include *Nuphar lutea, Equisetum fluviatile* and *Lemna minor*, however their cover is usually less than 25%.

Habitat

The *Typha latifolia* community occurs in habitats where standing water occurs throughout the year as demonstrated by the presence of species such as *Nuphar lutea* and *Equisetum fluviatile* in the vegetation.

Distribution

Although *Typha latifolia* is relatively common throughout the study area, the species only occasionally forms extensive stands. Although there is relatively little specific information regarding the distribution and composition of the community in Ireland, personal observation suggests that it is a relatively common community throughout the island. Mooney and O' Connell (1990) recorded a floristically similar Typhetum latifoliae from the shores of Lough Corrib.

Zonation

At Drumlark Lough (Site 51) the community occurs as a floating raft directly in front of very wet *Salix-Alnus-Filipendula* woodland.

Plate 14. A general view of the *Carex rostrata* community at Annagh Lough (Site 17). Throughout the survey area *Carex rostrata* appears to be much less common than *Carex vesicaria*, a similar species which thrives in more mesotrophic conditions.

Plate 15. The *Typha latifolia* community growing at the edge of open water at Drumlark Lough (Site 51). The shoots of the species can exceed 2 metres in places.

3.2.14 *Sparganium erectum – Alisma plantago-aquatica* community

Columns 58 to 60 in Table 2

Synonymy

Previous Irish Studies – Spaganio-Glycerietum fluitantis (O' Connell *et al.*, 1984)

National Vegetation Classification Scheme – *Sparganium erectum* swamp (S14)

Constant species

Sparganium erectum, Alisma plantago-aquatica, Nuphar lutea, Lemna minor.

Mean number of species per quadrat = 4 (range 3-5)

Vegetation

Sparganium erectum is a relatively tall aquatic species which can reach a height of 90cm. *Alisma plantago-aquatica* is the most frequent associated plant species in the vegetation, however *Nuphar lutea* and *Lemna minor* are also frequent.

Habitat

The community is unusual in that it appears to be absent from lake edges and favours muddy areas along the banks of rivers where there is a slow movement of water and periodic drying out.

Distribution

This community is relatively rare within the survey area and was only recorded from 3 locations. The community has a relatively widespread national distribution (O' Connell *et al.* 1984) and tends to be most common in ditches and narrow streams where water movement is slow.

Zonation

To the north-east of Bakers bridge (sites 33 and 34) the community occurs in front of an extensive area of *Rumex hydrolapathum* swamp, while along the river Erne at Belturbet (site 56) the community occurs in close association with *Glyceria maxima* swamp.

3.2.15 *Glyceria maxima* community

Columns 61 to 63 in Table 2

Synonymy

Previous Irish Studies – Glycerietum maximae (White and Doyle, 1982)

National Vegetation Classification Scheme – *Glyceria maxima* swamp (S5)

Constant species

Glyceria maxima, Rorippa amphibia

Number of species per quadrat = 5 (3-10)

Vegetation

Glyceria maxima is a robust grass species which grows in dense tussocks to a height in excess of 1.5 metres. The community occurs as two sub-communities a species-poor sub-community and a more species-rich sub-community that occurs on damp soils. In the species-rich sub-community *Agrostis stolonifera, Ranunculus repens, Phalaris arundinacea* and *Rorippa amphibia* are the most conspicuous associated species.

Habitat

The community occurs along the edges of rivers and lakes tends to grow in areas with damp, mineral-rich soil which are situated well above the summer water level. Along the banks of the river Erne at Belturbet, the community occurs along the river edge where there is flowing water.

Distribution

A relatively unusual vegetation type which was noted at only three locations within the survey area. The species is definitely rarer within the survey area than other tall swamp species such as *Phalaris arundinacea* and *Phragmites australis*.

Zonation

The community occurs in association with a variety of wetland vegetation types, most notably the *Sparganium erectum – Alisma plantago-aquatica* community and the *Glyceria fluitans* community.

3.2.16 *Glyceria fluitans* community

Column 64 in Table 2

Synonymy

Previous Irish Studies – Glycerietum fluitantis (White and Doyle, 1982)

National Vegetation Classification Scheme – *Glyceria fluitans* water-margin vegetation (S22)

Number of species per quadrat = 5

Vegetation

Glyceria fluitans is a decumbent grass which rarely exceeds 30 cm in height. The associated flora is relatively species-poor and includes a range of wetland species including *Berula erecta, Ranunculus repens, Myosotis scorpioides* and *Rorippa amphibia.*

Habitat

This community occurs on damp muddy substrate well back from the lake margins. At the one location from which the community was recorded (site 33), the vegetation is heavily poached and grazed by cattle.

Distribution

The community was recorded at only one site within the survey area. Vegetation dominated by *Glyceria fluitans* is relatively common throughout the country occurring in wet grassland and ditches (Mooney and O' Connell, 1990).

Zonation

Within the survey area the community occurs in close association with the *Glyceria maxima* community and behind an extensive area of *Rumex hydrolapathum* swamp.

3.2.17 *Eleocharis acicularis* community

Column 65 in Table 2

Synonymy

Previous Irish Studies – None apparent

National Vegetation Classification Scheme – None apparent

Number of species per quadrat = 6

Vegetation

Eleocharis acicularis is a low-growing wetland species with very narrow shoots, which covers c. 35% of the ground. The most prominent associated species are *Caltha palustris, Carex vesicaria* and *Lythrum salicaria.*

Habitat

The community occurs on a bare muddy substrate located just above the typical summer lake water level.

Distribution

Eleocharis acicularis is a relatively scarce species within the study area and the community was recorded from just one location. Vegetation types dominated by *Eleocharis acicularis* do not appear to have been recorded previously in Ireland.

Zonation

The community occupies a 2 to 3 metre wide zone between *Carex vesicaria* swamp and open water vegetation dominated by *Persicaria amphibium.*

Table 3 - Constancy table for aquatic and species-poor reedswamp communities

Number of quadrats	1	2	5	2	11	1	2	2	5	1	7	1	10	3	2	1	2	3	3	1	1
Number of species per quadrat	3	4.5	2	2	2.8	4	2.5	2.5	3.4	2	3.4	5	2.4	16.3	5.5	4	3.5	4	5.3	5	6
***Potamogeton lucens* community**																					
Potamogeton lucens	[5]	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
***Littorella uniflora* - *Juncus articulatus* community**																					
Littorella uniflora	.	[V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Juncus articulatus	.	V]	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
***Nuphar lutea* community**																					
Nuphar lutea	1	.	[V]	V	III	.	.	III	I	.	I	.	I	.	.	.	III	IV	.	.	.
***Schoenoplectus lacustris* community**																					
Schoenoplectus lacustris	.	.	.	V	[V]	3	III	.	I	.	III	.	I	.	.	.	.	.	.	.	.
***Persicaria amphibium* community**																					
Persicaria amphibium	.	.	.	.	.	3	[V	.	I	.	.	.	.	.	.	.	.	.	.	.	.
***Menyanthes trifoliata* community**																					
Menyanthes trifoliata	.	.	.	.	.	.	.	[V]	.	.	II	.	I	V	.	.	.	.	II	.	.
***Equisteum fluviatile* community**																					
Equisteum fluviatile	.	.	IV	.	II	1	V	V	[V]	2	I	.	III	IV	V	.	III	II	II	.	1
***Rumex hydrolapathum* community**																					
Rumex hydrolapathum	.	.	.	.	.	.	.	.	.	2	[V]	.	II	.	III	.	.	.	.	.	.
***Lychnis flos-cuculi* - *Lysmachia vulgaris* community**																					
Lychnis flos-cuculi	.	.	.	.	.	.	.	.	.	.	.	[4	.	IV	.	.	.	.	.	.	.
Lysmachia vulgaris	.	.	.	.	.	.	.	.	I	.	.	2]	.	.	.	.	.	.	.	.	.
***Phragmites australis* community**																					
Phragmites australis	.	.	.	.	II	.	.	.	II	.	.	1	[V	V]	.	.	.	.	.	.	.
***Rhytidiadelphus squarrosus* - *Succisa pratensis* sub-community**																					
Rhytidiadelphus squarrosus	.	.	.	.	.	.	.	.	.	.	.	.	.	[V	.	.	.	.	.	.	.
Succisa pratensis	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Filipendula ulmaria	.	.	.	.	.	.	.	.	.	.	.	2	.	V	.	.	.	.	.	.	.
Calliergon cuspidatum	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Potentilla palustris	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Juncus acutiflorus	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Angelica sylvestris	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Vicia cracca	.	.	.	.	.	.	.	.	.	.	.	.	.	V	.	.	.	.	.	.	.
Epilobium palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
Vicia sepium	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
Holcus lanatus	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	.	.	.
Potentilla erecta	.	.	.	.	.	.	.	.	.	.	.	.	.	IV]	.	.	.	.	.	.	.
***Carex elata* community**																					
Carex elata	.	.	.	.	.	.	.	.	.	.	.	.	.	.	[V	.	.	.	.	.	.
***Carex rostrata* community**																					
Carex rostrata	.	.	.	.	.	.	.	.	.	.	.	.	II	II	.	[3	.	.	.	.	.
***Typha latifolia* community**																					
Typha latifolia	.	.	I	.	.	1	.	.	.	.	II	.	I	.	III	.	[V	.	.	.	.
***Sparganium erectum* - *Alisma plantago-aquatica* community**																					
Sparganium erectum	.	.	.	.	I	.	.	.	.	.	I	.	.	.	.	.	.	[V	.	.	.
Alisma plantago-aquatica	.	.	.	.	.	.	.	.	.	.	I	.	II	.	.	.	.	IV]	.	.	.
***Glyceria maxima* community**																					
Glyceria maxima	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	[V	.	.
***Glyceria fluitans* community**																					
Glyceria fluitans	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	[5	.
***Eleocharis acicularis* community**																					
Eleocharis acicularis	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	[3
Companion species																					
Caltha palustris	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.	II	.	2
Galium palustre	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	.	.	.	.	II	.	.
Carex vesicaria	.	.	.	.	.	.	.	.	.	.	.	.	II	.	III	.	.	.	.	.	2
Phalaris arundinacea	.	.	.	.	.	.	.	.	.	.	I	.	.	.	III	.	III	.	II	.	.
Eleocharis palustris	.	III	.	.	.	.	.	.	.	.	.	.	.	.	III	1	.	.	.	.	.
Lythrum salicaria	.	.	.	.	.	.	.	.	.	.	II	1	II	.	III	.	.	.	.	.	1
Mentha aquatica	.	.	.	.	.	.	.	.	.	.	.	.	I	II	.	1	.	.	II	.	.
Potentilla anserina	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	+	.
Ranunculus repens	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.
Myosotis scorpioides	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	1
Carex nigra	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	IV	2	.
Rorippa amphibia	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	II	.	.
Agrostis stolonifera	.	.	.	.	I	.	.	.	II	.	I	.	I	.	III	.	III	IV	II	.	.
Lemna minor	.	.	.	.	I	.	.	.	II	.	.	.	II	.	.	.	III	.	.	.	.
Cicuta virosa	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	.
Potamogeton natans	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Utricularia vulgaris	.	.	.	.	I	.	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.
Sparganium emersum	2	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.
Ranunculus flammula	.	V	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	2	.
Berula erecta	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.
Elodea canadensis	.	.	.	.	.	.	.	.	.	.	.	.	I	.	.	.	.	.	.	.	.
Lemna trisulca	.	.	.	.	I	.	.	.	.	I	.	.	.	.	.	.	.	.	.	.	.
Iris pseudacorus	.	.	.	.	.	.	.	.	.	.	.	.	.	II	.	.	.	.	.	.	.
Carex remota	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	.

3.3 Species-rich swamp communities

In this section the vegetation and ecology of the more species-rich swamp communities encountered in the survey are outlined. In comparison with the previously described swamp communities, these are more species-rich and support on average between 6 and 11 species per $4m^2$ quadrat. These communities are located along lake margins and thus are subject to some degree of inundation, especially during the winter months. Three communities are described (see Tables 4 and 5) and it is clear that there are strong floristic links between all three.

3.3.1 *Eleocharis palustris* community

Columns 1 to 6 in Table 4

Synonymy

Previous Irish Studies – *Eleocharis palustris* community (Mooney and O' Connell, 1990)

National Vegetation Classification Scheme – *Eleocharis palustris* swamp (S19)

Constant species

Eleocharis palustris, Mentha aquatica

Mean number of species per quadrat (range) = 6 (3-9)

Vegetation

This low-growing, i.e. mostly < 40cm, swamp community is characterised by the dominance of the narrow erect shoots of *Eleocharis palustris*. The number of species per quadrat varies between 3 and 9 with *Mentha aquatica*, *Caltha palustris* and *Phalaris arundinacea* the most frequently associated species. Two sub-communities have been recorded, a species-poor typical sub-community and a more species-rich sub-community characterised by the presence of *Cicuta virosa*, *Epilobium parviflorum* and *Stachys palustris*.

Habitat

The *Eleocharis palustris* community is a vegetation type of shallow waters, which are generally less than 40cm in depth (summer observations).

Distribution

Although *Eleocharis palustris* is common throughout the site, the species only occasionally forms dense patches. The species is frequent in lakes throughout Ireland (Perring and Walters, 1962) and the vegetation type is also frequent (personal observation).

Zonation

The community is often found in close association with either the *Carex vesicaria* community or the *Carex nigra-Potentilla anserina* community, both of which occupy slightly drier ground.

3.3.2 *Carex vesicaria* community

Columns 7 to 11 in Table 4

Synonymy

Previous Irish Studies – *Caricetum vesicariae* (O' Connell *et al.*, 1984)

National Vegetation Classification Scheme – *Carex vesicaria* swamp (S22)

Constant species

Carex vesicaria, Eleocharis palustris, Potentilla anserina, Ranunculus repens, Caltha palustris, Rorrippa amphibia, Galium palustre.

Mean number of species per quadrat (range) = 11 (7-14)

Vegetation

This rather low-growing sedge-dominated community is one of the most species-rich swamp communities encountered in the survey, averaging 11 species per quadrat. The cover of *Carex vesicaria* ranges between 25 and 65% and the most commonly associated species are *Eleocharis palustris, Caltha palustris, Galium palustre, Potentilla anserina, Ranunculus repens* and *Rorippa amphibia*. In common with most of the swamp communities encountered in this study, mosses are either totally absent from the vegetation or present in very small amounts.

Habitat

The *Carex vesicaria* community is generally found within a metre or two of the summer water level and thus the vegetation must experience flooding for most of the year. The clear degree of overlap between this community and the *Eleocharis palustris* community suggests that they occupy broadly similar habitat conditions, however field observations suggest that *C. vesicaria* grows in slightly drier areas. The species occupies similar hydrological conditions to that of *C. rostrata*, however it tends to occur in more mesotrophic waters (Jermy *et al.* 1982).

Distribution

The community has a patchy distribution throughout the survey area and is by no means common. In Ireland *Carex vesicaria* is relatively uncommon and has a widely scattered distribution which appears to be largely restricted to the Shannon basin and other large lake systems (Jermy *et al.*, 1982).

Zonation

The community occurs along the low water level of lakes where it occurs directly in front of communities of slightly drier conditions such as the *Phalaris arundinacea* community and the *Carex nigra* - *Potentilla anserina* community. Wetter swamp communities such as the *Phragmites australis* community and the *Eleocharis palustris* community typically front the community.

Plate 16. A close-up view of *Carex vesicaria*, in fruit.

Plate 17. A general view of the *Carex vesicaria* community at Derrynagan (Site 11).

3.3.3 *Phalaris arundinacea* community

Columns 12 to 26 in Table 4

Synonymy

Previous Irish Studies – *Phalaridetum arundinaceae* (Mooney and O' Connell, 1990)

National Vegetation Classification Scheme – *Phalaris arundinacea* tall-herb fen (S28)

Constant species

Phalaris arundinacea.

Mean number of species per quadrat (range) = 8 (2-15)

Vegetation

Phalaris arundinacea is tall grass which can reach heights in excess of 1.5 metres. The *Phalaris* community varies greatly in terms of species-richness per quadrat (2 to 15) with a mean of 8. The most frequently associated plant species are *Eleocharis palustris, Ranunculus repens, Potentilla anserina* and *Persicaria amphibia, Mentha aquatica* and *Lythrum salicaria,* however the cover of any associated species rarely exceeds 25%. The community occurs as 4 reasonably distinct sub-communities. The very species-poor *Urtica-Rumex* variant (columns 12 and 13) is the version of the vegetation that occurs along the edges of rivers and streams within the site. The typical species poor community (columns 14 to 20) contains between 4 and 7 species per quadrat and is perhaps the most common of the sub-communities within the survey area. A species-rich sub-community also occurs (columns 21 to 24). It contains between 12 and 13 species per quadrat and is differentiated from the previously described sub-communities by the greater frequency and cover of species such as *Potentilla anserina, Ranunculus repens* and *Mentha aquatica.* The fourth sub-community, the *Lotus pedunculatus– Trifolium repens* sub-community is also species-rich and is differentiated by a group of species characteristic of slightly drier habitats.

Habitat

The community is frequently observed growing at or slightly above the high water mark of lakes and rivers within the site. The associated substrate is usually heavily scoured by lake waters and is often stony with little soil present (see plates 18).

Distribution

A frequent community within the survey area, especially along the edges of slow-flowing rivers, where it is the dominant vegetation type. The vegetation type appears to be more common in the larger, more exposed lakes, whereas *Phragmites* swamp tends to dominate the edges of the smaller, more sheltered lakes. On an national basis the community appears to be common along the margins of lakes, rivers and canals, however *Phalaris* tends to be more restricted to waters which are mesotrophic to eutrophic and have a reasonably high base-status (Rodwell, 1995).

Zonation

At many sites the community occupies very stony scoured ground, which is largely devoid of any other vegetation. At Town Lough (Site 28) the *Phalaris* community occurs on slightly drier ground behind the *Rumex hydrolapathum* community and *Carex elata* community. Just south of the footbridge at Killykeen (Site 3) the community grades into the *Carex vesicaria* community, which occupies wetter situations.

Plate 18. The *Phalaris arundinacea* community at Gubbarin Point (Site 9). At this location the community is low-growing (< 50cm) and the area is subject to scouring by wave-action.

Plate 19. The *Phalaris arundinacea* community at Town Lough (Site 28). At this location the vegetation is situated higher up on the lake shore and, as a result, *Phalaris* is much more luxuriant, reaching an average height of 150cm.

