A Report on the Wetland Vegetation of the Mulkear River catchment, Cos. Limerick and Tipperary.

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Acknowledgements

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CONTENTS

REFERENCES

1. SUMMARY

Wetland vegetation in the Mulkear river catchment, counties Limerick and Tipperary, was surveyed during summer 1991. Nine broadly defined vegetation types are recognized as occurring on damaged land. The distribution and extent of these types is mapped on a series of 6 inch maps. Rare or threatened species and sites of scientific interest are identified and discussed within the report. The vegetation of drainage channels and their banks are also considered.

2. INTRODUCTION

2.1. OBJECTIVES

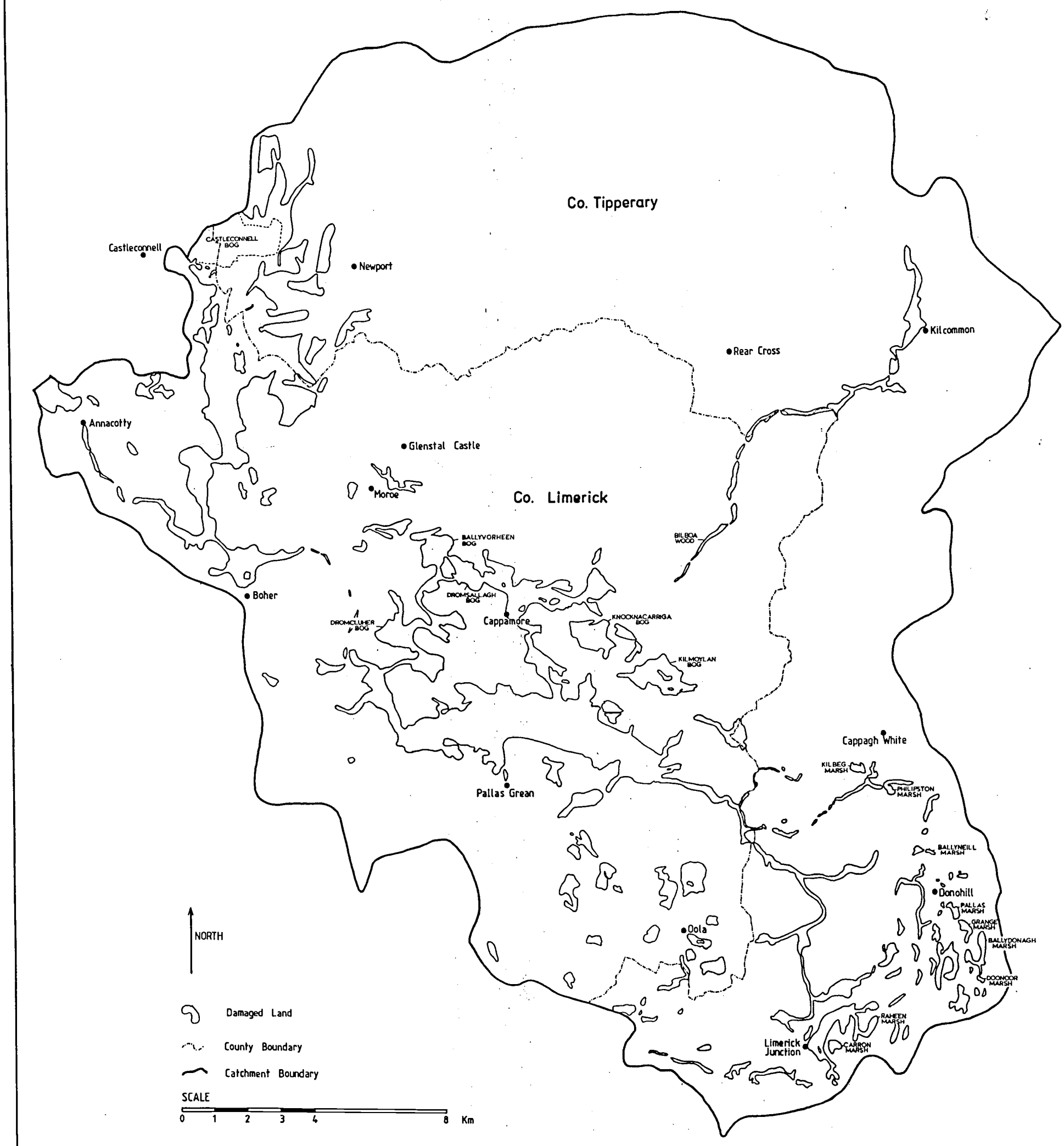
This study was commissioned by the National Parks and Wildlife Service as part of an environmental impact assessment of the affects of arterial drainage on the Mulkear river catchment. The primary aim was to describe and map the distribution of wetland vegetation. Lands surveyed by the Drainage Section of the Office of Public Works and termed "damaged land" were regarded as synonymous with wetlands and survey attention was focussed on them (Fig. 1).

In addition to mapping wetland vegetation it was also hoped to record, where possible, the occurrence of rare or threatened species, well formed stands of vegetation and sites of particular scientific (botanical) interest. Limitations of time meant that this could not be carried out on a systematic basis but rather as an addendum to the mapping survey.

2.2. SITE DESCRIPTION

The Mulkear river catchment covers an area of about 655 km^2, straddling the border of counties Limerick and Tipperary. The catchment is comprised of two major river systems, the Mulkear itself, which flows from south-east to north-west entering the Shannon just above Limerick city, and the Newport river, which flows north to south and joins the Mulkear about 7 km upstream of its confluence with the Shannon.

FIG. 1 MAP OF MULKEAR CATCHMENT SHOWING LOCATION OF DAMAGED LAND

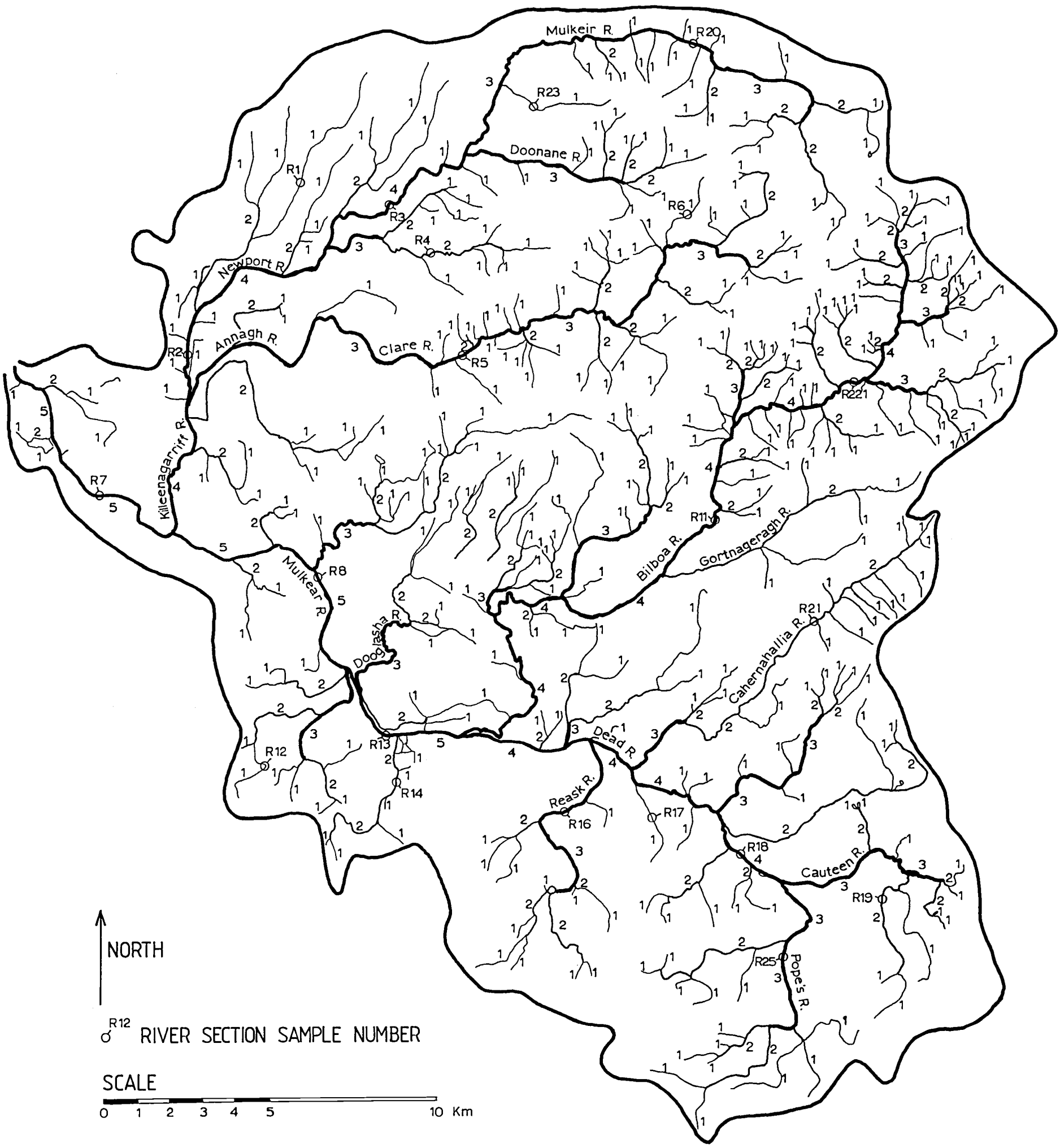


The Mulkear river has several important tributaries draining from the Slievefelim Mountains and the uplands north-west of Tipperary town, notably the Bilboa, the Reask and Cahernahallia rivers. In its upper reaches, stretches of the Mulkear are known as the Dead river, the Pope's river and the Cauteen, amongst others. The Newport river also has several important tributaries, draining from the Silvermine Mountains, Keeper Hill, Mauherslieve and north of the Slievefelim Mountains, notably the Annagh and Clare rivers, the Doonane river and the Mulkeir river. In its lower reaches, just before entering the main Mulkear river, the Newport river is also known as the Killeenagarriff river. A map, showing the main river channels and the stream orders, is given in Fig. 2.

The mountains and uplands, which occupy much of the northern half of the catchment, are composed of severely eroded Silurian Shales and Slates and Devonian Old Red Sandstone. The lowlands, which include most of the areas of damaged land, are underlain by Carboniferous Limestone. Bands of Carboniferous Shale are found where the mountains adjoin the lowland plain. Volcanic rocks, mainly basalt, form the ridge of low hills around Caherconlish which mark the south-western boundary of the catchment. The entire catchment area is thought to have been covered by ice sheets during both the Munsterian and Midlandian Cold Stages (Mitchell, 1986). Deposits left from the latter, mostly in the form of boulder-clay derived from limestone, cover much of the lowland area drained by the Mulkear (Synge, 1966).