Table 4 - Species-rich swamp communities

Column number	1	2	3	4	5	6	Mean	7	8	9	10	11	Mean	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	Mean
Quadrat code	17B	21C	21D	13B	17C	17a		12B	19F	3B	20B	34D		54A	55B	3D	3E	9A	10D	3C	9B	28A	3A	27B	19D	19C	43C	43D	
Quadrat size (m2)	3	4	4	4	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	3	3	4
Vegetation cover (%)	15	80	60	80	50	70	59	90	60	80	100	100	86	100	100	100	40	100	80	90	100	100	95	80	90	100	90	90	90
Open water (%)	100	0	0	0	60	40	33	0	0	0	0	0	0	0	0	0	100	0	0	0	0	0	0	0	0	0	0	0	7
Bare rock (%)	0	0	0	30	20	0	8	30	0	40	0	0	14	0	0	5	0	0	20	30	5	0	10	30	0	0	5	5	7
Bare soil (%)	0	40	70	0	10	0	20	0	50	0	3	0	11	0	0	0	0	0	5	0	0	0	0	10	15	3	5	10	3
Herb cover (%)	15	80	60	80	50	70	59	90	60	80	100	100	86	100	100	100	40	100	80	90	100	100	95	80	90	100	90	90	90
Height of vegetation (cm)	30	40	35	35	40	50	38	45	35	35	40	45	40	60	70	45	25	50	35	35	40	120	45	40	30	55	2	0	43
No. of species	3	4	4	7	7	9	6	7	10	11	13	14	11	2	3	4	4	4	4	5	7	7	12	13	12	13	15	11	8
***Eleocharis palustris* community**																													
Eleocharis palustris	2	4	3	3	3	3		3	1	2	1	3		.	.	.	2	.	.	.	.	1	1	.	1	2	.	.	
***Cicuta virosa - Epilobium parviflorum* sub-community**																													
Cicuta virosa	.	.	.	.	1	3		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Epilobium parviflorum	.	.	.	.	2	2		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Stachys palustris	.	.	.	.	2	2		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
***Carex vesicaria* community**																													
Carex vesicaria	.	.	.	2	.	.		3	3	3	4	3		.	.	.	.	.	3	.	.	1	1	.	.	.	.	.	
***Phalaris arundinacea* community**																													
Phalaris arundinacea	.	.	.	.	1	1		.	.	.	2	2		4	4	4	2	5	3	4	5	5	4	4	3	4	4	4	
***Urtica dioica - Rumex obtusifolius* sub-community**																													
Urtica dioica	.	.	.	.	.	.		.	.	.	.	.		2	2	.	.	.	.	.	.	.	.	.	.	.	.	.	
Rumex obtusifolius	.	.	.	.	.	.		.	.	.	.	.		.	1	.	.	.	.	.	.	.	.	.	.	.	.	.	
***Lotus pedunculatus-Trifolium repens* sub-community**																													
Lotus pedunculatus	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	
Trifolium repens	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	1	2	2	
Carex hirta	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	2	2	
Achillea ptarmica	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	1	+	
Vicia cracca	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	
Companion species																													
Mentha aquatica	1	.	.	1	2	2		.	.	1	1	.		.	.	.	.	.	.	2	.	.	+	1	+	.	+	1	
Potentilla anserina	.	.	.	.	.	.		.	1	1	1	1		.	.	.	.	.	.	.	1	+	2	2	2	1	3	2	
Ranunculus repens	.	.	.	.	.	.		.	.	1	3	1		.	.	2	.	2	.	1	1	.	2	1	3	2	.	.	
Lythrum salicaria	.	.	1	.	.	.		.	+	.	.	2		.	.	.	+	.	+	.	2	2	1	1	.	.	+	.	
Caltha palustris	.	2	2	2	.	.		.	2	3	.	2		.	.	2	.	.	.	.	.	.	2	.	.	.	.	.	
Carex nigra	.	.	.	3	.	.		.	2	2	.	.		.	.	.	+	.	.	.	1	+	.	2	.	.	.	.	
Rorippa amphibia	.	.	.	.	.	.		2	.	.	2	2		.	.	.	.	.	.	2	1	.	.	1	1	.	.	.	
Galium palustre	.	.	.	.	.	.		2	.	.	3	1		.	.	.	.	.	.	.	.	.	2	.	2	2	.	.	
Persicaria amphibium	.	.	.	.	.	.		.	3	.	.	2		.	.	.	.	2	.	.	2	.	.	.	3	2	.	.	
Equisteum fluviatile	.	.	1	2	.	.		2	1	.	.	.		.	.	.	.	.	1	.	.	1	.	.	.	.	.	.	
Agrostis stolonifera	.	.	.	.	.	.		2	.	.	2	.		.	.	.	.	.	.	.	.	.	.	.	2	2	2	+	
Filipendula ulmaria	.	.	.	.	2	.		.	.	1	.	.		.	.	2	.	.	.	2	.	.	1	.	.	.	.	.	
Myosotis scorpioides	.	.	.	.	.	.		.	.	2	2	.		.	.	.	.	.	.	.	.	.	2	.	1	.	.	.	
Cardamine pratensis	.	.	.	.	.	.		.	.	1	.	.		.	.	.	.	.	.	.	.	.	.	.	1	1	.	.	
Hydrocotyle vulgaris	.	.	.	.	.	.		.	.	2	.	+		.	.	.	.	.	.	.	.	.	.	1	.	.	.	.	
Ranunculus flammula	.	.	.	.	.	.		.	1	.	.	.		.	.	.	.	.	.	.	.	.	.	2	.	.	1	.	
Lemna minor	.	.	.	.	.	.		.	2	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	1	1	
Leontodon autumnalis	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	+	.	.	1	1	
Potentilla palustris	.	.	.	2	.	.		.	.	.	.	2		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Alisma plantago-aquatica	.	1	.	.	.	.		2	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Carex disticha	.	.	.	.	.	.		.	.	.	.	1		.	.	.	.	.	.	.	.	.	.	.	.	1	.	.	
Rumex crispus	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	+	.	1	.	.	
Lysmachia nummularium	.	.	.	.	.	.		.	.	.	2	.		.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	
Juncus articulatus	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	2	.	.	1	.	
Equisteum palustre	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	+	.	.	.	.	.	
Typha latifolia	.	.	.	.	.	1		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Epilobium palustre	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	1	.	.	.	.	.	.	.	.	.	.	
Lycopus europaeus	.	.	.	.	.	2		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Salix cinerea	.	.	.	.	.	+		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Hippurus vulgaris	.	2	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Algal mat	.	.	.	.	.	.		.	.	.	.	2		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Littorella uniflora	1	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Campylium stellatum	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	2	.	.	.	.	
Brachythecium rutabulum	.	.	.	.	.	.		.	.	.	2	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Plagiomnium undulatum	.	.	.	.	.	.		.	.	.	1	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	.	
Calliergon cuspidatum	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	1	.	.	.	
Rumex acetosa	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	+	.	.	
Bryum pseudotriquetrum	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	1	.	
Plantago lanceolata	.	.	.	.	.	.		.	.	.	.	.		.	.	.	.	.	.	.	.	.	.	.	.	.	.	+	

Table 5 - Constancy table for Species-rich swamp communities

Number of quadrats	4	2	5	2	7	4	2
Mean number of species per quadrat	4.5	8.5	11	2.5	5	12.5	13
***Eleocharis palustris* community**							
Eleocharis palustris	V	V	V	.	II	IV	.
***Cicuta virosa - Epilobium parviflorum* sub-community**							
Cicuta virosa	.	V	.	.	.	.	.
Epilobium parviflorum	.	V	.	.	.	.	.
Stachys palustris	.	V	.	.	.	.	.
***Carex vesicaria* community**							
Carex vesicaria	II	.	V	.	II	II	.
***Phalaris arundinacea* community**							
Phalaris arundinacea	.	V	II	V	V	V	V
***Urtica dioica - Rumex obtusifolius* sub-community**							
Urtica dioica	.	.	.	V	.	.	.
Rumex obtusifolius	.	.	.	III	.	.	.
***Lotus pedunculatus-Trifolium repens* sub-community**							
Lotus pedunculatus	.	.	.	.	.	.	V
Trifolium repens	.	.	.	.	.	II	V
Carex hirta	.	.	.	.	.	.	V
Achillea ptarmica	.	.	.	.	.	.	V
Vicia cracca	.	.	.	.	.	.	III
Companion species							
Mentha aquatica	III	V	II	.	I	IV	V
Potentilla anserina	.	.	IV	.	II	V	V
Ranunculus repens	.	.	III	.	III	V	.
Lythrum salicaria	II	.	II	.	III	III	III
Caltha palustris	IV	.	III	.	I	II	.
Carex nigra	II	.	II	.	III	II	.
Rorippa amphibia	.	.	III	.	II	III	.
Galium palustre	.	.	III	.	.	IV	.
Persicaria amphibium	.	.	II	.	II	III	.
Equisteum fluviatile	III	.	II	.	II	.	.
Agrostis stolonifera	.	.	II	.	.	III	V
Filipendula ulmaria	.	III	I	.	II	II	.
Myosotis scorpioides	.	.	II	.	.	III	.
Cardamine pratensis	.	.	I	.	.	III	.
Hydrocotyle vulgaris	.	.	II	.	.	II	.
Ranunculus flammula	.	.	I	.	.	II	III
Lemna minor	.	.	I	.	.	.	V
Leontodon autumnalis	.	.	.	.	.	II	V
Potentilla palustris	II	.	I	.	.	.	.
Alisma plantago-aquatica	II	.	I	.	.	.	.
Carex disticha	.	.	I	.	.	II	.
Rumex crispus	.	.	.	.	.	III	.
Lysmachia nummularium	.	.	I	.	.	II	.
Juncus articulatus	.	.	.	.	.	II	III
Equisteum palustre	.	.	.	.	.	II	.
Typha latifolia	.	III	.	.	.	.	.
Epilobium palustre	.	.	.	.	I	.	.
Lycopus europaeus	.	III	.	.	.	.	.
Salix cinerea	.	III	.	.	.	.	.
Hippurus vulgaris	II	.	.	.	.	.	.
Algal mat	.	.	I	.	.	.	.
Littorella uniflora	II	.	.	.	.	.	.
Campylium stellatum	.	.	.	.	.	II	.
Brachythecium rutabulum	.	.	I	.	.	.	.
Plagiomnium undulatum	.	.	I	.	.	.	.
Calliergon cuspidatum	.	.	.	.	.	II	.
Rumex acetosa	.	.	.	.	.	II	.
Bryum pseudotriquetrum	.	.	.	.	.	.	III
Plantago lanceolata	.	.	.	.	.	.	III

3.4 Wet grassland and tall-herb fen communities

In this section a variety of wetland vegetation types are described. These range from the low-growing and relatively species-rich *Carex nigra-Potentilla anserina* community to the tall, species-poor *Filipendula ulmaria* community. Vegetation communities dominated by *Juncus effusus* and *Iris pseudacorus* are also described. For much of the year most of these communities do not experience flooding by lake water, however it is likely that they all require some degree of winter flooding to maintain their floristic composition.

3.4.1 *Carex nigra – Potentilla anserina* community

Tables 6 and 7

Synonymy

Previous Irish Studies – *Carex nigra- Ranunculus repens* community (Heery, 1991)

National Vegetation Classification Scheme – *Festuca rubra-Agrostis stolonifera-Potentilla anserina* grassland (MG11) *pro parte*.

Constant species

Carex nigra, Potentilla anserina, Senecio aquaticus, Leontodon autumnalis, Agrostis stolonifera, Ranunculus repens, Trifolium repens.

Mean number of species per quadrat = 13 (range 5 to 19)

Vegetation

This low-growing (mostly <30cm) vegetation type is typically dominated by *Carex nigra, Ranunculus repens, Potentilla anserina* and *Agrostis stolonifera,* with the relative amounts of each species varying from quadrat to quadrat. The mean number species per quadrat is 15, with a range of 5 to 22. *Trifolium repens, Senecio aquaticus* and *Leontodon autumnalis* are also present in more than 60% of the quadrats with *Mentha aquatica, Galium palustre, Lythrum salicaria* and *Ranunculus flammula* locally frequent. The moss cover is generally less than 10%, however in some quadrats the cover can reach between 40 and 50%. *Calliergon cuspidatum* is the main moss species with *Climacium dendroides* and *Brachythecium rutabulum* of lesser importance.

The vegetation is divided into 4 sub-communities, on the basis of species content (see Table 6). The first sub-community is the typical sub-community which lacks the character species of the other sub-communities and ranges from very species-poor to relatively species-rich. The *Lotus pedunculatus – Plantago lanceolata* sub-community is a dry, species-rich sub-community that contains species of scrub and dry grassland. A variant of this sub-community characterised by the presence of *Festuca arundinacea, Trifolium pratense* was also noted. The *Calliergon cuspidatum – Rumex crispus* sub-community is characterised by the presence of species indicative of scoured, frequently inundated locations such as *Calliergon cuspidatum, Phalaris arundinacea* and *Rumex crispus*. The final sub-community, the *Eleocharis palustris – Caltha palustris* sub-community, is the wettest expression of the community and contains many species typical of wet, frequently inundated habitat conditions

such as *Caltha palustris, Eleocharis palustris* and *Equisetum fluviatile*. At most of the sites visited the vegetation was grazed by cattle, however sites are generally not overgrazed or poached.

Habitat

The *Carex-Potentilla* community occurs in seasonally inundated areas along the margins of lakes within the study area. The substrate is frequently stony and scoured by wave action, however the vegetation can also be found on deeper, organic soils some distance back from the lake edge. Heery (1991) described extensive areas of the community from callow grassland along the river Shannon where it is subjected to long periods of flooding, especially during the winter months.

Distribution

This grassy vegetation type is frequent within the survey area and nearly all lake margins contain at least a small area of the community. A particularly well developed area of the community is located at Derryna (Site 21). The community has a widespread distribution throughout Ireland and is particularly frequent and extensive in habitats prone to a fluctuating water table such as turloughs and the flood plains of rivers (O' Connell *et al.*, 1984, Heery, 1991)

Zonation

At many sites the community is found along exposed lake edges scoured by wave action with little or no vegetation fronting it, apart from occasional sparse *Schoenoplectus lacustris* swamp. A wide variety of vegetation communities occur directly behind the community including *Salix-Almus-Filipendula* woodland, *Phalaris arundinacea* swamp and *Filipendula ulmaria* tall-herb fen. At a number of sites the community occurs as a mosaic with stands of *Carex vesicaria* swamp.

Plate 20. A view of the *Carex nigra – Potentilla anserina* community at Killyvally (Site 46). In this instance *Mentha aquatica* (purple flowering heads) and *Potentilla anserina* are frequent.

Plate 21. An extensive area of the *Carex nigra – Potentilla anserina* community at Derryna (Site 21).

Table 6 - The *Carex nigra-Potentilla anserina* community

																												Mean
Column number	1	2	3	4	5	6	7	8	9	10	11	12	13	17	15	14	16	18	19	20	21	22	23	24	25	26	27	28	29	
Quadrat code	5C	5D	10C	45C	30B	8C	48C	30C	11B	10B	11C	43A	43B	47C	49D	27A	44D	19E	20C	20D	35C	36A	36C	11D	36B	21A	21B	37A	34C	
Quadrat size (m^2)	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	2	4	
Vegetation cover (%)	95	80	80	98	90	85	90	85	100	98	95	90	90	95	90	100	85	95	100	80	75	5	50	40	98	100	98	100	100	86
Open water (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0	0	0	0	0	0	1
Bare rock (%)	0	0	10	0	20	0	0	30	0	0	0	15	15	5	15	0	0	0	0	30	40	0	0	10	5	0	0	0	0	7
Bare soil (%)	3	35	30	3	0	25	5	0	0	2	5	0	5	0	0	0	0	10	0	10	0	10	60	60	0	0	10	3	0	10
Herb cover (%)	95	80	80	98	90	85	90	85	95	98	95	90	90	95	85	95	80	95	100	80	75	90	50	40	95	95	95	95	100	87
Moss cover (%)	0	0	0	3	0	0	2	0	15	12	0	5	5	15	35	40	30	2	25	5	25	0	0	0	20	40	30	35	0	12
Shrub cover (%)	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	<1
Height of vegetation (cm)	15	15	30	5	0	20	8	10	25	35	15	20	15	30	15	20	15	25	20	15	8	5	20	25	13	23	30	35	10	18
No. of species	7	9	9	10	14	14	17	16	19	19	17	16	17	22	18	16	19	13	18	15	17	15	5	9	16	17	16	12	14	15
Constant species																														
Carex nigra	2	2	4	2	2	4	2	2	2	2	3			1		3	3	4	4	3	3	1	3	3	4	3	3	3	2	
Potentilla anserina	3	3	1	2	1	2	1		1	1		2	1	2	1	1		1	1	2	2	+			1	1	1		1	
Ranunculus repens	2	1	2	2		1	2		2	2	3			+		2	2	3	2	3	+	3		1	1	2	2		2	
Agrostis stolonifera	3	3		4	3	2	3	3	2		2	3	3	3	3	2	2	2	3	2	3	2			1				2	
Senecio aquaticus		1	1	1	2	+	1	2	1		2			1	1	1	1	+	+	2	+	2		+				+		
Leontodon autumnalis		1	+	1	2	1	2	2	2	2	2	2	2	1	2	1		1	2		1	+				+				
Trifolium repens	2	1		2	2	+	3	2	2	2		2	3	2	3	3			1		1	3				1				
***Lotus pedunculatus - Plantago lanceolata* sub-community**																														
Lotus pedunculatus			+					2	3	2	2	3	2	2						+										
Plantago lanceolata									2	2	1	1	+	1	2							+								
Vicia cracca									2	2	1	1	1								1									
Equisetum palustre								1	1	1	1																			
Rubus fruticosus									1	1			1		+															
Rumex acetosa									1							1														
Carex panicea									1	1																				
Variant with *Festuca arundinacea*																														
Festuca arundinacea												2	2																	
Trifolium pratense												1	2																	
Achillea ptarmica					+							1	1	+			+													
Potentilla anglica												+	+																	
Viola riviniana												+																		
***Callitrigon cuspidatum - Rumex crispus* sub-community**																														
Callitrigon cuspidatum							1		2			1		2	2	3	3	1	3	2	2							2		
Rumex crispus												+	+	+	+	1	+	1	1		1	1				1				
Lysmachia nummularium																			2	1	1	2			1					
Climacium dendroides														1	2	1					1									
Phalaris arundinacea			2					1		1								1	1	1									2	
***Eleocharis palustris - Caltha palustris* sub-community**																														
Caltha palustris					1			1									1						2		3	2	1	2	2	
Eleocharis palustris											2								1					2	2	1	2	2	3	
Equisetum fluviatile											1												2	1	+		1			
Callitrigon giganteum																									2	2	3	3		
Hydrocotyle vulgaris							1													2					1		3	2		
Persicaria amphibium							2										2	+							+		2		1	
Potentilla palustris																										2	2			
Companion species																														
Galium palustre		2				2	+		2	2	2			1	+	2	3	+	2						1	2	2	1	2	
Mentha aquatica			1			1	+	+		1	1			3					2	2	+	1		+		2	2		1	
Ranunculus flammula		2			1	1		2			2						1	1		2	1		1	1	1	+				
Lythrum salicaria	+				1	1		1			+								+	+	+		+	+			1		+	
Myosotis scorpioides				2	+	1											2	1	+	2	+	1		2	2					
Filipendula ulmaria					3		1	2	2	3				1	+	3	1									3			3	
Cardamine pratensis						+					+			+		1	2		1			1			+	1	1	1		
Juncus articulatus	1						+	2			1			+			2					1			1					
Carex hirta					2			2				+	2			2						2								
Carex disticha										2				2												1			3	
Odontites vernus												+	+	+	1															
Mnium spp.										2											+						1			
Lemna minor				1			1								1															
Carex vesicaria			1																										3	
Rorripa amphibium																			2								1			
Lychnis flos-cuculi									1	1																				
Plantago major					+			1																						
Alopecurus pratensis													+	1																
Brachythecium rutabulum										2			1																	
Ranunculus acris									1																					
Salix cinerea						+																								
Apium inundatum																									+					
Plagiomnium undulatum																									1					
Alisma plantago-aquatica																	+											+		
Baldellia ranunculoides																												+		
Phragmites australis																												+		
Sagina procumbens																	1													
Pellia epiphylla																	1													
Epilobium palustre																	+													
Oenanthe aquatica																	1													
Rorippa Nasturtium-aquaticum				+																										
Taraxacum officinale							+																							
Juncus acutiflorus														1																
Myosotis laxa							1																							
Poa trivialis																	1													
Lotus corniculatus															3															
Cinclidotus fontanaloides															1															

Table 7 - The constancy table for the *Carex nigra-Potentilla anserina* community

Number of quadrats	8	3	2	9	7
Mean number of species per quadrat	12	18	16.5	17	13
Constant species					
Carex nigra	V	V		V	V
Potentilla anserina	V	IV	V	V	III
Ranunculus repens	IV	V		V	IV
Agrostis stolonifera	V	IV	V	V	III
Senecio aquaticus	V	IV		V	III
Leontodon autumnalis	V	V	V	IV	I
Trifolium repens	V	IV	V	IV	I
***Lotus pedunculatus - Plantago lanceolata* sub-community**					
Lotus pedunculatus	II	V	V	II	
Plantago lanceolata		V	V	II	
Vicia cracca		V	V	I	
Equisetum palustre	I	V			
Rubus fruticosus		IV	III	I	
Carex panicea		IV			
Rumex acetosa		II		I	
Variant with *Festuca arundinacea*					
Festuca arundinacea			V		
Trifolium pratense			V		
Achillea ptarmica	I		V	II	
Potentilla anglica			V		
Viola riviniana			III		
***Calliergon cuspidatum - Rumex crispus* sub-community**					
Calliergon cuspidatum	I	II	III	V	I
Rumex crispus			V	V	I
Lysmachia nummularium				III	I
Climacium dendroides				III	
Phalaris arundinacea	II	II		II	I
***Eleocharis palustris - Caltha palustris* sub-community**					
Caltha palustris	II			I	V
Eleocharis palustris		II		I	V
Equisetum fluviatile		II			III
Calliergon giganteum					III
Hydrocotyle vulgaris	I			I	III
Persicaria amphibium	I			II	III
Potentilla palustris					II
Companion species					
Galium palustre	II	V		IV	IV
Mentha aquatica	III	IV		III	III
Ranunculus flammula	III	II		III	III
Lythrum salicaria	III	II		II	III
Myosotis scorpioides	II			IV	II
Filipendula ulmaria	II	IV		III	II
Cardamine pratensis	I	II		III	III
Juncus articulatus	III	II		II	I
Carex hirta	II		V	II	
Carex disticha		II		I	II
Odontites vernus			V	II	
Mnium spp.		II		I	I
Lemna minor	II			I	
Carex vesicaria	I				I
Rorripa amphibium				I	I
Lychnis flos-cuculi		IV			
Plantago major	II				
Alopecurus pratensis			III		
Brachythecium rutabulum		II	III		
Ranunculus acris		II			
Salix cinerea	I				
Apium inundatum					I
Plagiomnium undulatum					I
Alisma plantago-aquatica				I	I
Baldelia ranunculoides					I
Phragmites australis					I
Sagina procumbens				I	
Pellia epiphylla				I	
Epilobium palustre				I	
Oenanthe aquatica				I	
Rorippa Nasturtium-aquaticum	I				
Taraxacum officinale	I				
Juncus acutiflorus				I	
Myosotis laxa	I				
Poa trivialis				I	
Lotus corniculatus				I	
Cinclidotus fontanaloides				I	

3.4.2 *Juncus effusus – Senecio aquaticus* community

Tables 8 and 9

Synonymy

Previous Irish Studies – Senecioni-Juncetum acutiflori (O' Sullivan, 1982)

National Vegetation Classification Scheme – *Holcus lanatus – Juncus effusus* rush pasture (MG 10) *pro-parte*.

Constant species

Juncus effusus, Cardamine pratensis, Calliergon cuspidatum, Senecio aquaticus, Agrostis stolonifera, Ranunculus repens, Filipendula ulmaria, Trifolium repens.

Mean number of species per quadrat = 18 (10-27)

Vegetation

The dark green shoots of *Juncus effusus* visually dominate in this variable community of wet pastures (see Plate 26). Species richness of the vegetation varies from 10 to 27 species in an area of $4m^2$ with an average of 18. The most common associated vascular plant species are characteristic of damp to wet pastures and the most prominent of these are *Trifolium repens, Ranunculus repens, Senecio aquaticus, Filipendula ulmaria* and *Agrostis stolonifera*. Moss cover is typically low (mean = 22% cover) however, in places, *Calliergon cuspidatum* can reach a cover of 50%. The community occurs as three sub-communities, a typical sub-community which is rather species-poor, a herb-rich *Ranunculus acris – Carex hirta* sub-community and an *Apium nodiflorum – Hydrocotyle vulgaris* sub-community, which is the most species-rich. In terms of habitat, the *Apium-Hydrocotyle* sub-community is clearly the wettest of the three sub-communities encountered.

Habitat

This is a community of wet mineral/organic soils that experience frequent flooding, especially during the winter months. Within the survey area the community is often grazed by cattle which gives the vegetation a poached and hummocky appearance.

Distribution

The community is reasonably common within the survey area, although it is likely that large areas of the vegetation have been lost due to land improvement and drainage in the last few decades (O'

Sullivan, 1982). A very good example of the wettest sub-community (the *Apium-Hydrocotyle* sub-community) is to be found at site 52 along the southern shore of the Killyvally peninsula. O' Sullivan (1982) classified this vegetation in the Senecioni-Juncetum acutiflori association and states that the vegetation is generally widespread in wet lowland pastures throughout the country.

Zonation

Typically, this community occurs as extensive patches between the lake edge and drier, semi-improved types of agricultural pastures. In the study area such adjoining pastures tend to be semi-improved dominated by species such as *Poa pratensis, Holcus lanatus, Cynosurus cristatus, Agrostis capillaris, Trifolium repens, Plantago lanceolata* and *Taraxacum officinale*.

Table 8 - The *Juncus effusus - Senecio aquaticus* community

								Mean
Column number	1	2	3	4	5	6	7	
Quadrat code	5B	13A	31A	13D	31B	44B	44C	
Quadrat size (m^2)	4	4	4	4	4	4	4	4
Vegetation cover (%)	80	95	100	95	95	90	85	91
Open water (%)	0	0	0	0	0	10	10	3
Bare rock (%)	0	0	0	0	0	0	0	0
Bare soil (%)	20	5	5	10	10	10	5	9
Herb cover (%)	80	95	95	90	90	90	80	89
Moss cover (%)	0	15	10	50	25	30	25	22
Height of vegetation (cm)	20	50	80	60	60	70	110	64
No. of species	10	17	15	27	14	19	21	18
***Juncus effusus - Senecio aquaticus* community**								
Juncus effusus	2	3	4	3	3	3	3	
Cardamine pratensis	+	+	1	1	1	1	1	
Trifolium repens	2	2	2	3	2	2	.	
Ranunculus repens	2	3	2	2	2	.	2	
Senecio aquaticus	.	1	1	1	2	1	1	
Agrostis stolonifera	3	3	.	3	.	2	2	
Filipendula ulmaria	.	2	1	2	.	1	1	
Calliergon cuspidatum	.	2	.	3	2	2	3	
***Ranunculus acris - Carex hirta* sub-community**								
Ranunculus acris	.	.	3	2	1	.	.	
Carex hirta	.	.	2	2	1	.	.	
Rumex acetosa	.	.	1	+	2	.	.	
Brachythecium rutabulum	.	.	2	.	2	.	.	
Rhytidiadelphus squarrosus	.	.	.	2	.	.	.	
Cerastium fontanum	.	.	.	1	.	.	.	
Festuca ovina	.	.	2	.	.	.	.	
Cynosurus cristatus	.	.	1	.	.	.	.	
***Apium nodiflorum - Hydrocotyle vulgaris* sub-community**								
Apium nodiflorum	.	.	.	.	.	2	3	
Hydrocotyle vulgaris	.	+	.	.	.	2	2	
Sagina procumbens	.	.	.	+	.	1	+	
Rorippa nasturtium-aquatica	.	.	.	.	.	1	.	
Stellaria uliginosa	.	.	.	.	.	+	.	
Callitriche spp.	.	.	.	.	.	.	1	
Myosotis scorpioides	.	.	.	.	.	.	1	
Climacium dendroides	.	.	.	.	.	.	1	
Bidens cernua	.	.	.	.	.	.	+	
Companion species								
Galium palustre	.	2	.	2	.	2	2	
Holcus lanatus	2	.	2	.	1	2	.	
Anthoxanthum odoratum	2	.	2	1	3	.	.	
Carex nigra	.	2	2	2	.	.	1	
Rumex crispus	.	+	.	+	.	+	1	
Potentilla anserina	.	1	.	1	.	.	1	
Juncus articulatus	.		.	1	.	1	1	
Caltha palustris	.	2	.	.	.	.	+	
Lotus pedunculatus	.	.	.	+	.	1	.	
Bellis perennis	1	.	.	.	.	.	.	
Adjuga reptans	1	.	.	.	.	.	.	
Carex sylvatica	1	.	.	.	.	.	.	
Leontodon autumnalis	.	1	.	.	.	.	.	
Lysmachia nummularium	.	1	.	.	.	.	.	
Myosotis spp.	.	+	.	.	.	.	.	
Poa pratensis	.	.	.	1	.	.	.	
Plantago lanceolata	.	.	.	1	.	.	.	
Prunella vulgaris	.	.	.	1	.	.	.	
Carex disticha	.	.	.	1	.	.	.	
Equisetum fluviatile	.	.	.	1	.	.	.	
Epilobium parviflorum	.	.	.	+	.	.	.	
Poa trivialis	.	.	.	.	2	.	.	
Juncus inflexus	.	.	.	.	.	1	.	
Ranunculus flammula	.	.	.	.	.	+	.	
Plantago major	.	.	.	.	.	.	+	

Table 9 - Constancy table for the *Juncus effusus - Senecio aquaticus* community

Number of quadrats	**2**	**3**	**2**
Number of species per quadrat	**13.5**	**18.6**	**20**
Constant species			
Juncus effusus	V	V	V
Cardamine pratensis	V	V	V
Trifolium repens	V	V	III
Ranunculus repens	V	V	III
Senecio aquaticus	III	V	V
Agrostis stolonifera	V	II	V
Filipendula ulmaria	III	IV	V
Calliergon cuspidatum	III	IV	V
***Ranunculus acris - Carex hirta* sub-community**			
Ranunculus acris	.	V	.
Carex hirta	.	V	.
Rumex acetosa	.	V	.
Brachythecium rutabulum	.	IV	.
Rhytidiadelphus squarrosus	.	II	.
Cerastium fontanum	.	II	.
Festuca ovina	.	II	.
Cynosurus cristatus	.	II	.
***Apium nodiflorum - Hydrocotyle vulgaris* sub-community**			
Apium nodiflorum	.	.	V
Hydrocotyle vulgaris	III	.	V
Sagina procumbens	.	II	V
Rorrippa nasturtium-aquatica	.	.	III
Stellaria uliginosa	.	.	III
Callitriche spp.	.	.	III
Myosotis scorpioides	.	.	III
Climacium dendroides	.	.	III
Bidens cemua	.	.	III
Companion species			
Holcus lanatus	III	IV	III
Galium palustre	III	II	V
Carex nigra	III	IV	III
Rumex crispus	III	II	V
Potentilla anserina	III	II	III
Anthoxanthum odoratum	III	V	.
Juncus articulatus	.	II	V
Caltha palustris	III	.	III
Lotus pedunculatus	.	II	III
Bellis perennis	III	.	.
Adjuga reptans	III	.	.
Carex sylvatica	III	.	.
Leontodon autumnalis	III	.	.
Lysmachia nummularium	III	.	.
Myosotis spp.	III	.	.
Poa pratensis	.	II	.
Plantago lanceolata	.	II	.
Prunella vulgaris	.	II	.
Carex disticha	.	II	.
Equisetum fluviatile	.	II	.
Epilobium parviflorum	.	II	.
Poa trivialis	.	II	.
Juncus inflexus	.	.	III
Ranunculus flammula	.	.	III
Plantago major	.	.	III

3.4.3 *Filipendula ulmaria* community

Columns 1 to 6 in Table 10

Synonymy

Previous Irish Studies – *Filipendula ulmaria* community (Mooney and O'Connell 1990)

National Vegetation Classification Scheme – *Filipendula ulmaria-Angelica sylvestris* mire (M27)

Constant species

Filipendula ulmaria, Rubus fruticosus, Agrostis stolonifera, Plantago lanceolata, Festuca arundinacea, Taraxacum officinale.

Mean number of species per quadrat (range) = 12 (8-16)

Vegetation

This relatively species-poor fen vegetation is dominated by *Filipendula ulmaria*, which typically reaches heights of between 80 and 140cm (mean = 110cm). The cover of *Filipendula* is very high with cover values of between 60 and 90% typical (see Plate 22). This dominance leads to a very poorly developed associated flora and moss layer. Common associated vascular plant species include *Agrostis stolonifera, Plantago lanceolata, Festuca arundinacea* and *Taraxacum officinale*, however their cover rarely exceeds 20%. Two sub-communities of the community are recognised, a typical sub-community and a more mature sub-community which contains shrub species such as *Rubus fruticosus, Rosa* spp. and *Fraxinus excelsior*.

Habitat

This vegetation type occurs on firm, but moist soils which are located between 5 and 15 metres back from the lake edge. In Britain, the community is associated with damp, nutrient-rich soils affected by varying degrees of flooding throughout the year (Rodwell, 1995).

Distribution

The community is relatively rare in the survey area being only recorded at the Killyvally peninsula (Sites 46 to 50). The community is widely distributed and common in Ireland (O' Sullivan, 1982, Mooney and O' Connell 1990), however a general overview of the floristic variation within this widespread wetland community is still required (O' Sullivan, *op. cit.*)

Zonation

At Killyvally the *Filipendula ulmaria* community typically occurs behind semi-natural grassland communities which are subject to frequent periods of flooding. A closely associated community is the species-rich *Juncus inflexus-Ranunculus acris* community with which it froms a mosaic.

Plate 26. A general view of wet grassland, dominated by the *Juncus effusus* – *Senecio aquaticus* community at Site 13.

Plate 24. A clump of *Iris pseudacorus* growing in wet pasture along the north-eastern shore of Inishmuck Lough (Site 34).

Plate 25. *Iris pseudacorus* growing along the margins of Gartinardress Lough (Site 40), accompanied by the large dissected leaves of *Cicuta virosa*.

Plate 22. A view of the *Filipendula ulmaria* community at Killyvally (Site 46). The photograph was taken in September 1999, when *Filipendula* had finished flowering.

Plate 23. The species-rich *Juncus inflexus – Ranunculus acris* community at Ardan Lough (Site 35). The yellow flowers visible are those of *Ranunculus acris*.

3.4.4 *Iris pseudacorus* community

Columns 7 to 10 in Table 10

Synonymy

Previous Irish Studies – *Iris pseudacorus* community (Mooney and O'Connell, 1990)

National Vegetation Classification Scheme – *Iris pseudacorus - Filipendula ulmaria* mire (M28)

Constant species

Iris pseudacorus, Cicuta virosa, Equisetum fluviatile, Lemna minor, Sparganium erectum, Phragmites australis, Mentha aquatica.

Mean number of species per quadrat (range) = 9 (6-14)

Vegetation

Iris pseudacorus is a tall wetland species with striking yellow flowers which can grow in a wide variety of aquatic and semi-aquatic habitats. Vegetation dominated by *Iris* recorded in this survey occurs as two distinct sub-communities, an *Agrostis stolonifera* sub-community confined to damp, occasionally flooded soils and a *Cicuta virosa* sub-community which occurs in permanently wet areas along lake margins. *Cicuta virosa* (see Plate 25) is a large and poisonous member of the Umbelliferae which, in Ireland is largely restricted to shallow lake-margins in the centre and north of the country (Webb *et al.*, 1996). Additional common species in the *Cicuta* sub-community include *Equisetum fluviatile, Lemna minor* and *Sparganium erectum*, which demonstrate the very wet nature of the habitat in this sub-community. Moss cover is low (c 10% cover) in the *Agrostis* sub-community and is totally absent in the wetter *Cicuta* sub-community.

Habitat

The habitat of the community ranges from damp mineral soils (in the case of the *Agrostis* sub-community) to very wet quaking soils at the margins of lakes (in the case of the *Cicuta* sub-community). At lake edges the water depth typically ranges between 10 and 40cm, but can be deeper in places.

Distribution

The *Iris* community is not particularly widespread within the survey area but was recorded at three sites, two of which are the shores of small, sheltered lakes. Nationally, *Iris*-dominated communities

are widespread and common in lowland areas (personal observation). Mooney and O' Connell (1990) have recorded the community from wet habitats in Lower Lough Corrib and *Iris*-dominated communities have even been recorded from wet areas of fixed dune grassland in the north-west of the country (Crawford *et al.*, 1996).

Zonation

The *Agrostis* sub-community is found in close proximity to low-growing grassland vegetation and the *Carex-Potentilla* community. The wetter *Cicuta* sub-community generally forms a narrow band between the lake shore and swamp communities such as the *Equisetum fluviatile* community and the *Phragmites australis* community.

Table 10 - *Filipendula ulmaria* and *Iris pseudacorus* communities

							Mean					Mean
Column number	1	2	3	4	5	6		7	8	9	10	
Quadrat code	46B	46A	48A	48B	49C	50C		40A	40B	22A	34A	
Quadrat size (m^2)	4	4	4	4	4	4		4	4	3	4	
Vegetation cover (%)	100	100	100	100	100	100	**100**	98	95	80	100	**93**
Open water (%)	0	0	0	0	0	0	**0**	100	100	70	0	**68**
Bare rock (%)	0	0	0	0	0	0	**0**	0	0	0	0	**0**
Bare soil (%)	0	0	0	0	0	0	**0**	0	0	10	5	**4**
Herb cover (%)	100	100	95	90	80	80	**91**	98	95	80	100	**93**
Moss cover (%)	2	2	0	0	10	10	**4**	0	0	0	10	**3**
Shrub cover (%)	0	0	10	20	45	35	**18**	0	0	0	0	**0**
Height of vegetation (cm)	130	80	90	110	140	110	**110**	170	140	140	140	**148**
No. of species	10	13	13	8	12	16	**12**	6	6	14	10	**9**
***Filipendula ulmaria* community**												
Filipendula ulmaria	5	4	4	5	4	4		.	.	1	2	
***Rubus fruticosus* sub-community**												
Rubus fruticosus	.	.	2	2	2	2		.	.	.	.	
Vicia cracca	.	.	.	1	1	1		.	.	1	.	
Rosa spp.	.	.	.	.	2	1		.	.	.	.	
Fraxinus excelsior	.	.	.	.	1	1		.	.	.	.	
***Iris pseudacorus* community**												
Iris pseudacorus	.	.	.	.	.	.		4	4	4	5	
***Cicuta virosa* sub-community**												
Cicuta virosa	.	.	.	.	.	.		2	2	1	.	
Equisetum fluviatile	.	.	.	.	.	.		1	1	2	.	
Lemna minor	.	.	.	.	.	.		1	1	2	.	
Sparganium erectum	.	.	.	.	.	.		1	2	.	.	
Phragmites australis	.	.	.	.	.	.		1	.	2	.	
Mentha aquatica	.	.	.	.	.	.		.	1	2	.	
Companion species												
Agrostis stolonifera	1	2	3	2	1	2		.	.	.	2	
Plantago lanceolata	1	1	.	.	+	+		.	.	.	.	
Festuca arundinacea	2	2	.	.	1	1		.	.	.	.	
Taraxacum officinale	+	.	.	.	+	+		.	.	.	1	
Potentilla anserina	.	+	2	.	.	.		.	.	.	.	
Juncus effusus	.	.	1	1	.	.		.	.	.	.	
Carex hirta	.	.	1	+	.	.		.	.	.	.	
Trifolium repens	.	.	2	.	.	2		.	.	.	.	
Odontites vernus	.	.	+	.	.	+		.	.	.	.	
Galium palustre	.	.	1	.	.	.		.	.	.	2	
Ranunculus repens	.	.	.	1	.	.		.	.	.	1	
Stellaria uliginosa	.	+	.	.	+	.		.	.	.	.	
Calliergon cuspidatum	2	.	.	.	.	2		.	.	.	.	
Ranunculus acris	.	+	.	.	.	+		.	.	.	.	
Brachythecium rutabulum	1	2	.	.	.	.		.	.	.	.	
Festuca ovina	1	1	.	.	.	.		.	.	.	.	
Rorripa amphibium	.	.	.	.	.	.		.	.	1	2	
Cardamine pratensis	.	.	.	.	.	.		.	.	1	+	
Holcus lanatus	2	.	.	.	.	.		.	.	.	.	
Lathyrus pratensis	+	.	.	.	.	.		.	.	.	.	
Centaurea nigra	.	2	.	.	.	.		.	.	.	.	
Alopecurus pratensis	.	2	.	.	.	.		.	.	.	.	
Juncus inflexus	.	1	.	.	.	.		.	.	.	.	
Trifolium pratense	.	1	.	.	.	.		.	.	.	.	
Succisa pratensis	.	+	.	.	.	.		.	.	.	.	
Rumex acetosa	.	.	1	.	.	.		.	.	.	.	
Cerastium fontanum	.	.	+	.	.	.		.	.	.	.	
Urtica dioica	.	.	+	.	.	.		.	.	.	.	
Arrhenatherum elatius	.	.	.	1	.	.		.	.	.	.	
Eurhynchium praelongum	.	.	.	.	2	.		.	.	.	.	
Festuca rubra	.	.	.	.	1	.		.	.	.	.	
Agrimonia procera	.	.	.	.	.	2		.	.	.	.	
Lotus pedunculatus	.	.	.	.	.	1		.	.	.	.	
Leontodon autumnalis	.	.	.	.	.	+		.	.	.	.	
Caltha palustris	.	.	.	.	.	.		.	.	2	.	
Hydrocotyle vulgaris	.	.	.	.	.	.		.	.	1	.	
Alisma plantago-aquatica	.	.	.	.	.	.		.	.	1	.	
Lemna trisulca	.	.	.	.	.	.		.	.	1	.	
Calliergon giganteum	.	.	.	.	.	.		.	.	.	2	
Glyceria maxima	.	.	.	.	.	.		.	.	.	2	

Table 11 - Constancy table for *Filipendula ulmaria* and *Iris pseudacorus* communities

Number of quadrats	2	4	3	1
Mean number of species per quadrat	11.5	12	12	10
***Filipendula ulmaria* community**				
Filipendula ulmaria	V	V	II	2
***Rubus fruticosus* sub-community**				
Rubus fruticosus	.	V	II	.
Vicia cracca	.	IV	.	.
Rosa spp.	.	III	.	.
Fraxinus excelsior	.	III	.	.
***Iris pseudacorus* community**				
Iris pseudacorus	.	.	V	5
***Cicuta virosa* sub-community**				
Cicuta virosa	.	.	V	.
Equisetum fluviatile	.	.	V	.
Lemna minor	.	.	V	.
Sparganium erectum	.	.	IV	.
Phragmites australis	.	.	IV	.
Mentha aquatica	.	.	IV	.
Companion species				
Agrostis stolonifera	V	V	.	2
Plantago lanceolata	V	III	.	.
Festuca arundinacea	V	III	.	.
Taraxacum officinale	III	III	.	.
Potentilla anserina	III	.	.	1
Juncus effusus	.	II	.	.
Carex hirta	.	II	.	.
Trifolium repens	.	II	.	.
Odontites vernus	.	II	.	.
Galium palustre	.	.	.	2
Ranunculus repens	.	II	.	1
Stellaria uliginosa	III	II	.	.
Calliergon cuspidatum	III	II	.	.
Ranunculus acris	III	II	.	.
Brachythecium rutabulum	V	.	.	.
Festuca ovina	V	.	II	.
Rorripa amphibium	.	.	II	2
Cardamine pratensis	.	.	.	+
Holcus lanatus	III	.	.	.
Lathyrus pratensis	III	.	.	.
Centaurea nigra	III	.	.	.
Alopecurus pratensis	III	.	.	.
Juncus inflexus	III	.	.	.
Trifolium pratense	III	.	.	.
Succisa pratensis	III	.	.	.
Rumex acetosa	.	II	.	.
Cerastium fontanum	.	II	.	.
Urtica dioica	.	II	.	.
Arrhenatherum elatius	.	II	.	.
Eurhynchium praelongum	.	II	.	.
Festuca rubra	.	II	.	.
Agrimonia procera	.	II	.	.
Lotus pedunculatus	.	II	.	.
Leontodon autumnalis	.	II	.	.
Caltha palustris	.	.	II	.
Hydrocotyle vulgaris	.	.	II	.
Alisma plantago-aquatica	.	.	II	.
Lemna trisulca	.	.	II	.
Calliergon giganteum	.	.	.	2
Glyceria maxima	.	.	.	2

3.5 Base-rich fen communities

One plant community of base-rich fens was identified during the survey. This community occurs in wet, base-rich soils along lake margins which experience flooding infrequently. The community is the most species-rich encountered during the survey and contains a number of locally and nationally rare plant species.