The soils of damaged lands are mostly classified as Alluvium or Gley. River alluvial soils (Mulkear and Darkisland series), mainly of sandstone - shale - limestone origin and influenced by base-rich groundwater,

FIG. 2 MAP OF MULKEAR CATCHMENT SHOWING MAIN RIVER CHANNELS AND STREAM ORDERS



occur on the lowland floodplains of the Mulkear, north of Pallas Grean, and the lower stretches of the Bilboa and Newport rivers (Finch and Ryan, 1966). Gley soils (Cluggin, Gortaclareen, Howardstown, Puckane, Shannon and Kilcommon series), also of sandstone-shale-limestone origin, are widely distributed elsewhere throughout the catchment. Brown Earths, Brown Podzolics and Grey-Brown Podzolics are poorly represented on damaged land. Organic soils are fairly widespread, however, and occur as basin peats in a series of raised bogs around Cappamore and Castleconnell and in some small fens around Donohill. Blanket peats are extensively developed in the mountain and upland areas in the north of the catchment.

The present vegetation of the catchment has been strongly influenced by human activity. Most of the mineral soils now support agricultural grassland used for livestock grazing. Large areas of blanket peat in the mountainous areas have been afforested with conifer plantations. Virtually all of the wetlands have been affected by drainage and much of what was probably once an extensive network of river callows vegetation has been reclaimed and reseeded for pasture. Natural and semi-natural vegetation does still exists, however, but is confined to less intensively managed areas such as river headwaters, wooded ravines and river banks, regenerating cutaway bogs and isolated swamps and fen wetlands.

3. METHODS

The primary objective of this study was to map the distribution of the major wetland vegetation types, focussing primarily on those occurring on damaged lands and expected to be affected by arterial drainage.

Unlike other catchment surveys of this kind (eg. Lockhart, 1984), where the range of vegetation variation was first sampled by relevés, classified by cluster and discriminant function analyses (Hill, 1979, Jennrich and Sampson, 1981) and the classification the used to map vegetation types in the field, time did not permit a preliminary sampling and analysis stage to be carried out. Vegetation mapping had thus to proceed without the aid of a catchment-based vegetation key. It was therefore decided to utilize vegetation mapping categories previously defined for another catchment (i.e. Dunkellin/Lavally, Co. Galway) and to amend and augment these categories where appropriate during the course of the survey.