3.5.1 *Juncus inflexus – Ranunculus acris* community

Tables 12 and 13

Synonymy

Previous Irish Studies – Juncus inflexus community (Mooney and O' Connell, 1990)

National Vegetation Classification Scheme – *Holcus lanatus – Juncus effusus* rush pasture, *Juncus inflexus* sub-community (MG 10b) pro-parte.

Constant species

Juncus inflexus, Calliergon cuspidatum, Agrostis stolonifera, Ranunculus acris, Filipendula ulmaria, Holcus lanatus, Trifolium repens, Mentha aquatica.

Mean number of species per quadrat (range) = 25 (19-34)

Vegetation

This base-rich fen community is the most species-rich encountered in the survey. Generally the grey-green shoots of *Juncus inflexus*, which reaches a height of between 45 and 100cm, dominate the vegetation. Most of the other constant species are typical of damp to wet grassland. In some of the quadrats, herb species such as *Agrostis stolonifera, Holcus lanatus* and *Carex flacca* may achieve co-dominance with *Juncus inflexus* giving a grassy appearance to the vegetation. The community is divided into two sub-communities a typical sub-community and a *Cynosurus cristatus-Senecio aquaticus* sub-community. The latter sub-community contains a greater representation of grassland species such as *Cynosurus cristatus, Senecio aquaticus, Bellis perennis, Centaurea nigra, Trifolium pratense, Prunella vulgaris* and *Briza media*. The vegetation community is remarkable in that it supports a large number of plant species which are otherwise very rare in Co. Cavan, most notably *Carex lepidocarpa, Pulicaria dysenterica, Equisetum variegatum* and *Epipactis palustris*. These species are all characteristic of base-rich fen habitats (Webb *et al.*, 1996).

The moss layer is generally relatively well developed covering between 20 and 60% of the ground. *Calliergon cuspidatum* is the dominant species with *Climacium dendroides, Philonotis fontana* and *Ctenidium molluscum* also frequent.

Habitat

The community is typically found on wet clay soils, grey in colour, which are irrigated by base-rich water. Typically the community occurs a distance from the lake edge and it is unlikely that the vegetation is flooded for much of the time. There may be a thin layer of fen peat present in the topmost 10cm of soil. At Carrawtraw bridge the vegetation is subject to heavy cattle trampling and this has resulted in a very species-poor variant of the community, which was not sampled during the survey.

Distribution

The community was recorded from four locations within the survey area (Carrawtraw Bridge, Lake shore at Killyvally, western shores of Lough Inchin and N.E. shore of Ardan Lough) and, at the last three of these sites, the community is quite extensive, covering an area of at least 0.5 hectares. *Juncus inflexus* is relatively common throughout Ireland, but is largely confined to limestone areas where there is a heavy clay soil (Webb *et al.*, 1996). There appears to be little published information on communities dominated by *Juncus inflexus* in Ireland, however Mooney and O' Connell (1990) recorded a *Juncus inflexus* community from the shores of Lough Corrib. Their community appears to be wetter than the one described in this study and also differs in the high cover values for *Carex rostrata, Caltha palustris, Potentilla anserina* and *Juncus subnodulosus.* In Britain *Juncus inflexus*-dominated communities have also gone largely unrecorded, however the vegetation described here is broadly similar to the *Juncus inflexus* sub-community of the *Holcus lanatus – Juncus effusus* rush pasture (MG 10), although that sub-community is markedly poorer in species.

Zonation

The *Juncus inflexus* community is found in a variety of zonation types along lake-margins. At Lough Inchin the community occurs between wet Alder woodland and seasonally flooded semi-natural grassland, while at Killyvally the community occurs between Alder woodland and tall-herb fen dominated by *Filipendula ulmaria*. At Ardan Lough the vegetation occurs on sloping ground behind a narrow band of *Carex nigra-Potentilla anserina* poor-fen.

Table 12 - *Juncus inflexus-Ranunculus acris* community

												Mean
Column number	1	2	3	4	5	6	7	8	9	10	11	
Quadrat code	49B	47B	16B	16C	35B	35B2	35A	35X	47A	11A	10A	
Quadrat size (m²)	4	4	4	4	4	4	4	4	4	4	4	4
Vegetation cover (%)	100	100	98	95	95	95	95	90	100	100	100	97
Bare soil (%)	5	0	5	5	10	30	15	15	0	0	0	8
Bare rock (%)	0	0	0	0	0	0	0	0	0	0	0	0
Open water (%)	0	0	0	0	0	0	0	0	0	0	0	0
Herb cover (%)	90	100	95	90	95	90	95	75	100	95	95	93
Moss cover (%)	60	20	30	40	35	35	40	35	30	40	45	37
Height of vegetation (cm)	70	100	70	55	45	60	50	40	100	50	40	62
No. of species	28	21	28	22	19	23	27	34	31	20	21	25
Constant species												
Juncus inflexus	3	3	3	4	4	4	4	2	2	2	2	
Calliergon cuspidatum	2	2	3	3	3	3	4	3	3	3	3	
Agrostis stolonifera	2	2	1	2	3	2	3	2	2	2	2	
Ranunculus acris	1	+	1	1	2	2	2	1	1	1	+	
Filipendula ulmaria	1	1	1	2	2	1	+	1	.	1	.	
Holcus lanatus	.	2	1	2	1	2	2	1	.	3	2	
Trifolium repens	1	+	2	1	2	.	.	1	1	2	1	
Mentha aquatica	+	2	1	.	.	+	1	+	1	1	.	
***Cynosurus cristatus - Senecio aquaticus* sub-community**												
Cynosurus cristatus	.	.	.	.	1	2	1	2	1	2	3	
Senecio aquaticus	.	.	.	.	1	2	1	1	1	.	.	
Centaurea nigra	.	.	.	.	+	.	+	.	+	1	1	
Bellis perennis	.	.	.	.	+	1	1	1	.	.	.	
Trifolium pratense	.	.	.	2	1	.	2	.	+	+	.	
Carex panicea	.	.	.	.	1	.	.	2	1	.	1	
Prunella vulgaris	.	.	.	.	+	1	.	1	+	.	.	
Briza media	1	.	.	.	.	1	.	1	+	.	.	
Taraxacum officinale	+	.	.	.	+	.	.	+	.	+	+	
Poa trivialis	.	.	.	.	+	.	.	1	.	.	.	
Companion species												
Carex flacca	2	2	.	.	.	2	.	2	2	2	3	
Festuca rubra	1	1	.	.	.	.	+	.	2	2	2	
Lotus pedunculatus	1	1	.	1	.	.	.	.	1	1	1	
Carex lepidocarpa	2	.	.	.	.	1	.	1	2	.	+	
Epilobium parviflorum	.	+	1	.	.	+	1	.	+	.	.	
Climacium dendroides	2	1	1	.	.	.	1	.	1	.	.	
Succisa pratensis	1	+	.	.	.	.	.	2	1	.	+	
Plantago lanceolata	.	+	+	.	.	.	.	.	+	1	2	
Galium palustre	.	.	1	+	2	.	2	.	.	.	.	
Cirsium palustre	+	.	+	.	.	.	+	+	.	.	.	
Juncus articulatus	1	1	.	.	.	.	.	1	1	.	.	
Lathyrus pratensis	.	.	+	.	.	.	.	.	1	1	1	
Lysmachia nummularium	.	.	+	.	2	1	.	.	.	.	.	
Veronica beccabunga	.	.	.	.	.	2	1	1	.	.	.	
Hypericum tetrapetrum	+	.	1	.	.	.	+	.	.	.	.	
Dactylorhiza fuchsii	.	.	+	.	.	.	+	+	.	.	.	
Ranunculus repens	.	.	+	+	.	.	2	.	.	.	.	
Vicia cracca	.	.	1	1	.	.	.	.	+	.	.	
Rhytidiadelphus squarrosus	.	.	1	2	.	.	.	.	.	1	.	
Rhinanthus minor	1	+	.	.	.	.	.	.	.	.	.	
Angelica sylvestris	+	.	1	.	.	.	.	.	.	.	.	
Valeriana officinalis	+	.	1	.	.	.	.	.	.	.	.	
Festuca arundinacea	.	.	2	2	.	.	.	.	.	.	.	
Stachys palustris	.	.	+	+	.	.	.	.	.	.	.	
Carex nigra	.	.	.	.	2	.	.	.	.	2	.	
Samolus valerandi	.	.	.	.	.	+	+	.	.	.	.	
Philonotis fontana	.	.	.	.	.	1	.	1	.	.	.	
Rorippa nasturtium-aquatica	.	.	.	.	.	1	.	+	.	.	.	
Alnus glutinosa	1	.	.	.	.	+	.	.	.	.	.	
Rumex crispus	.	.	.	+	.	+	.	.	.	.	.	
Cerastium fontanum	.	.	.	.	.	.	+	.	.	+	.	
Hydrocotyle vulgaris	+	.	.	.	.	.	+	.	.	.	.	
Ctenidium molluscum	1	.	.	.	.	.	.	2	.	.	.	
Juncus acutiflorus	.	.	.	.	.	.	.	.	1	.	1	
Potentilla anserina	.	1	.	.	.	.	.	.	1	.	.	
Carex disticha	.	1	.	.	.	.	.	.	1	.	.	
Molinia caerulea	.	.	1	.	.	.	.	.	1	.	.	
Anthoxanthum odoratum	.	1	.	.	.	.	.	.	.	.	2	
Ajuga reptans	.	.	+	.	.	.	.	.	.	.	+	
Equisetum variegatum	1	.	.	.	.	.	.	.	.	.	.	
Betula pubescens	+	.	.	.	.	.	.	.	.	.	.	
Dactylorhiza spp.	+	.	.	.	.	.	.	.	.	.	.	
Odontites vernus	.	+	.	.	.	.	.	.	.	.	.	
Drepanocladus revolvens	.	.	.	.	.	.	.	.	.	.	.	
Eupatorium cannabinum	.	.	2	.	.	.	.	.	.	.	.	
Iris pseudacorus	.	.	+	.	.	.	.	.	.	.	.	
Carex hirta	.	.	.	2	.	.	.	.	.	.	.	
Achillea ptarmica	.	.	.	1	.	.	.	.	.	.	.	
Pulicaria dysenterica	.	.	.	1	.	.	.	.	.	.	.	
Carex ovalis	.	.	.	1	.	.	.	.	.	.	.	
Calystegia sepium	.	.	.	1	.	.	.	.	.	.	.	
Salix cinerea	.	.	.	+	.	.	.	.	.	.	.	
Ranunculus flammula	.	.	.	.	.	+	.	.	.	.	.	
Pellia spp.	.	.	.	.	.	.	1	.	.	.	.	
Cardamine pratensis	.	.	.	.	.	.	+	.	.	.	.	
Scrophularia spp.	.	.	.	.	.	.	+	.	.	.	.	
Schoenus nigricans	.	.	.	.	.	.	.	2	.	.	.	
Lotus corniculatus	.	.	.	.	.	.	.	2	.	.	.	
Juncus bufonius	.	.	.	.	.	.	.	1	.	.	.	
Danthonia decumbens	.	.	.	.	.	.	.	+	.	.	.	
Pellia epiphylla	.	.	.	.	.	.	.	+	.	.	.	
Carex hostiana	.	.	.	.	.	.	.	+	.	.	.	
Hypochoeris radicata	.	.	.	.	.	.	.	+	.	.	.	
Epipactis palustris	.	.	.	.	.	.	.	.	1	.	.	
Leontodon autumnalis	.	.	.	.	.	.	.	.	1	.	.	
Lophocolea bidentata	.	.	.	.	.	.	.	.	+	.	.	
Poa pratensis	.	.	.	.	.	.	.	.	.	.	2	

Table 13 - Constancy table for the *Juncus inflexus-Ranunculus acris* community

Number of quadrats	4	7
Number of species per quadrat	25	25
Constant species		
Juncus inflexus	V	V
Calliergon cuspidatum	V	V
Agrostis stolonifera	V	V
Ranunculus acris	V	V
Filipendula ulmaria	V	IV
Holcus lanatus	IV	V
Trifolium repens	V	IV
Mentha aquatica	IV	IV
***Cynosurus cristatus - Senecio aquaticus* sub-community**		
Cynosurus cristatus	.	V
Senecio aquaticus	.	IV
Centaurea nigra	.	IV
Bellis perennis	.	III
Trifolium pratense	II	III
Carex panicea	.	III
Prunella vulgaris	.	III
Briza media	II	III
Taraxacum officinale	II	III
Poa trivialis	.	II
Companion species		
Carex flacca	III	IV
Festuca rubra	III	III
Lotus pedunculatus	IV	III
Carex lepidocarpa	II	III
Epilobium parviflorum	III	III
Climacium dendroides	IV	II
Succisa pratensis	III	III
Plantago lanceolata	III	III
Gallium palustre	III	II
Cirsium palustre	III	II
Juncus articulatus	III	II
Lathyrus pratensis	II	III
Lysmachia nummularium	II	II
Veronica beccabunga	.	III
Hypericum tetrapetrum	III	I
Dactylorhiza fuchsii	II	II
Ranunculus repens	III	I
Vicis cracca	III	I
Rhytidiadelphus squarrosus	III	I
Rhinanthus minor	III	.
Angelica sylvestris	III	.
Valeriana officinalis	III	.
Festuca arundinacea	III	.
Stachys palustris	III	.
Carex nigra	.	II
Samolus valerandi	.	II
Philonotis fontana	.	II
Rorippa nasturtium-aquatica	.	II
Alnus glutinosa	II	I
Rumex crispus	II	I
Cerastium fontanum	.	II
Hydrocotyle vulgaris	II	I
Ctenidium molluscum	II	I
Juncus acutiflorus	.	II
Potentilla anserina	II	I
Carex disticha	II	I
Molinia caerulea	II	I
Anthoxanthum odoratum	II	I
Adjuga reptans	II	I
Equisetum variegatum	II	.
Betula pubescens	II	.
Dactylorhiza spp.	II	.
Odontites vernus	II	.
Drepanocladus revolvens	.	.
Eupatorium cannabinum	II	.
Iris pseudacorus	II	.
Carex hirta	II	.
Achillea ptarmica	II	.
Pulicaria dysenterica	II	.
Carex ovalis	II	.
Calystegia sepium	II	.
Salix cinerea	II	.
Ranunculus flammula	.	I
Pellia spp.	.	I
Cardamine pratensis	.	I
Scrophularia spp.	.	I
Schoenus nigricans	.	I
Lotus corniculatus	.	I
Juncus bufonius	.	I
Danthonia decumbens	.	I
Pellia epiphylla	.	I
Carex hostiana	.	I
Hypochoeris radicata	.	I
Epipactis palustris	.	I
Leontodon autumnalis	.	I
Lophocolea bidentata	.	I
Poa pratensis	.	I

3.6 Dry and damp grassland communities

Although most of the grassland within the site consists of species-poor silage grasslands dominated by high yielding-agricultural species such as *Lolium perenne* and *Lolium multiflorum*, there are some small areas of semi-natural grasslands on dry to damp soils. These often occur in close proximity to lake margins and are almost universally grazed by cattle.

3.6.1 *Anthoxanthum odoratum – Vicia sepium* community

Columns 1 and 2 in Table 14

Synonymy

Previous Irish Studies – None apparent

National Vegetation Classification Scheme – None apparent

Constant species

Anthoxanthum odoratum, Vicia sepium, Geranium robertianum, Viola riviniana, Rhytidiadelphus squarrosus

Mean number of species per quadrat (range) = 7.5 (7-8)

Vegetation

This species-poor, ungrazed grassland community is dominated by the relatively thin flowering shoots of common grassland species *Anthoxanthum odoratum*, which reaches a general height of 35cm. The associated flora contains many species typical of woodland and/or hedgerows such as *Geranium robertianum, Viola riviniana, Digitalis purpurea* and *Vicia sepium*. A moss layer dominated by *Rhytidiadelphus squarrosus* is present and this reaches cover of between 20 and 45%.

Habitat

The community occurs on very dry mineral-rich soil along the edges of coniferous forestry.

Distribution

The community appears to be confined to small areas of clearings in coniferous forestry and was only recorded close to the megalithic tomb at Gartnanoul. It is likely that the community is widespread in Ireland, however there does not appear to have been any previous description of a similar vegetation type.

Zonation

Apart from the surrounding coniferous forestry, there is little other associated vegetation.

3.6.2 *Alopecurus pratensis* community

Column 3 in Table 14

Synonymy

Previous Irish Studies – Centaureo-Cynosuretum (O' Sullivan, 1982)

National Vegetation Classification Scheme – *Lolium perenne-Cynosurus cristatus* grassland (MG6), typical sub-community, *Alopecurus pratensis* variant *pro parte.*

Number of species per quadrat = 16

Vegetation

This is a relatively species-rich meadow community characterised by the tall and attractive flowering shoots of the grass *Alopecurus pratensis.* The species is accompanied by a range of grassland species the most abundant of which are *Holcus lanatus, Trifolium repens, Ranunculus repens, Agrostis stolonifera, Plantago lanceolata, Leontodon autumnalis, Poa trivialis* and *Festuca pratensis.*

Habitat

This grassland vegetation is confined to slightly damp, but well-drained mineral soil. The community dominates an area of ground that is elevated c. 40cm above the level of that community. Because of this situation it is unlikely that the community is subject to extended periods flooding by the lake waters.

Distribution

The community was recorded from a small area (c. 0.5 ha) at only one site within the survey area namely site 19, Northwest of Carrawtraw bridge. In Ireland, species-rich hay-meadow communities have suffered a drastic decline in distribution and extent over the past 30 years. It also appears that the rate of decline has greatly accelerated within the last 20 years with advent of widespread silage making and the intensive reseeding and fertilisation which invariably accompany this farming practice.

Zonation

The vegetation occurs behind an extensive area of *Phalaris arundinacea* swamp.

3.6.3 *Poa pratensis-Trifolium repens* community

Columns 4 to 9 in Table 14

Synonymy

Previous Irish Studies – Centaureo-Cynosuretum (O' Sullivan, 1982)

National Vegetation Classification Scheme – *Lolium perenne-Cynosurus cristatus* grassland (MG6), typical sub-community *pro-parte*.

Constant species

Poa pratensis, Trifolium repens, Ranunculus repens, Taraxacum officinale, Plantago lanceolata, Bellis perennis, Holcus lanatus, Agrostis stolonifera, Ranunculus acris, Cardamine pratensis.

Number of species per quadrat (range) = 18 (11-26)

Vegetation

This somewhat ill defined community is the dominant type of semi-natural grassland within the site. The vegetation is dominated by a core group of species, which indicate mesotrophic grassland that has been improved to varying degrees. The most conspicuous of these species include *Poa pratensis, Trifolium repens, Taraxacum officinale, Bellis perennis, Holcus lanatus, Ranunculus repens, Agrostis stolonifera* and *Plantago lanceolata*. The dominant species in the vegetation are either *Poa pratensis, Trifolium repens, Ranunculus repens* and, occasionally, *Lolium perenne*. A feature of the community is the presence of species which indicate agricultural improvement such as *Lolium perenne, Cirsium vulgare, Cirsium arvense* and *Cerastium fontanum*, however it must be pointed out that these species are not major components of the community. In samples of this vegetation type taken from close to lake edges species such as *Odontites vernus* and *Cardamine pratensis* have a higher cover. In most cases cattle tightly graze the vegetation and, as a result, the bulk of the vegetation does not exceed 10cm in height. A more intensive study of this vegetation type within the site would reveal a greater degree of variation, than observed in Table 14.

Habitat

The community is restricted to dry or damp mineral soils. Many of these areas are fertilised, however the intensity of fertilisation does not appear to be great.

Distribution

The community is widely distributed within the survey area and is the main, semi-natural grassland community encountered. It is also a widespread community within lowland agricultural regions of Ireland (O' Sullivan 1982), who classified similar vegetation in the Centaureo-Cynosuretum association.

Zonation

Along lake edges the community can be found within a few metres of the waters edge where it may experience flooding for substantial periods of time. More typically, the community occupies drier ground behind areas of *Juncus effusus – Senecio aquaticus* wet grassland and forms the transition between that community and the improved silage pastures.

3.6.4 *Carex hirta* community

Column 10 in Table 14

Synonymy

Previous Irish Studies – None apparent

National Vegetation Classification Scheme – None apparent

Number of species per quadrat = 12

Vegetation

The low-growing sedge *Carex hirta* is the dominant species in this wet grassland community, achieving a cover of approximately 40%. It is accompanied by a range of typical grassland species of which *Trifolium repens, Festuca rubra, Plantago major, Plantago lanceolata* and *Holcus lanatus* are the most abundant.

Habitat

This is a community located within a couple of metres of the rocky lake edge where there is frequent inundation and/or splashing by water.

Distribution

The community was recorded from only one location within the survey area, site 9, the northwestern tip of the Inishconnell Peninsula.

Zonation

There are no other associated vegetation types.

3.6.5 *Dactylis glomerata – Festuca rubra* community

Columns 11 to 13 in Table 14

Synonymy

Previous Irish Studies – *Molinia caerulea – Arrhenatherum elatius* community (Mooney and O' Connell, 1990)

National Vegetation Classification Scheme – None apparent

Constant species

Dactylis glomerata, Festuca rubra, Filipendula ulmaria, Juncus acutiflorus, Vicia cracca, Juncus conglomeratus, Calystegia sepium, Lathyrus pratensis, Holcus lanatus, Agrostis stolonifera, Anthoxanthum odoratum, Agrostis capillaris, Carex panicea.

Mean number of species per quadrat (range) = 14 (13-15)

Vegetation

Robust grass species such as *Dactylis glomerata, Holcus lanatus* and *Agrostis stolonifera* typically dominate this species-poor community. The vegetation is tall, reaching an average height of 93cm. Other common species in the vegetation include *Festuca rubra, Filipendula ulmaria, Juncus acutiflorus, Anthoxanthum odoratum, Lathyrus pratensis, Vicia cracca* and *Juncus conglomeratus*. Such is the dominance of vascular plant species that mosses are completely absent from the vegetation.

Habitat

The habitat of the community consists of wet but firm peat which dominates the flood plain between two small water bodies.

Distribution

The community was recorded at one site within the survey area, Dawson's Lough (sites 52 and 53), where the community covers and area of approximately 8 hectares of flood plain between the two water bodies which make up the lake. Although there has been little formal description of the vegetation in Ireland, the *Molinia caerulea – Arrhenatherum elatius* community described from Lower Lough Corrib by Mooney and O' Connell (1990) is broadly similar in terms of general floristic composition and structure.

Zonation

The community occurs over large areas with few vegetation transitions evident, apart from abrupt changes to narrow bands of wet *Salix-Alnus-Filipendula* woodland along lake edges. Substantial areas of the community appear to be undergoing invasion by *Salix* scrub.

Table 14 - Dry and damp grassland communities.

			Mean								Mean					Mean
Column number	1	2		3	4	5	6	7	8	9		10	11	12	13	
Quadrat code	24A	24B		19A	5A	44A	45B	16D	12A	45A		9D	53A	52B	52A	
Quadrat size (m^2)	4	4		4	4	4	4	4	4	4		4	4	4	4	
Vegetation cover (%)	100	100	100	95	100	100	98	99	100	99	99	95	100	100	100	100
Bare rock (%)	0	0	0	0	0	0	0	0	0	1	0	5	0	0	0	0
Bare soil (%)	0	0	0	5	0	0	5	1	3	0	2	0	0	0	0	0
Herb cover (%)	95	98	97	95	100	100	95	99	95	97	98	95	100	100	100	100
Moss cover (%)	20	45	33	0	0	0	10	5	50	5	12	5	0	0	0	0
Height of vegetation (cm)	35	35	35	30	10	10	13	8	20	10	12	10	120	90	70	93
No. of species	8	7	7.5	16	11	14	17	21	21	26	18	12	15	15	13	14
***Anthoxanthum odoratum - Vicia sepium* community**																
Anthoxanthum odoratum	5	5		.	2	.	.	.	.	.		.	.	2	2	
Vicia sepium	2	1		.	.	.	.	.	.	.		.	.	.	1	
Geranium robertianum	1	1		.	.	.	.	.	.	.		.	.	.	.	
Viola riviniana	1	1		.	.	.	.	.	.	.		.	.	.	.	
Digitalis purpurea	1	.		.	.	.	.	.	.	.		.	.	.	.	
Hay meadow species																
Alopecurus pratensis	.	.		2	.	.	.	.	.	.		.	.	2	.	
Festuca pratensis	.	.		2	.	.	.	.	.	.		.	.	.	.	
Glyceria fluitans	.	.		1	.	.	.	.	.	.		.	.	.	.	
***Poa pratensis-Trifolium repens* community**																
Poa pratensis	.	.		.	2	2	2	2	3	2		.	.	.	.	
Trifolium repens	.	.		3	3	2	2	2	3	2		3	.	.	.	
Taraxacum officinale	.	.		+	2	1	+	+	+	+		.	.	.	.	
Bellis perennis	.	.		.	1	.	+	.	2	1		.	.	.	.	
Trifolium pratense	.	.		.	.	.	.	3	1	1		1	.	.	.	
Plantago major	.	.		.	1	.	.	1	+	.		2	.	.	.	
Odontites vernus	.	.		.	.	.	2	1	.	2		.	.	.	.	
Centaurea nigra	.	.		.	.	.	+	.	1	2		.	.	.	.	
Cerastium fontanum	1	.		.	2	.	+	+	.	.		.	.	.	.	
Prunella vulgaris	.	.		.	.	.	.	1	1	.		.	.	.	.	
Lolium perenne	.	.		.	.	3	.	.	.	.		.	.	.	.	
Senecio jacobea	.	.		+	.	2	.	.	.	.		.	.	.	.	
Cynosurus cristatus	.	.		.	.	2	.	.	.	.		.	.	.	.	
Cirsium vulgare	.	.		.	.	+	.	.	.	.		.	.	.	.	
Cirsium arvense	.	.		.	.	.	.	+	.	.		.	.	.	.	
Stellaria media	.	.		.	.	.	.	+	.	.		.	.	.	.	
***Carex hirta* community**																
Carex hirta	.	.		1	.	.	1	1	.	+		3	.	.	.	
***Dactylis glomerata - Festuca rubra* community**																
Dactylis glomerata	.	.		.	.	.	.	.	1	.		.	2	1	3	
Festuca rubra	.	.		.	.	.	.	.	.	.		2	3	2	1	
Filipendula ulmaria	.	.		.	.	.	.	.	+	+		.	2	3	1	
Juncus acutiflorus	.	.		.	.	.	.	.	.	.		.	2	1	2	
Vicia cracca	.	.		.	.	.	.	.	1	+		.	2	1	2	
Juncus conglomeratus	.	.		.	.	.	.	.	.	.		.	.	1	2	
Calystegia sepium	.	.		.	.	.	.	.	.	.		.	.	2	1	
Lathyrus pratensis	.	.		.	.	.	.	.	.	.		.	+	1	.	
Angelica sylvestris	.	.		.	.	.	.	.	.	.		.	1	.	.	
Potentilla palustris	.	.		.	.	.	.	.	.	.		.	1	.	.	
Equisetum fluviatile	.	.		.	.	.	.	.	.	.		.	+	.	.	
Companion species																
Holcus lanatus	.	.		3	2	2	.	.	2	1		2	2	2	2	
Ranunculus repens	2	.		2	3	2	.	2	1	1		.	.	.	.	
Agrostis stolonifera	.	.		2	.	2	1	2	2	.		.	2	2	.	
Plantago lanceolata	.	.		2	2	.	3	+	2	2		1	.	.	.	
Ranunculus acris	.	.		1	.	1	.	1	2	+		.	.	.	.	
Cardamine pratensis	.	.		+	.	1	.	+	+	+		.	.	.	.	
Rhytidiadelphus squarrosus	2	3		.	.	.	.	.	3	1		.	.	.	.	
Leontodon autumnalis	.	.		2	.	.	.	1	.	1		1	.	.	.	
Carex spp.	.	.		.	2	.	.	.	1	.		.	.	1	2	
Potentilla anserina	.	.		.	.	.	1	.	.	1		1	+	.	.	
Poa trivialis	.	.		2	.	.	2	.	.	.		.	1	.	.	
Rumex crispus	.	.		2	.	.	.	+	.	.		1	.	.	.	
Senecio aquaticus	.	.		.	.	1	+	1	.	.		.	.	.	.	
Agrostis capillaris	.	.		.	.	.	.	.	.	1		.	1	2	.	
Euphrasia spp.	.	.		.	.	.	+	.	.	2		.	.	.	.	
Hypochoeris radicata	.	.		.	.	.	+	.	.	+		.	.	.	.	
Callergon cuspidatum	.	.		.	.	.	.	2	.	2		.	.	.	.	
Lotus corniculatus	.	.		.	.	.	.	.	.	2		1	.	.	.	
Polytrichum commune	.	1		.	.	.	.	.	.	.		.	.	.	.	
Rubus fruticosus	.	+		.	.	.	.	.	.	.		.	.	.	.	
Rumex acetosa	.	.		.	.	1	.	.	.	.		.	.	.	.	
Sagina procumbens	.	.		.	.	.	.	+	.	.		.	.	.	.	
Plagiomnium undulatum	.	.		.	.	.	.	.	1	.		.	.	.	.	
Lysmachia nemorum	.	.		.	.	.	.	.	+	.		.	.	.	.	
Festuca ovina	.	.		.	.	.	.	.	.	2		.	.	.	.	
Alchemilla spp.	.	.		.	.	.	.	.	.	1		.	.	.	.	
Climacium dendroides	.	.		.	.	.	.	.	.	+		.	.	.	.	
Phalaris arundinacea	.	.		.	.	.	.	.	.	.		+	.	.	.	
Juncus effusus	.	.		.	.	.	.	.	.	.		.	.	2	.	
Succisa pratensis	.	.		.	.	.	.	.	.	.		.	.	.	1	
Stachys palustris	.	.		.	.	.	.	.	.	.		.	.	.	+	

Table 15 - Constancy table for dry and damp grassland communities

Number of quadrats	**2**	**1**	**6**	**1**	**3**
Number of species per quadrat	**7.5**	**16**	**18**	**12**	**14**
***Anthoxanthum odoratum -Vicia sepium* community**					
Anthoxanthum odoratum	V	.	I	.	IV
Vicia sepium	V	.	.	.	II
Geranium robertianum	V	.	.	.	.
Viola riviniana	V	.	.	.	.
Digitalis purpurea	III	.	.	.	.
Hay meadow species					
Alopecurus pratensis	.	2	.	.	II
Festuca pratensis	.	2	.	.	.
Glyceria fluitans	.	1	.	.	.
***Poa pratensis-Trifolium repens* community**					
Poa pratensis	.	.	V	.	.
Trifolium repens	.	3	V	3	II
Taraxacum officinale	.	+	V	3	.
Bellis perennis	.	.	IV	.	.
Trifolium pratense	.	.	III	1	II
Plantago major	.	.	III	2	II
Odontites vernus	.	.	III	.	.
Centaurea nigra	.	.	III	.	.
Cerastium fontanum	III	.	III	.	.
Prunella vulgaris	.	.	I	.	.
Lolium perenne	.	.	I	.	.
Senecio jacobea	.	+	I	.	.
Cynosurus cristatus	.	.	I	.	.
Cirsium vulgare	.	.	I	.	.
Cirsium arvense	.	.	I	.	.
Stellaria media	.	.	I	.	.
***Carex hirta* community**					
Carex hirta	.	1	III	3	.
***Dactylis glomerata - Festuca rubra* community**					
Dactylis glomerata	.	.	I	.	V
Festuca rubra	.	.	.	2	V
Filipendula ulmaria	.	.	II	.	V
Juncus acutiflorus	.	.	.	.	V
Vicia cracca	.	.	II	.	V
Juncus conglomeratus	.	.	.	.	IV
Calystegia sepium	.	.	.	.	IV
Lathyrus pratensis	.	.	.	.	IV
Angelica sylvestris	.	.	.	.	II
Potentilla palustris	.	.	.	.	II
Equisetum fluviatile	.	.	.	.	II
Companion species					
Holcus lanatus	.	3	IV	2	V
Ranunculus repens	III	2	V	.	.
Agrostis stolonifera	.	2	IV	.	.
Plantago lanceolata	.	2	V	1	IV
Ranunculus acris	.	1	IV	.	.
Cardamine pratensis	.	+	IV	.	.
Rhytidiadelphus squarrosus	V	.	II	.	.
Leontodon autumnalis	.	2	II	1	.
Carex spp.	.	.	II	.	IV
Potentilla anserina	.	.	II	1	II
Poa trivialis	.	2	I	.	II
Rumex crispus	.	2	I	1	.
Senecio aquaticus	.	.	III	.	.
Agrostis capillaris	.	.	I	.	IV
Euphrasia spp.	.	.	II	.	.
Hypochoeris radicata	.	.	II	.	.
Calliergon cuspidatum	.	.	II	.	.
Lotus corniculatus	.	.	I	1	.
Polytrichum commune	III	.	.	.	.
Rubus fruticosus	III	.	.	.	.
Rumex acetosa	.	.	I	.	.
Sagina procumbens	.	.	I	.	.
Plagiomnium undulatum	.	.	I	.	.
Lysmachia nemorum	.	.	I	.	.
Festuca ovina	.	.	I	.	.
Alchemilla spp.	.	.	I	.	.
Climacium dendroides	.	.	I	.	.
Phalaris arundinacea	.	.	.	+	.
Juncus effusus	.	.	.	.	II
Succisa pratensis	.	.	.	.	II
Stachys palustris	.	.	.	.	II

3.7 Woodland and Scrub Communities

Four woodland and scrub communities were recorded during the survey. These are as follows:

(a) The *Salix cinerea – Alnus glutinosa – Filipendula ulmaria* community = A low-growing wet woodland community of lake margins.

(b) The *Fraxinus excelsior – Geum urbanum – Primula vulgaris* community – This tall canopy woodland community is confined to dry, base-rich soils.

(c) The *Betula pubescens* community – This is a very rare community of lake margins dominated by tall *Betula pubescens*.

(d) The *Prunus spinosa-Crataegus monogyna* community – A rather species-poor scrub community which is dominated by *Prunus spinosa* with frequent *Crataegus monogyna* and *Rubus fruticosus*.

As can be seen from Table 16 (columns 21 to 27), there is can be considerable floristic and ecological overlap between the *Salix-Alnus-Filipendula* community and the *Fraxinus-Geum-Primula* community.

Table 16 - Woodland and scrub communities

Species with only one occurrence have been omitted from this table and are listed in Appendix 3

Transition

Column number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	#
Quadrat code	7B	2C	4A	8A	1B	52C	6B	53B	39D	41A	4C	30A	29A	16A	9C	29B	21X	51C	25X	50A	50B	1A	1C	14A	51B	51A	2E	39C	49A	2A	2B	42A	39B	39A	6G	7A	6A	23A	20A	19B	
Quadrat size (m^2)	64	64	60	48	64	64	75	64	64	64	64	64	64	64	64	64	64	64	49	64	70	64	64	64	100	100	64	64	70	64	64	64	64	64	100	64	100	64	56	36	
Vegetation cover (%)	75	85	85	85	80	98	90	98	95	90	95	100	100	100	95	100	93	95	95	100	95	95	100	100	100	100	100	98	100	100	100	100	98	100	100	95	99	100	95	100	
Bare rock (%)	25	25	30	40	20	0	5	0	0	0	40	0	0	0	5	5	5	0	0	0	0	10	5	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	1	0	
Bare soil (%)	50	40	30	10	50	0	25	5	5	0	5	5	15	10	5	10	10	10	10	5	20	5	10	25	5	5	5	10	30	3	0	5	5	5	5	10	3	5	20	5	
Open water (%)	0	0	0	0	0	70	0	15	90	95	0	0	0	0	0	0	0	80	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Tree/shrub cover (%)	70	70	80	75	80	90	70	90	90	75	80	80	90	95	80	90	80	80	85	95	90	95	90	95	90	95	95	95	98	85	95	90	95	98	95	95	95	80	70	90	
Herb cover (%)	35	60	60	50	55	70	55	75	65	60	60	80	85	80	70	80	90	30	75	80	60	60	90	65	55	40	60	30	35	50	40	60	50	25	60	70	80	85	70	40	
Moss cover (%)	0	70	30	30	50	70	30	30	5	10	55	60	60	65	60	65	50	35	60	60	40	80	60	70	70	70	90	50	70	90	80	80	80	80	90	80	70	60	5	5	
Height of vegetation (m)	11	12	11	9	11	7	9	7	8	9	10	8	13	7	9	19	10	9	8	7	9	10	11	13	13	14	12	9	12	9	12	12	9	12	14	12	15	13	5	5	
No. of species	10	18	22	20	21	17	20	19	22	22	26	32	25	33	23	25	32	24	27	28	31	29	28	21	20	23	30	21	22	23	21	26	27	31	29	25	25	27	22	17	

Salix cinerea - Alnus glutinosa - Filipendula ulmaria community

Salix cinerea	3	3	4	4	2	4	3	5	3	1	4	3	4	2	4	4	4	2	1	1	1						2		1					2							
Filipendula ulmaria	1	2	3	3	2	4	3	3	2	+	3	3	3	2	4	4	4	2	2	2	2	2		4	3	2	3															
Alnus glutinosa	3	3	2	2	3	1	2	2	3	3	2	1	3	5				3	5	5	4	3				2		2							3		3	3	3			
Brachythecium rutabulum		3	4	3	3		2		2		3	2	3		4	3			2	2	2	2	3		2										2						
Galium palustre			1			+		+	+	+	2	1	2	2	2	1	1	1				1	1		1	1	+					2									
Mentha aquatica				+	2			+	1				1	1	2	+	1	1	2																					
Senecio aquaticus		1		1	1					1	1	1	1	1	+	+	+	1																						
Equisetum palustre		1		1							+	2	2	1					2	1	1		2														1			
Angelica sylvestris			+		1			1			1	+	+	1				1				+	2	2	1			2	1												
Agrostis stolonifera						1		1		1	1	3		2	1			1			2				1												+				
Caltha palustris		2		1	2						1	3			2	2	1																				2			
Mnium affine (small)		3			2							2	2	1	1	3	2					2	3																	
Lysmachia vulgaris	2	2	2				2		1		2		2			2																								
Phalaris arundinacea		2			2				3	2			2		1	1		2					2																	
Lychnis flos-cuculi			1					+			1	1				1	2								2													+	2	
Plantago major			+		+							1		+		+	1																							
Myosotis scorploides		1												+																										
Iris pseudacorus				1					+					1													1											1		
Potentilla palustris										+					+																									

Lythrum salicaria - Phragmites australis sub-community

Lythrum salicaria	2	2	1	2	2		1		2		2		2		2																									
Phragmites australis	2		2	2		2	1	2		3	2																													
Carex vesicaria	+	3			1				1				+																											
Rhamnus cathartica			1				2				1	1											1	2																
Equisetum fluviatile					2	+		1		1				1																										
Stachys palustris				+								+		+																										

Ranunculus repens - Calliergon cuspidatum sub-community

Calliergon cuspidatum										1	2		2	4	1	2	3	2																						
Ranunculus repens				+					+			1	+	2	1	1	1		3	1	+				2														2	2	
Cardamine pratensis						1										+	+	+	1			1	1	+			+												3	2	
Ranunculus flammula															+	+											+												2	1	

Fraxinus excelsior - Geranium robertianum community

Fraxinus excelsior			2	1	2						1		1		1		+	2	1	+	1	3	3	3	4	4	4	2	4	4	5	5	2	2		4	4	2	+	
Adjuga reptans														1						+	1	1	+				+	1													
Geum urbanum																				+									1												
Primula vulgaris																				+				+	+				3		2	1	1	+	1	2				
Ilex aquifolium																				+							+	+	1			+	1	1	+		1				
Thuidium tamariscinum										1																		+	2		+	1	1				+				
Geranium robertianum																				1									2	4	4	4	2	2			2	4			
Veronica montana																				+	1									1	2	1	+		1	2	2				
Dryopteris filix-mas																							+				1			1	1	+			+	2					
Oxalis acetosella																												+	2	1				+	+						
Arum maculatum																														2	+		1	1	1						
Fagus sylvatica																												+			+				+		+				
Phyllitis scolopendrium																														2	1				1						
Hypericum androsaemum																													+							+				

Circaea lutetiana - Sanicula europaea sub-community

Circaea lutetiana							+																																		
Sanicula europeea																						1			+		+			1	2	1	1	2	2	3				
Potentilla sterilis																																2	+	2	+	1					
Heracleum sphondylium																																1	+	+							
Polystichum setiferum																																		1	1	+					
Conopodium majus																													1			+	2								
Allium ursinum																																+		1							
Anemone nemorosa																																		1	+						
																						3	1											2		2					

Betula pubsecens community

Betula pubescens	2						2			2					2		1					2	3	2	1	1	1	1	1	2		1		2	2		4			

Prunus spinosa community

Prunus spinosa				1				1			1				1																										
Lysmachia nummularium																						1																	4	4	
Rumex obtusifolius														+																									1	1	
																																						1	1	

Companion species

Crataegus monogyna	1	1	2	2	1	+	2	+			2	2	1			2	2					2	1	2	1	1	3	1	+			+	2	1	1		1	2	2	2	
Hedera helix				1	1	+	1	+	+	+		1				1	1	1	+	2	2	1	2	1	2	1	2	2	4	1	2	2	1	2	4	3	3	1			
Rubus fruticosus agg.			2	2		1		2		1	2						2	1		2	1		1	1	1	2	2	2	1	3	2	1	2	1	1	2	1	1		
Corylus avellana					2		1														1	1	1	3	2	1	1	1	1	3	2	1	1	+	1	1	2	2	2	
Eurhynchium praelongum						2		3		1				1	+					1	3	3	3		2	5	3	2			1	4	3	2		-3	1			
Thamnobryum alopecurum												1				2	3	2	2	2	2		2	3	3		2	3				2	2	2	2					
Euonymus europaeus				2			1				1								2	3	2	2	4		2	1	3	3			4	4	5	4	4	2				
Viburnum opulus	2	1	1		+		2							2		1	+		1		1		1			2	1		1	2			1	1	1					
Taraxecum officinale										+			+			+	+	+	+				2		2	2					1			1						
Carex remota						1		1					1	1		1	1	2	3		2			+	2	1	+			1				+		+					
Acer pseudoplatanus										1		+										+	+	2	2	1	+		1		+					+				
Ranunculus acris												2		+		+	1		2	+	1	1	+			2	1						4	2	2					
Brachypodium sylvaticum												+										1	1															2		
Rumex sanguineus					+							+		+	+											2		+		+		+		2					
Lonicera periclymenum										+																+	+												1	
Dryopteris dilatata										+														1	2			1	1	3	1	2	2							
Rhytidiadelphus triquetrus																								+	+				+	1	+	+								
Rosa spp.					+							+				+				+	1												1	2		2				
Carex sylvatica										+												+		1	+	1										1		2		
Viola riviniana												+				1				1	1		1			+	1			+	1									
Dactylorhiza fuchsii							+									1				1	1							1	1	1		1	1			1				
Holcus lanatus			1		1					1			+							1	+	+	+			+														
Plagiomnium undulatum												2				1						2		2						1							2		2	
Pellia spp.		2											+		1																		1							
Viola spp.			1														+																							
Trifolium repens											1	2		+								1	+				2													
Ranunculus ficaria												+																											2	
Climacium dendroides					4										1							1												1	2					
Vicia sepium							+										2							1	2															
Valeriana officinalis																						1										1		+						
Urtica dioica								+					+				+							+	1											1			
Vicia cracca				1											+											2												2	
Cardamine spp.											+						+																				1	+		
Listera ovata																						1	+				+													
Juncus effusus					+																																			
Poa trivialis																												+												
Rosa canina				1		1																					1	1								2			1		
Achillea ptarmica											1			+																						1					
Crepis paludosa																																							1		
Deschampsia caespitosa																				1															1		1			
Lemna minor							1	1								3	3	1				1			1						+	1	2							
Rorippa amphibium							1									2																									
Viola canina						1																																	1	1	
Epilobium montanum								+															2											+							
Lophocolea bidentata																																+					+				
Succisa pratensis																	2	1						1																	
Chrysosplenium oppositifolium													+				+																								
Rhytidiadelphus loreus																									+					1											
Veronica chamaedrys																														3	2										
Epilobium palustre				1																			+											+							
Eurhynchium striatum													1																												
Glechoma hederaceae				+																												2	3								
Typha latifolia	1														1																				1						
Rumex spp.								+					+																												
Lemna trisulca						+	+																																		
Epilobium hirsutum		+																																							
Rumex acetosa																+																									
Anthoxanthum odoratum																3																							1		
Galium aparine																																						2			
Rhizomnium punctatum		2							2																											+		+			
Juncus acutiflorus	+												+																												
Cirsium palustre							+						+																												

3.7.1 *Salix cinerea-Alnus glutinosa-Filipendula ulmaria* community

Columns 1 to 20 in Table 16

Synonymy

Previous Irish Studies – Osmundo-Salicetum atrocinereae *pro-parte* (O' Connell *et al.*, 1984)

National Vegetation Classification Scheme – *Salix cinerea-Betula pubescens-Phragmites australis* woodland, *Alnus glutinosa-Filipendula ulmaria* sub-community (W2a)

Constant species

Salix cinerea, Filipendula ulmaria, Alnus glutinosa, Brachythecium rutabulum, Galium palustre, Crataegus monogyna

Mean number of species per quadrat (range) = 22 (10 to 33)

Vegetation

This is a wet woodland community characterised by the dominance of *Salix cinerea* and/or *Alnus glutinosa* in the canopy and *Filipendula ulmaria* in the ground layer. Typically the canopy reaches a height of 9 to 10 metres, however in places the tallest trees only barely exceed 7 metres in height. In most locations the vegetation occurs as a narrow band along the lake shore which varies between 10 and 20 metres in width. In addition to *Salix* and *Alnus*, tree/shrub species such as *Crataegus monogyna, Fraxinus excelsior, Euonymous europaeus, Viburnum opulus* and *Corylus avellana* are often present, however their cover rarely, if ever, exceeds 25%. The climber *Hedera helix* is occasional and in the wet habitat of this community it is largely confined to the trunks of trees. In most of the quadrats the cover of *Filipendula ulmaria* exceeds 25% and in some the cover of the species approaches 80% (see Plates 27 and 28). Most of the other frequent species in the ground layer are typical of frequently inundated habitats, and include *Galium palustre, Mentha aquatica, Senecio aquaticus, Equisetum palustre, Angelica sylvestris, Caltha palustris, Lythrum salicaria* and *Phragmites australis*. The community can be divided into two sub-communities, a *Lythrum salicaria – Phragmites australis* sub-community which is associated with wet, open water conditions and a *Ranunculus repens – Calliergon cuspidatum* sub-community which indicate a more occasionally inundated habitat. At Drumlark Lough (Site 51) the community contains *Prunus padus*, a scarce species in the Republic of Ireland, which is listed in the Red Data Book (Curtis and

McGough, 1988). *Equisetum variegatum*, a nationally rare species, grows in wet *Alnus*-dominated woodland along the northwestern shore of the Killyvally peninsula (Site 49).
Although a well-developed moss layer is frequently absent, in places *Brachythecium rutabulum, Calliergon cuspidatum* and *Mnium affine* are conspicuous. From Table 16 it is evident that there is considerable floristic overlap between this community and the drier *Fraxinus-Geum-Primula* community (see columns 21 to 27).

Habitat

The community occurs in a wide range of soil types and hydrological regimes. These range from shallow, stony, inorganic soils which are subject to frequent episodes of flooding (at least during the summer) to permanently wet quaking scraw surfaces along open water. At a number of sites, the community occurs on wet, base-rich, fen soils well back from the lake edge.

Distribution

A common community within the survey area, that occurs along many areas of lakeshore. Most of the samples of this community correspond to the Osmundo-Salicetum atrocinereae outlined by Kelly and Iremonger (1997) in their comprehensive review of wetland wood vegetation in Ireland. The community appears to have a widespread, if patchy distribution throughout Ireland (O' Connell *et al.*, 1984).

Zonation

The most common location for this community is along lake edges where there is little or no associated vegetation apart from sparse areas of fringing swamp in open water in front of the community. However, in a number of sites the community occurs well back from the lake edge and occurs as a mosaic with areas of *Juncus inflexus – Ranunculus* acris fen, with *Fraxinus – Geum – Primula* woodland occurring on slopes behind.

Plate 27. A view of the interior of an area of *Salix-Alnus-Filipendula* woodland at Gubbarin Point (Site 9). In the case of this area most of the trees are *Salix cinerea*.

Plate 28. A view of the ground layer of the *Salix-Alnus-Filipendula* woodland at Site 9. *Filipendula ulmaria* is clearly the overwhelmingly dominant species in the ground layer.

3.7.2 *Fraxinus excelsior – Geum urbanum – Primula vulgaris* community

Columns 28 to 38 in Table 16

Synonymy

Previous Irish Studies – Corylo-Fraxinetum (Kelly and Kirby, 1982)

National Vegetation Classification Scheme – *Fraxinus excelsior – Sorbus aucuparia – Mercurialis perennis* (W9)

Constant species

Fraxinus excelsior, Adjuga reptans, Geum urbanum, Primula vulgaris, Ilex aquifolium, Thuidium tamariscinum, Geranium robertianum, Circaea lutetiana, Betula pubescens, Crataegus monogyna, Hedera helix, Rubus fruticosus, Corylus avellana, Thamnobryum alopecurum, Dryopteris dilatata.

Mean number of species per quadrat (range) = 25 (21 to 31)

Vegetation

This woodland community is typically dominated by *Fraxinus excelsior*, the canopy of which often exceeds 12 metres in height. Other taller tree species are frequent in the community with the most common being *Corylus avellana, Betula pubescens* and *Acer pseudoplatanus*. In addition to the taller canopy species *Crataegus monogyna, Ilex aquifolium* and *Euonymous europaeus* often form a low shrub layer which ranges between 2 and 5 metres in height. The most common species in the ground layer include *Geum urbanum, Primula vulgaris, Adjuga reptans, Circaea lutetiana, Brachypodium sylvaticum, Hedera helix* and *Rubus fruticosus*. Most of these species indicate that the soil is relatively well drained and mineral-rich. The moss layer in this woodland community is much better developed than in the wetter *Salix-Alnus-Filipendula* woodland covering, on average, 80% of the quadrat area. Common species of the moss layer include *Thuidium tamariscinum, Thamnobryum alopecurum* and *Eurhynchium praelongum*. The community occurs as a typical sub-community and a *Circaea lutetiana – Sanicula europaea* sub-community. Most of the species which differentiate the *Circaea-Sanicula* sub-community indicate that the soils of that community are better drained than those of the typicum.

Habitat

This community typically occurs on well-developed, damp to dry, base-rich soils well back from lake edges. Frequently the community occurs on sloping ground between fields and the flood zone

of the lake. As can be seen from Table 16 there is some degree of floristic overlap between this community and the previous one and this also applies to the habitat of both woodland types. This observation simply illustrates that there is continuum in habitat between the two woodland communities.

Distribution

This community is relatively rare within the survey area and was only recorded from six different locations. This type of woodland is relatively widespread throughout Ireland, however more extensive stands are generally confined to limestone soils in the midlands and west of the country (Kelly and Kirby, 1982)

Zonation

At many of its sites there are no other vegetation types associated with the community, however in a few locations the community occurs on sloping ground below agricultural fields and in both cases the community grades into *Salix-Alnus-Filipendula* woodland on the flatter, wetter ground of the lake edge.

3.7.3 *Betula pubescens* community

Column 39 in Table 16

Synonymy

Previous Irish Studies – Betuletum pubescentis *pro parte* (Kelly and Iremonger, 1997)

National Vegetation Classification Scheme – None apparent

Number of species per quadrat = 27

Vegetation

This woodland community is characterised by a dominance of tall *Betula pubescens* in the canopy and a luxuriant cover of the herb species *Filipendula ulmaria* and the moss *Thuidium tamariscinum* in the ground layer. *Fraxinus excelsior* is occasional in the canopy with *Crataegus monogyna* and *Corylus avellana* forming a low shrub layer. Additional conspicuous species in the ground layer include *Rubus fruticosus, Thamnobryum alopecurum, Holcus lanatus, Poa trivialis, Anthoxanthum odoratum* and *Rumex acetosa*.

Habitat

This area of well-grown woodland occurs on damp, peaty soil in the margins of a lake. The substrate is quaking in places.

Distribution

The community was recorded at only one site within the survey area namely Deralk Lough (Site 23). Apart from areas of bog woodland on wet, acid substrates, there has been scant reference to the occurrence of areas of wet woodland dominated by *Betula pubescens* in either Ireland or Britain. The community could however be accommodated in the Betuletum pubescentis outlined by Kelly and Iremonger (1997) which has a high cover of *Betula* and *Thuidium tamariscinum*.

Zonation

At Deralk Lough the community occurs along the lake edge and there is a rather abrupt transition from woodland to open water.

3.7.4 *Prunus spinosa – Crataegus monogyna* community

Columns 40 and 41 in Table 16

Synonymy

Previous Irish Studies – *Rubus fruticosus/Prunus spinosa* hedge (Hegarty and Cooper, 1994)

National Vegetation Classification Scheme – *Crataegus monogyna – Hedera helix* scrub (W21)

Mean number of species per quadrat = 19.5 (Range 17 to 22)

Vegetation

This low scrub community typically reaches a maximum height of between 4 and 5 metres. The dominant species is clearly *Prunus spinosa*, but *Crataegus monogyna* and *Rubus fruticosus* are also very important components of the vegetation. As a result of the heavy shading of the dominant species, the associated herb flora is restricted to small clear patches around the edges of the scrub. The most frequent low herb species include *Filipendula ulmaria, Ranunculus repens, Cardamine pratensis, Lysmachia nummularium, Rorrippa amphibium* and *Rumex obtusifolius*, many of which are typical of wetlands. The moss *Calliergon cuspidatum* also occurs although it only achieves a cover of approximately 5%.

Habitat

The habitat of the community consists of damp mineral soils located between agricultural fields and the flood margin of lakes. The ground surrounding areas of the vegetation is poached by cattle.

Distribution

Although the community was only recorded at two sites within the survey area it is undoubtedly a common community. Formal description of this common scrub/hedgerow community has been scant in Ireland, however the floristic composition of the community is broadly similar to the *Rubus fruticosus/Prunus spinosa* field margin hedge recorded in Northern Ireland by Hegarty and Cooper (1994)

Zonation

At the two sites in which the community was recorded the *Prunus-Crataegus* scrub occurs between agricultural grassland, which is cut for silage and the flood margin of a lake, dominated by *Carex nigra-Potentilla anserina* poor-fen vegetation.

Table 17 - Constancy table of woodland and scrub communities

Companion species with 3 occurrences or less have been omitted.

No. of quadrats	12	7	7	6	5	1	2
No. of species	20.8	27	25.7	23.8	27.4	27	19.5
***Salix cinerea - Alnus glutinosa - Filipendula ulmaria* community**							
Salix cinerea	V	V	II	II	I	.	.
Filipendula ulmaria	V	V	V	I	I	3	V
Alnus glutinosa	V	III	III	I	I	.	.
Brachythecium rutabulum	IV	III	IV	I	.	.	.
Galium palustre	III	V	III	I	.	.	.
Mentha aquatica	II	V	.	.	.	.	.
Senecio aquaticus	II	V	.	.	.	.	III
Equisetum palustre	II	III	III	.	.	.	.
Angelica sylvestris	II	III	III	II	I	.	.
Agrostis stolonifera	II	III	II	.	.	.	.
Caltha palustris	II	III	.	.	.	.	III
Mnium affine	II	IV	II	.	.	.	.
Lysimachia vulgaris	III	II	I	.	.	.	.
Phalaris arundinacea	II	III	II	.	.	.	V
Lychnis flos-cuculi	II	II	.	.	.	.	.
Plantago major	II	III	.	.	.	.	.
Myosotis scorpioides	I	II	.	I	.	.	III
Iris pseudacorus	I	I	.	.	.	.	.
Potentilla palustris	I	I	.	.	.	.	.
***Lythrum salicaria - Phragmites australis* sub-community**							
Lythrum salicaria	IV	II	.	.	.	.	.
Phragmites australis	IV	.	.	.	.	.	.
Carex vesicaria	II	I	.	.	.	.	.
Rhamnus cathartica	II	.	II	.	.	.	.
Equisetum fluviatile	II	I	.	.	.	.	.
Stachys palustris	I	I	.	.	.	.	.
***Ranunculus repens - Callitrichon cuspidatum* sub-community**							
Callitrichon cuspidatum	I	V	I	.	.	.	V
Ranunculus repens	II	V	II	I	.	.	V
Cardamine pratensis	I	III	III	I	.	.	V
Ranunculus flammula	.	II	.	.	.	.	.
***Fraxinus excelsior - Geranium robertianum* community**							
Fraxinus excelsior	II	IV	V	V	IV	2	III
Adjuga reptans	.	I	III	IV	IV	.	.
Geum urbanum	.	.	III	III	V	.	.
Primula vulgaris	.	.	I	IV	IV	.	.
Ilex aquifolium	.	.	.	IV	III	.	.
Thuidium tamariscinum	I	.	I	IV	III	4	.
Geranium robertianum	.	.	II	III	IV	.	.
Veronica montana	.	.	I	III	III	.	.
Dryopteris filix-mas	.	.	.	III	III	.	.
Oxalis acetosella	.	.	.	II	III	.	.
Arum maculatum	.	.	.	II	II	.	.
Fagus sylvatica	.	.	.	II	I	.	.
Phyllitis scolopendrium	.	.	.	I	I	.	.
Hypericum androsaemum	.	.	.	I	I	.	.
***Circaea lutetiana - Sanicula europaea* sub-community**							
Circaea lutetiana	I	.	II	III	V	.	.
Sanicula europaea	.	.	.	.	V	.	.
Potentilla sterilis	.	.	.	.	III	.	.
Heracleum sphondylium	.	.	.	.	III	.	.
Polystichum setiferum	.	.	.	II	II	.	.
Conopodium majus	.	.	.	.	II	.	.
Allium ursinum	.	.	.	.	II	.	.
Anemone nemorosa	.	.	II	.	II	.	.
***Betula pubsecens* community**							
Betula pubescens	II	II	IV	V	II	4	.
***Prunus spinosa - Crataegus monogyna* community**							
Prunus spinosa	II	I	I	.	I	.	V
Lysmachia nummularium	.	I	.	.	.	.	V
Rumex obtusifolius	.	.	.	.	.	.	V
Companion species							
Crataegus monogyna	IV	III	IV	IV	IV	2	V
Hedera helix	III	III	V	V	V	1	.
Rubus fruticosus agg.	III	II	III	IV	V	2	V
Corylus avellana	I	II	IV	IV	IV	1	.
Carex remota	I	V	IV	IV	I	.	.
Thamnobryum alopecurum	I	I	V	III	V	2	.
Euonymus europaeus	II	.	II	IV	II	1	.
Viburnum opulus	II	III	III	II	I	.	.
Taraxacum officinale	I	III	III	I	II	.	.
Acer pseudoplatanus	I	.	II	I	III	.	.
Ranunculus acris	I	III	IV	.	.	.	III
Brachypodium sylvaticum	I	.	III	III	II	.	.
Rumex sanguineus	I	III	I	I	.	.	III
Holcus lanatus	II	.	.	I	.	2	III
Eurhynchium praelongum	II	II	V	III	III	.	.
Lonicera periclymenum	I	.	II	IV	II	.	.
Dryopteris dilatata	I	I	II	III	I	.	.
Ranunculus ficaria	I	I	I	.	II	.	.
Rosa spp.	I	I	I	III	.	1	III
Carex sylvatica	I	.	IV	II	II	.	.
Viola spp.	I	.	II	I	.	.	.
Dactylorhiza fuchsii	I	I	III	I	.	.	.
Viola riviniana	I	I	II	III	II	1	.
Deschampsia caespitosa	.	I	III	II	II	.	.
Trifolium repens	I	I	.	.	.	.	III
Pellia spp.	I	III	.	.	.	.	.
Climacium dendroides	I	I	II	.	.	.	.
Rhytidiadelphus triquetrus	.	.	III	.	II	2	.
Valeriana officinalis	.	II	II	.	.	1	.
Urtica dioica	.	I	.	I	.	.	III

3.8 Overview of the flora of the site

A total of 210 species of vascular plants and 23 species of mosses and liverworts were recorded from sites surveyed during this study (see Appendix 2). This demonstrates that the survey area contains a very diverse flora, which is comparable with other areas of Ireland. In addition to the species-richness of the site, a number of species were recorded which are rather rare both in a local and national context. The location, ecology and importance of these records are outlined in Table 18 below. All of the species are very a rare within the survey area, each being noted at only one locality. Although present recent knowledge of their distribution within Co. Cavan is not available, information in Scannell and Synnott (1987) suggests that the records for *Epipactis palustris* and *Equisetum variegatum* are first records for Co. Cavan (Vice-county no. 30).

Table 18. List of rare plant species recorded from the Lough Oughter region during this survey. Data on species distribution in Ireland on a 10km square basis taken from Perring and Walters (1962).

Species	Site No.	Comments
Epipactis palustris	47	Although this species is still relatively frequent in suitable habitats in the centre of Ireland, it is undoubtedly declining (Webb *et al.*, 1996), due to drainage and reclamation of its fen habitat. Previously recorded from 87 10k squares in Ireland. A very rare species in County Cavan due to the scarcity of base-rich fen habitat.
Equisetum variegatum	49	This is a very rare species of horsetail that grows in wet to damp base-rich areas. It is likely that this species has suffered the same fate as many other fen species and has undergone a decline in distribution over the past 30 years due to drainage and habitat reclamation. Previously recorded from only 43 10k squares in Ireland.
Prunus padus	51	This species is considered to be Scarce on a national basis and has been recorded from only 49 10k squares, many of which are based on pre-1930 records. There is little information on the current distribution of the species in Co. Cavan, however it is unlikely the species occurs in many other locations.

3.9 Sites within the survey area of exceptional ecological/botanical interest

During the survey, a number of sites containing areas of particularly well developed vegetation were noted. These areas either possess an extensive area of a particular vegetation type or support a relatively large number of vegetation types in close proximity to one another and thus provide good examples of vegetation zonation. In addition, a number of these locations are easily accessible and thus are of considerable educational importance. The location of these areas and their particular attributes are outlined in Table 19. It is of crucial importance that these areas are included within the proposed Special Area of Conservation.

Table 19. Sites of exceptional ecological/botanical interest within the survey area.

Site name & no.	Grid reference	Comments
East of Footbridge at Killykeen (Site no. 1)	H 348 067	An extensive area of lake-shore scrub which contains most of the native trees such as Ash, Hazel, Alder, Spindle, Wayfaring tree and Purging Buckthorn. Relatively easy to access and thus is of good educational value.
Western Shore of Farnham Lough (Site no. 6)	H 393 078	The area between the lake and the road supports a reasonably extensive area of woodland dominated by Ash and Hazel. The understorey is species-rich and contains most of the species typical of native woodlands on base-rich soils. Close to the road and thus of good educational value. Provides a good contrast with wet woodland (see site 1 above).
Lake shore at Derrynagan (Sites 10 and 11)	H 37 08	This area of lakeshore contains one of the best, and easily accessible, examples of vegetation zonation within the survey area. The vegetation ranges from lakeshore scrub to aquatic vegetation dominated by Reedmace and yellow water lily. Various types of swamp and wet grassland vegetation dominate intervening areas.
Lake shore at Derryna (Site no. 21)	H 368 086	One of the largest areas of *Carex nigra-Potentilla anserina* fen within the survey area, covering in the region of 2 hectares.
Lake shore at Derries Lower (Site no. 26)	H 33 05	This shallow, sheltered bay (c. 20 ha) is almost completely colonised by a large area of swamp dominated by *Rumex hydrolapathum*. Large areas of this vegetation type appear to be relatively rare nationally.
North-eastern shore of Ardan Lough A (Site no. 35)	H 354128	Along this section of lakeshore, there is a well-developed area (c. 2 ha) of base-rich fen dominated by *Juncus inflexus*. The vegetation is species-rich and contains a number of unusual species such as *Carex lepidocarpa, Carex hostiana* and *Schoenus nigricans*.
Northern Shore of Inishconnell Peninsula (Site 39)	H 357 077	An extensive area of scrubby woodland that ranges from dry Ash/Hazel dominated on sloping field edges to wetter Willow/Alder on flat, occasionally flooded ground.
North-western shore of the Killyvally peninsula (Sites 48, 49 and 50)	H 35 04	The lake shore in this areas shows excellent variety and zonation in vegetation which includes dry Ash/Hazel woodland on sloping ground, wet Willow/Alder woodland and species-rich *Juncus inflexus* fen on wet mineral soil and scrub dominated by Meadowsweet and *Rosa* spp. close to the lake shore.
Lake at Drumlark (Site 51)	H 413 072	Along the southern shore of this lake there is an extensive area of tall woodland dominated by Ash, with an understorey of wetland species. The area constitutes what is probably the only large area of wet Ash woodland within the survey area. The nationally scarce shrub, *Prunus padus*, grows along the lake edge.
Dawsons Lough (Sites 52 to 54)	H 36 16	This lake, which may have been partially drained in the past, contains large areas of wet grassland, which is a rare habitat within the survey area. Other habitats of interest present include wet Willow woodland and unusually species-rich *Phragmites* reedswamp.

3.10 Observations of animals made during the survey

Although no systematic survey of the animal life of the survey area was attempted, a number of incidental observations of animals were made during fieldwork. The locations of these sightings and the details are outlined in Table 20. For details of bird counts within the site see Sheppard (1993).

Table 20. Incidental animal observations of interest within the survey area.

Species	Location/ Grid reference	Details
Crayfish	Eastern shore of Town Lough (H 312 082).	Remains washed up on the shore.
Crayfish	Northeastern shore of Ardan Lough (H 354 128).	Remains washed up on the shore.
Hare	Lake shore at Derrynagan (H 37 08)	One individual seen.
Swan Mussels	North-east of Bakers Bridge (H 381 130)	100 - 200 mussels noted growing in shallow (< 20cm deep) water along rivers edge.
Jay	Mixed woodland in Killykeen Forest Park (H 34 06)	One individual seen.
Common Tern	Seen at most of the larger lakes within the survey area.	A small island in Farnham lake appears to be a nesting site.
Stoat	Field south of Dawson's Lough (H 365 163)	One individual seen.

3.11 Discussion of survey results

This survey has demonstrated that, despite the relatively low water quality of many of the lakes within the site (Allott *et al.*, 1998), the Lough Oughter Complex still retains a relatively well developed and diverse flora around lake margins which is worthy of conservation. The swamp vegetation in particular is well developed with a large number of swamp communities (21) recorded from within the study area. This figure compares favourably with other lake sites studied in the country e.g. Lough Corrib (Mooney and O' Connell, 1990). From a biogeographical point of view, perhaps the most interesting swamp community recorded is the *Rumex hydrolapathum* community. Well-developed areas of this type of swamp community appear to have a restricted distribution in Ireland and the area of the community at Derries Lower must be one of the largest expanses of the vegetation type in the country. Areas of swamp vegetation are best developed in the smaller, more sheltered lakes, e.g. Derrygid Lough, Dawson's Lough, or in shallow sheltered bays of the larger waterbodies. It appears that the greater intensity of wave action may be partially responsible for the limited development of marginal swamp vegetation in the larger lakes. In addition to contributing to the floristic diversity and scenic value of lakes within the survey area, areas of reedswamp are important in providing nesting areas and cover for wildfowl (Burgess *et al.*, 1995).

Perhaps the most striking observation of the vegetation survey is the relative scarcity of floating or submerged aquatic vegetation with only two such communities recorded, i.e. the *Potamogeton lucens* community and the *Nuphar lutea* community. Although it is acknowledged that the aquatic and submerged vegetation of some of the lakes within the survey area was not fully investigated, there can be little doubt that the enrichment of lake waters has significantly decreased the diversity and amount of submerged and floating vegetation. The relatively poor water quality of the lake is also reflected in the types and extent of plant communities present. Many of the main aquatic species growing in deep water throughout the site, e.g. *Nuphar lutea, Sparganium emersum, Potamogeton lucens* and *Rumex hydrolapthum* indicate that water conditions fall within the mesotrophic to eutrophic range (Palmer *et al.*, 1992). There is evidence to suggest that a decline in the water quality of a lake results in a decline in the diversity of plant species (Palmer *et al.*, 1992). Thus an improvement in the water quality of lakes within the Lough Oughter Complex is considered essential in order to improve the present ecological value of the site (see Chapter 4).

One of the most important findings of this survey was the discovery and documentation of species-rich fen vegetation, i.e. the *Juncus inflexus-Ranunculus acris* community, along lake margins at a number of locations. This community is the most species-rich of the communities recorded within the site with a mean of 25 species per $4m^2$ quadrat. One of the most important characteristics of this community is that it supports a number of plant species, e.g. *Equisetum variegatum, Epipactis palustris* and *Carex lepidocarpa*, which are very rare within the county and in surrounding areas.

Areas of species-rich fen vegetation are becoming relatively rare nationally due to the drainage and reclamation of the habitat (Irish Peatland Conservation Council, 1996). The habitat is listed as a habitat of conservation importance within the European Union under the Habitats Directive (Ramão, 1996). Thus because of the apparent rarity of species-rich *Juncus inflexus* fen nationally and the general rarity of alkaline fen habitat in the south Ulster/north Leinster region, it is recommended that the Lough Oughter Complex is selected by the National Parks and Wildlife Service as containing a good example of the habitat. It is estimated that the habitat covers somewhere in the region of 7 hectares within the site and although this is a relatively small area, the rarity of the habitat in this intensively agricultural part of the country cannot be overstated.

The woodland and scrub communities that occur within the survey area are important in that they contribute greatly to the species-richness of the site. Not only do they support many plant species which would otherwise not occur within the site, but they are an important habitat for a wide range of bird species. The low-growing wet *Salix-Alnus-Filipendula* woodland recorded from lake margins within the survey area is of interest mainly because of the great diversity of shrub species, which the community commonly supports. The most noteworthy species are *Viburnum opulus, Rhamnus catharticus* and *Euonymous europaeus*. Because of the general paucity of semi-natural woodland and scrub within the site, it is essential that such areas are conserved.

Although this survey has revealed the diverse and species-rich nature of habitats within the site, there still remains scope for further baseline study of the plant communities. It is felt that the vegetation of grassland and aquatic habitats still require more research in order to fully appreciate their composition, variation and distribution. Further surveys of the bird and invertebrate populations are also required and it is felt that these studies would reveal much about the ecological health of the site.

CHAPTER 4

ENVIRONMENTAL PROBLEMS AND POSSIBLE CONSERVATION MEASURES

4.1 Introduction

Though it is acknowledged that the Lough Oughter area is subject to damaging operations such as shooting, dumping and littering, at present the main environmental problem facing the site is eutrophication of lake waters. This eutrophication has a damaging impact on a wide range of plants and animals and is a particular problem for those aquatic species which demand water which is both unclouded and low in nutrients, e.g. salmonids and charophytes. It is suspected, for example, that eutrophication has played a major role in the decline and extinction of Arctic Char in a number of lakes in western Ireland including Lough Corrib and Lough Conn (Champ, 1998). It is also noteworthy that the species is now extinct at nearly all of its previous sites in the midlands of Ireland (Whilde, 1993). Eutrophication of waters has also been shown to reduce the diversity of plant species in aquatic systems (Palmer *et al.*, 1992) and much research has been directed towards developing strategies ultimately aimed at halting or reversing the process (Moss, 1998).

4.2.1 The eutrophication problem

Eutrophication is perhaps the most serious problem facing lake ecosystems in Ireland at present (Allot *et al.*, 1998). Water quality problems result when an excess of nutrients, in particular phosphorous and nitrogen compounds, enter a water body and cause a greatly accelerated rate of plant growth to take place. In the case of lakes in temperate regions of the world, the main effect of eutrophication is to cause a dramatic increase in growth rates of phytoplankton, which in turn lower the dissolved oxygen concentration of the water (Moss, 1998). Increased phytoplankton growth within a waterbody can be visually perceived by the increased turbidity of surface water and by the accumulation of algal scums along lake margins. Once eutrophication of a waterbody has commenced, oxygen depletion is especially pronounced in the lower depths of the lake, however, in time the upper layer of lake water may also become severely deoxygenated. If left unchecked this lowering of the dissolved oxygen content will eventually lead to the extinction of many plant and fish species, leaving only the species that can survive in water of low dissolved oxygen concentration. The main anthropogenic sources of enrichment in Ireland at present are agricultural

run-off (fertilisers, animal manures, silage effluent etc.) and sewage discharge (both from private domestic and municipal sources) (Bowman and Clabby, 1998).

The degree of enrichment of lake waters can be assessed by a number of methods including the measurement of the amount of chlorophyll a or total phosphorous in the water or by the assessment of water transparency with the aid of a Secchi disc. The trophic status of lake waters in Ireland is divided into 5 main categories, shown in Table 21.

Table 21. The classification of lake waters on the basis of the concentrations of Total Phosphorous, chlorophyll a and transparency (after Bowman and Clabby, 1998).

Lake category	Total Phosphorous mg/m^3	Chlorophyll a mg/m^3		Transparency (m)	
	Mean	Mean	Max	Mean	Max
Ultra-Oligotrophic	<4	<1.0	<2.5	>12	>6
Oligotrophic	<10	<2.5	<8	>6	>3
Mesotrophic	10 - 35	2.5 – 8	8 - 25	6 – 3	3 – 1.5
Eutrophic	35 - 100	8 – 25	25 - 75	3 – 1.5	1.5 – 0.7
Hypereutrophic	> 100	> 25	> 75	<1.5	<0.7

The relative contribution of different sources to the pollution of a waterbody is a contentious issue which is dependent on a number of factors, however McCarrigle *et al.* (1997) state that in the case of Lough Conn, Co. Mayo, agriculture is the main source of total phosphorous load to the lake, with other anthropogenic sources being of relatively minor importance (see Table 21 overleaf). In the case of Lough Oughter, where agriculture is, if anything, more intensive in nature, it seems reasonable to assume that the contribution of agriculture to total phosphorous loading is equal to or greater than 60%. Furthermore, it has been recently demonstrated by Allott *et al.* (1998) that the total phosphorous content of lake waters in Ireland is positively related to various measures of cattle-based agriculture, such as the cattle density and degree of silage production within the lake catchment.

Table 22. Total phosphorous contribution by sector within the Lough Conn catchment (McCarrigle *et al.* (1997).

Source	% load of total phosphorous
Agriculture	60.2
Background	26.1
Forestry	5.4
Rural sewage	4.3
Town sewage	3.6
Peat workings	0.4

4.2.2 Water quality of the Lough Oughter lake Complex

Lough Oughter is a relatively shallow lake (Mean depth 3.0 metres), with relatively high values of water alkalinity (67 mg l^{-1}) (Allott *et al.*, 1998). These high alkalinity values are due to the dominance of limestone bedrock and drift within the catchment of the lake. Throughout the past 25 years the water quality of the Lough Oughter has been classified as eutrophic to hypereutrophic (Toner *et al.*, 1986, Clabby *et al.*, 1992). Allott *et al.* (1998) report an annual average lake total phosphorous level of 63 mg/m^3 and maximum total chlorophyll a levels of 43µg l^{-1} which clearly put the lake in the eutrophic to hypereutrophic category. It must be pointed out however that these water quality figures apply to Lough Oughter and do not necessarily reflect water quality in all of the lakes within the Lough Oughter Complex. Because of the relatively poor water quality, Lough Oughter has gained a degree of notoriety and, along with a number of other lakes in the Cavan/Monaghan area, e.g. Lough Sheelin and Lough Egish, is often quoted as one of the aquatic pollution blackspots in the country.

The primary reason for the low water quality of the lake system is the point and non-point pollution that results from agricultural and domestic sources within the catchment of the lake. The main source of pollution is runoff from cattle slurry which is spread on fields close to the lake, however the application rates of bag fertiliser must also be substantial. Slurry and fertiliser is applied to fields in the area in order to boost grass growth for both grazing and silage production, primarily in the spring and early summer. Dairying and dry-stock rearing of cattle are the principal forms of farming in this area of Co. Cavan (Lafferty, Commins and Walsh, 1999). This type of animal husbandry leads to the accumulation and storage of large amounts of cattle slurry over the winter, which is spread on land

over relatively short periods of time. A proportion of this slurry finds its way into streams and rivers which supply lakes and this leakage is primarily responsible for the high total phosphorus levels which ultimately cause an elevated algal growth rate. The runoff of slurry or fertiliser is particularly pronounced if it rains heavily within a few days of spreading (Allott *et al.*, 1998). In Lough Oughter, pollution effects are particularly acute because most of the lakes are almost completely surrounded by agricultural land and many of the lakes are interlinked, thus facilitating the migration of enriched waters between lakes.

It is likely that enrichment from badly designed domestic septic tanks within the catchment of the lake is also contributing to the problem of eutrophication in Lough Oughter, however this source is thought to contribute far less to the phosphorous load than cattle related farming (McCarrigle *et al.*, 1997).

4.2.3 Measures to improve water quality within the site

While it is obvious that the solution to the water quality problem within the lakes of the site lies in the reduction of the amount of plant nutrients being released to waterbodies it has, in the past, been difficult to achieve this aim especially in areas of intensive agriculture such as counties Cavan and Monaghan. At present the most widespread scheme available to encourage a reduction in the levels of fertiliser and manure being applied to land is the Rural Environment Protection Scheme (REPS). The prevention of pollution of rivers and lakes is one of the primary objectives of the scheme and, in return for agreeing to implement a range of environmentally-friendly practices, the farmer receives a cash payment of approximately £120 per hectare per year, up to a ceiling of 40 hectares. An integral part of the scheme includes advising farmers of the maximum amount of fertiliser and/or slurry to be applied to land. The objective of this advice is to maximise crop growth while at the same time avoiding the overloading of the soil with phosphorous and hence reducing the level of phosphorous run-off to rivers and lakes. The "ideal" figure for soil phosphorous is currently 15 mg P per litre of soil (determined by Morgan's method) and, if adhered to, maintaining the soil phosphorous at this level could result a substantial reduction of the annual fertiliser bill the farmer. There is however much debate on various aspects of this problem such as at what level of soil phosphorous do significant losses of P to the aquatic environment occur? Furthermore there appears to be conflicting advice between the Department of Agriculture and Teagasc regarding the optimum levels of phosphorous in soils (The Heritage Council, 1999).

Even though much effort and expense which has gone into the devising and checking of REPS plans there appears to be no monitoring of the effects of REPS measures on the water quality of lake or river habitats. (The Heritage Council, 1999). One of the main drawbacks of the scheme is that, at present, participation is not obligatory and thus many of the more intensive farming enterprises

which produce and spread relatively large volumes of manure and fertiliser on land, choose not to participate. There are a number of reasons for this, however the main ones appear to be the relatively low financial incentives offered and the constraints that would be imposed on the nutrient management budgets of intensive farms (Leavy, 1997). The uptake of REPS in Co. Cavan is generally not high and, as of 1999, the uptake in the Lough Oughter area was between 15 and 40% (Lafferty, Commins and Walsh, 1999).

There are guidelines already in place which, if adhered to, would probably lead to a rapid reduction in the amount of nutrients reaching rivers and lakes. REPS and Department of Agriculture guidelines state that slurry should not be spread within 10 metres of a small watercourse or within 20 metres of a larger watercourse or waterbody, however this is a guideline that, in practice, is difficult to enforce and monitor. There is also advice on the timing of slurry application which basically advises that application should take place during spring and summer when conditions are drier and uptake of nutrients by grass is more efficient, due to the fact that grass is actively growing at that time.

Perhaps the best way in which to tackle the problem of eutrophication within the site is through the Erne Catchment Nutrient Management Scheme (or a more rigorous and improved version of that scheme). This cross-border scheme is funded by the E.U. and its primary aim is to improve water quality in the Erne catchment. The soil phosphorous levels of fields within participating farms is analysed and from these results a nutrient management plan for the farm is drawn up. In Co. Fermanagh the most intensive farms are targeted and participation rates in the scheme are high, varying between 80 and 100% of targeted farms (The Heritage Council, 1999). Participation rates within Co. Cavan are much lower however and this is thought to be due to a general reluctance on the part of the more intensive farmers in the area to have voluntary nutrient management plans drawn up (The Heritage Council, 1999). Although this plan provides a worthwhile model for the improvement of water quality within the Lough Oughter area a number of important changes need to be made. The most important of these is the calculation of nutrient budgets for individual fields, in order to take into account factors such as the wetness of soil and the proximity of fields to lakes or rivers. Furthermore, in order to ensure the success of the scheme, all farms - in particular the most intensive farms - have to be involved.

Thus, in conclusion, there is an urgent need to develop a strategy for the effective and safe utilisation of animal slurry within the Lough Oughter catchment in particular and in the Cavan/Monaghan area generally. The only way in which this can be achieved involves the strict control of slurry and fertiliser application to fields within the catchment of lakes. This control will necessitate the identification of farms which produce the largest amounts of animal waste within the lake catchments. Nutrient management budgets should be drawn up for each individual farm and this

should be followed by the education of farmers in all aspects of pollution control and the subsequent detailed monitoring of water quality. This monitoring of water quality is essential in order to gauge the effectiveness of the scheme and monitoring should be carried out at a large number of sites, at intervals of not greater than every two months. It is also suggested that particular attention should be paid to slurry/fertiliser application rates in fields that abut lakes or major watercourses, as a large proportion of the nutrients that find their way into waterbodies must be initially applied to such areas. Every effort should be made to encourage farmers to stop, or drastically reduce, the application of all slurry and fertiliser to such fields. This measure would inevitably involve some degree of financial compensation however, from an environmental quality point of view, it would be money well spent.

In addition to the more stringent planning and monitoring of slurry and fertiliser application to land within the catchment of lakes there is also a general need to deal with excess amounts of slurry produced by farming enterprises in the area. One possible future solution involves the siting of a number of anaerobic digestion plants within counties Cavan and Monaghan which would receive and process excess waste from agriculture. The location of a number of plants in this region of relatively intensive agriculture would go a considerable way to relieving the problem of the safe disposal of large amounts of animal slurry.

4.3 The value of the natural history interest of the Lough Oughter Complex

At present, apart from the use of the lake for angling purposes, the level of local knowledge regarding the natural history of the site appears to be relatively low. As one of the stated aims of this survey is to raise the profile of the site both locally and nationally, a number of possibilities with regard to this aim will be investigated. One effective way of generating local interest in the site involves the compilation of an information pack for local schools. In this way the lake system could be used as an educational resource. Thought should also be given to the compilation and printing of a small weatherproof guide to the natural history of the Lough Oughter area, using a similar format to the recent heritage guide series published by Archaeology Ireland. A number of these guides could be distributed freely schools throughout the area and also sold in local shops. It is planned to investigate the feasibility of these measures during the year 2000.

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Appendix 1 – Number, name and grid reference of vegetation sampling sites

Site Number	Site Name	Grid reference
1	East of Footbridge at Killykeen Park	H 348 067
2	Southern shore of Gartnanoul peninsula	H 343 067
3	South-west of Footbridge at Killykeen Park	H 346 066
4	Northern shore of Garnanoul peninsula	H 344 071
5	Picnic area on southern shore of Gartnanoul peninsula	H 345 067
6	Western shore of Farnham Lough	H 393 078
7	North-western shore of Farnham Lough	H 394 081
8	Western side of Inisconnell peninsula	H 356 072
9	Gubarrin point	H 355 077
10	Lake shore at Derrynagan (A)	H 376 081
11	Lake shore at Derrynagan (B)	H 377 083
12	Lake shore south-west of Derrynagan (A)	H 373 082
13	Lake shore south-west of Derrynagan (B)	H 373 081
14	Inlet to Sally Lough (A)	H 354 059
15	Inlet to Sally Lough (B)	H 353 058
16	Western shore of Lough Inchin	H 385 086
17	Northern shore of Annagh Lough (A)	H 396 126
18	Northern shore of Annagh Lough (B)	H 395 126
19	Inishmuck Lough, N.W. of Carrawtraw Bridge (A)	H 369 103
20	Inishmuck Lough, N.W. of Carrawtraw Bridge (B)	H 369 104
21	Lake shore at Derryna	H 368 086
22	South-eastern shore of Tully Lough	H 347 096
23	South-eastern shore of Deralk Lough	H 339 094
24	Megalithic tomb at Gartnanoul	H 334 069
25	Southern shore of Green Lough	H 314 069
26	Lake shore at Derries Lower	H 334 055
27	Eastern shore of Town Lough	H 312 080
28	North-eastern shore of Town Lough	H 312 084
29	South-western shore of Eonish Island	H 331 080
30	Southern shore of Eonish Island	H 341 078
31	Wet pasture at Corratobber	H 354 057
32	North-east of Bakers Bridge (A)	H 381 130
33	North-east of Bakers Bridge (B)	H 381 129
34	North-eastern shore of Inishmuck Lough	H 369 117
35	North-eastern shore of Ardan Lough (A)	H 354 128
36	North-eastern shore of Ardan Lough (B)	H 354 129
37	North-eastern shore of Derrybrick Lough	H 347 123
38	North-western shore of Inishmuck	H 360 115
39	Northern shore of Inishconnell peninsula	H 357 077

40	South-western shore of Gartinardress Lough (A)	H 338 028
41	South-western shore of Gartinardress Lough (B)	H 337 028
42	North-eastern shore of Gartinardress Lough	H 341 028
43	North-western shore of Tawlaght Lough	H 336 041
44	Southern shore of Killyvally peninsula	H 358 038
45	Western shore of Killyvally peninsula (A)	H 355 043
46	Western shore of Killyvally peninsula (B)	H 355 042
47	Western shore of Killyvally peninsula (C)	H 356 041
48	North-western shore of Killyvally peninsula (A)	H 357 047
49	North-western shore of Killyvally peninsula (B)	H 356 046
50	North-western shore of Killyvally peninsula (C)	H 355 045
51	Lake at Drumlark	H 413 072
52	Western section of Dawsons Lough (A)	H 366 162
53	Western section of Dawsons Lough (B)	H 367 162
54	Western section of Dawsons Lough (C)	H 367 162
55	North of old railway bridge, south of Belturbet	H 359 166
56	River Erne north of bridge at Belturbet	H 352 172

Appendix 2 – List of vascular plants, mosses and liverworts from the Lough Oughter Complex

Vascular Plants

Acer pseudoplatanus - Sycamore
Achillea ptarmica - Sneezewort
Adjuga reptans - Bugle
Agrimonia procera – Fragrant Agrimony
Agrostis capillaris – Common Bent
Agrostis stolonifera – Creeping Bent
Alchemilla spp. – Lady's Mantle
Alisma plantago-aquatica – Water Plantain
Allium ursinum – Wild Garlic
Alnus glutinosa - Alder
Alopecurus pratensis – Meadow Foxtail
Anemone nemorosa – Wood Anemone
Angelica sylvestris – Wild Angelica
Anthoxanthum odoratum – Sweet Vernal Grass
Apium nodiflorum – Fool's Water-cress
Arrhenatherum elatius – False Oat-grass
Arum maculatum – Cuckoo Pint
Athyrium filix-femina – Lady Fern
Bellis perennis - Daisy
Berula erecta – Lesser Water Parsnip
Betula pubescens – Downy Birch
Bidens cernua – Nodding Bur-Marigold
Brachypodium sylvaticum – False Brome
Briza media – Quaking Grass
Callitriche stagnalis agg. - Starwort
Caltha palustris – Marsh Marigold
Calystegia sepium - Bindweed
Cardamine flexuosa – Wavy Bitter-cress
Cardamine pratensis – Cuckoo Flower
Carex diandra – Lesser Tussock Sedge
Carex disticha – Brown Sedge
Carex elata – Tufted Sedge
Carex flacca – Glaucous Sedge
Carex hirta – Hairy Sedge
Carex hostiana – Tawny Sedge
Carex lepidocarpa – Long-stalked Yellow Sedge
Carex nigra – Common Sedge
Carex ovalis – Oval Sedge
Carex panicea – Carnation Sedge
Carex remota – Remote Sedge
Carex rostrata – Bottle Sedge
Carex sylvatica – Wood Sedge
Carex vesicaria – Bladder Sedge
Centaurea nigra - Knapweed
Cerastium fontanum - Common Mouse Ear
Chamaenerion angustifolium – Rosebay Willowherb
Chrysosplenium oppositifolium – Opposite Leaved Golden Saxifrage
Cicuta virosa - Cowbane
Circaea lutetiana – Enchanters Nightshade
Cirsium arvense – Creeping Thistle
Cirsium palustre – Marsh Thistle
Cirsium vulgare – Spear Thistle
Cladium mariscus – Saw Sedge

Conopodium majus - Pignut
Corylus avellana - Hazel
Crataegus monogyna - Hawthorn
Crepis paludosa – Marsh Hawk's Beard
Cynosurus cristatus – Crested Dogs Tail
Dactylis glomerata - Cocksfoot
Dactylorhiza fuchsii – Common Spotted Orchid
Dactylorhiza maculata – Heath Spotted Orchid
Danthonia decumbens – Heath Grass
Deschampsia caespitosa – Tufted Hair-grass
Digitalis purpurea – Foxglove
Dryopteris aemula – Hay-scented Buckler Fern
Dryopteris affinis – Scaly Male Fern
Dryopteris dilatata – Broad Buckler Fern
Dryopteris filix-mas – Male Fern
Eleocharis acicularis – Needle Spike-rush
Eleocharis palustris – Common Spike-rush
Elodea canadensis – Canadian Pondweed
Epilobium hirsutum –Great Willowherb
Epilobium montanum - Broad-leaved Willowherb
Epilobium palustre – Marsh Willowherb
Epilobium parviflorum – Hoary Willowherb
Epipactis palustris – Marsh Helleborine
Equisetum fluviatile – Water Horsetail
Equisetum palustre – Marsh Horsetail
Equisetum variegatum – Variegated Horsetail
Euonymus europaeus – Spindle tree
Eupatorium cannabinum – Hemp-agrimony
Euphrasia spp. – Eyebright
Fagus sylvatica – Beech
Festuca arundinacea – Tall Fescue
Festuca ovina – Sheep's Fescue
Festuca pratensis – Meadow Fescue
Festuca rubra – Red Fescue
Filipendula ulmaria – Meadowsweet
Fraxinus excelsior – Ash
Galium aparine – Cleavers
Galium odoratum – Woodruff
Galium palustre – Marsh Bedstraw
Geranium robertianum – Herb Robert
Geum urbanum – Wood Avens
Glechoma hederaceae – Ground Ivy
Glyceria fluitans – Floating Sweet Grass
Glyceria maxima – Reed Sweet Grass
Hedera helix – Ivy
Heracleum sphondylium – Hogweed
Hippurus vulgaris – Mare's Tail
Holcus lanatus – Yorkshire Fog
Hyacinthoides non-scripta – Bluebell
Hydrocotyle vulgaris – Marsh Pennywort
Hypericum androsaemum – Tutsan
Hypericum tetrapetrum – Square-stemmed St. John's Wort
Hypochoeris radicata – Cats Paw
Ilex aquifolium – Holly
Iris pseudacorus – Yellow Flag
Juncus acutiflorus – Blunt-flowered Rush
Juncus articulatus – Jointed Rush
Juncus bufonius – Toad Rush

Juncus conglomeratus – Compact Rush
Juncus effusus – Soft Rush
Juncus inflexus – Hard Rush
Lathyrus pratensis – Meadow Vetchling
Lemna minor – Common Duckweed
Lemna trisulca – Ivy-leaved Duckweed
Leontodon autumnalis – Autumn Hawkbit
Listera ovata – Common Twayblade
Littorella uniflora – Shoreweed
Lolium perenne – Perennial Rye-grass
Lonicera periclymenum – Honeysuckle
Lotus corniculatus – Birds Foot trefoil
Lotus uliginosus – Marsh Bird's Foot Trefoil
Lychnis flos-cuculi – Ragged Robin
Lycopus europaeus - Gypsywort
Lysmachia nemorum – Yellow Pimpernel
Lysmachia nummularium – Creeping Jenny
Lysmachia vulgaris – Yellow Loosestrife
Lythrum salicaria – Purple Loosestrife
Melica uniflora – Wood Melick
Mentha aquatica – Water Mint
Menyanthes trifoliata – Bog Bean
Molinia caerulea – Purple Moor Grass
Myosotis laxa – Tufted Forget-me-not
Myosotis scorpioides – Water Forget-me-not
Nuphar lutea – Yellow Water-lily
Odontites vernus – Red Bartsia
Oenanthe aquatica – Fine-leaved Water Dropwort
Oxalis acetosella – Wood Sorrel
Persicaria amphibium – Amphibious Bistort
Phalaris arundinacea – Reed Canary Grass
Phragmites australis – Common Reed
Phyllitis scolopendrium – Hart's Tongue Fern
Picea sitchensis – Sitka Spruce
Plantago lanceolata – Ribwort Plantain
Plantago major – Greater Plantain
Poa pratensis – Common Meadow Grass
Poa trivialis – Rough Meadow Grass
Polypodium vulgare – Common Polypod
Polystichum setiferum – Soft-Shield Fern
Potamogeton lucens – Shining Pondweed
Potamogeton natans – Broad-leaved Pondweed
Potentilla anserina – Silverweed
Potentilla erecta – Tormentil
Potentilla palustris – Marsh Cinquefoil
Potentilla sterilis – Barren Strawberry
Primula vulgaris – Primrose
Prunella vulgaris – Self Heal
Prunus padus – Bird Cherry
Prunus spinosa – Blackthorn
Pulicaria dysenterica – Common Fleabane
Quercus petraea – Irish Oak
Ranunculus acris – Meadow Buttercup
Ranunculus ficaria – Lesser Celandine
Ranunculus flammula – Lesser Spearwort
Ranunculus repens – Creeping Buttercup
Rhamnus cathartica – Purging Buckthorn
Rhinanthus minor – Yellow Rattle

Rorrippa amphibium – Great Yellow-cress
Rorrippa nasturtium-aquatica – Water Cress
Rosa canina – Dog Rose
Rubus fruticosus – Bramble
Rumex acetosa – Sorrel
Rumex crispus – Curled Dock
Rumex hydrolapathum – Water Dock
Rumex obtusifolius – Broad-leaved Dock
Rumex sanguineus – Wood Dock
Sagina procumbens – Procumbent Pearlwort
Salix cinerea – Grey Willow
Samolus valerandii – Brooklime
Sanicula europaea – Wood Sanicle
Schoenoplectus lacustris – Reedmace
Schoenus nigricans – Black Bog Rush
Senecio aquaticus – Marsh Ragwort
Senecio jacobea – Ragwort
Solanum dulcamara – Bittersweet
Sparganium emersum – Branched Bur-reed
Sparganium erectum – Unbranched Bur-reed
Stachys palustris – Marsh Woundwort
Stachys sylvatica – Hedge Woundwort
Stellaria media – Common Chickweed
Stellaria uliginosa – Marsh Stitchwort
Succisa pratensis – Devil's-bit Scabious
Taraxacum officinale – Dandelion
Trifolium pratense – Red Clover
Trifolium repens – White Clover
Tussilago farfara – Colt's Foot
Typha latifolia – Bulrush
Urtica dioica – Common Nettle
Utricularia vulgaris – Greater Bladderwort
Valeriana officinalis – Common Valerian
Veronica beccabunga – Brooklime
Veronica chamaedrys – Germander Speedwell
Veronica montana – Wood Speedwell
Viburnum opulus – Wayfaring Tree
Vicia cracca – Tufted Vetch
Vicia sepium – Bush Vetch
Viola hirta – Hairy Violet
Viola riviniana – Common Dog Violet

Mosses and Liverworts

Brachythecium rutabulum
Calliergon cuspidatum
Calliergon giganteum
Campylium stellatum
Cinclidotus fontanaloides
Climacium dendroides
Ctenidium molluscum
Drepanocladus revolvens
Eurhynchium praelongum
Eurhynchium striatum
Hypnum cupressiforme
Lophocolea bidentata
Mnium affine
Mnium hornum

Pellia epiphylla
Philonotis fontana
Plagiomnium undulatum
Polytrichum commune
Pseudoscleropodium purum
Rhytidiadelphus loreus
Rhytidiadelphus triquetrus
Thamnobryum alopecurum
Thuidium tamariscinum

Appendix 3 - Species with one occurrence, not listed in Table 16

Quadrat code	7B	2C	4A	8A	1B	52C	6B	53B	39D	41A	4C	30A	29A	16A	9C	29B	21X	51C	25X	50A	50B	1A	1C	14A	51B	51A	2E	39C	49A	2A	2B	42A	39B	39A	6G	7A	6A	23A	20A	19B
Agrostis capillaris																				1											+									
Athyrium filix-femina									+																														
Cardamine flexuosa																																							
Carex diandra								+																														2	
Carex elata			2																																				
Carex flacca														2																									
Carex hirta															2																								
Carex nigra																																							
Carex rostrata						1											1																						
Carex spp.										+																													
Cicuta virosa																	2																						
Cinclidotus font																			+																		1	
Cirsium vulgare																																					+		
Dactylis glomerata																																	+						
Dactylorhiza maculata																															+								
Dryopteris aemula																															+								
Dryopteris affinis																																							
Epilobium angustifolium														1																									
Epilobium parviflorum																					2																		
Equisetum variegatum														2																								2	
Eupatorium cannabinum																				1																			
Festuca spp.																																				1			
Galium odoratum																																					1		
Hyacinthoides non-scripta																	1																						
Hydrocotyle vulgaris																																							
Hypnum cupressiforme														1																									
Juncus inflexus												1																											
Leontodon autumnalis													2																										
Liverwort spp.																	1																						
Lotus uliginosus														+																									
Lysmachia nemorum																													+										
Marchantia spp.				1																															+				
Melica uniflora																																							
Mnium hornum									+																														
Myosotis spp.									+																														
Persicaria amphibium																						1																	
Picea sitchensis																											2												
Poa pratensis																										+													+	
Polypodium vulgare																																						1	
Potentilla anserina																																							
Potentilla erecta																		2																				1	
Prunus padus																																+							
Pseudoscleropodium purum																																							2
Quercus petraea																																							
Rumex crispus																																							
Rumex hydrolapathum					+																											2							
Solanum dulcamara						+																																	
Stachys sylvatica																			+																				
Tussilago farfara																				1																				
Veronica beccabunga																																							
Viola hirta																																							