Field work was carried out between May and August 1991. The vegetation of virtually all the areas described by OPW as damaged land was mapped on 6 inch Ordnance Survey maps. As most of the wetlands are divided into small fields, and in view of the scale of the survey, the field unit was usually used as the vegetation mapping unit. In cases of unenclosed land, such as cutaway bogs, aerial photographs were used in addition to site visits. In the early weeks of the survey, descriptive accounts and numerous relevés were made, particularly of grasslands and sedge-dominated vegetation types. These were later arranged by hand into a series of vegetation tables and used to help describe the main variations within and between vegetation categories.

Throughout the mapping survey note was made of the rarer plant species. New vice-county records were verified by the appropriate county recorders. Pressed specimens of some rare and taxonomically critical vascular plants were made and a collection lodged with the Trinity College herbarium, Dublin. A collection of new bryophyte county

records was donated to the British Bryological Society herbarium, Cardiff. Special attention was given to sites of scientific interest, which, where time allowed, were revisited and examined in some detail. Unfortunately, due to the scale of the survey, sites of scientific interest on non-damaged land were not visited.

The vegetation of river channels and banks was surveyed by examining selected 100 m stretches of channel length, chosen to represent the range of stream orders found in the catchment. The locations of sample stretches are shown in Fig. 2. A list of vascular plants and bryophytes, both in channel beds and on banks, was made at each stretch, together with notes on the morphology of the channel, i.e. gradient, substrate etc. Additional lists of channel and bank vegetation were made at point locations throughout the catchment during the main mapping survey. Data on channel and bank vegetation is presented in a series of vegetation tables.

4. RESULTS

4.1. SPECIES

A total of 426 vascular plants, bryophytes and stoneworts were recorded from the catchment. These are listed in Table 1. It should be noted that this list does not include species which may occur in upland or non-wetland areas and therefore cannot be regarded as a definitive list for the catchment.

Table 1. Species List

Mulkear River Catchment Survey

May-August, 1991

Vascular Plants

* Acer pseudoplatanus
Achillea millefolium
* Aesculus hippocastanum
Agrostis capillaris
A. gigantea
A. stolonifera
Ajuga reptans
Alchemilla filicaulis
Alisma plantago-aquatica
Alnus glutinosa
Alopecurus geniculatus
A. pratensis
Anemone nemorosa
Angelica sylvestris
Anthoxanthum odoratum
Anthriscus sylvestris
Apium nodiflorum
Arctium minus agg.
Arrhenatherum elatius
Arum maculatum
Asplenium trichomanes
Athyrium filix-femina
* Atriplex patula
Avenula pubescens
Bellis perennis
Berula erecta
Betula pubescens
Blechnum spicant
Brachypodium sylvaticum
* Brassica rapa
Briza media
Bromus hordeaceus
B. ramosus
Callitriche stagnalis
Calluna vulgaris
Caltha palustris
Calystegia sepium
Cardamine pratensis
Carex acuta
C. acutiformis
C. caryophyllea
C. curta
C. demissa
C. diandra
C. disticha
C. echinata
C. elata
C. flacca
C. hirta

C. hostiana
C. lasiocarpa
C. lepidocarpa
C. nigra
C. ovalis
C. pallescens
C. panicea
C. paniculata
C. pendula
C. pulicaris
C. remota
C. rostrata
C. sylvatica
C. vesicaria
Catabrosa aquatica
Centaurea nigra
Cerastium fontanum
Chrysosplenium oppositifolium
Circaea lutetiana
Cirsium arvense
C. dissectum
C. palustre
C. vulgare
Cladium mariscus
Conium maculatum
Conopodium majus
Convolvulus arvensis
Corylus avellana
* Cotoneaster sp.
Crataegus monogyna
Crepis paludosa
Cynosurus cristatus
Cytisus scoparius
Dactylis glomerata
Dactylorhiza fuchsii
D. incarnata
D. maculata
Deschampsia caespitosa
Digitalis purpurea
Drosera rotundifolia
Dryopteris aemula
D. affinis
D. dilatata
D. filix-mas
Eleocharis palustris
* Elodea canadensis
Elymus repens
Epilobium hirsutum
E. palustre
Epipactis palustris
Equisetum arvense
E. fluviatile
E. palustre
E. telmateia
Erica tetralix
Eriophorum angustifolium
E. latifolium
E. vaginatum

Euphrasia rostkoviana
* Fagus sylvatica
Festuca arundinacea
F. pratensis
F. rubra
Filipendula ulmaria
Fragaria vesca
Fraxinus excelsior
Galium aparine
G. odoratum
G. palustre
G. saxatile
G. uliginosum
Geranium dissectum
G. molle
G. robertianum
Geum urbanum
Glyceria fluitans
G. maxima
G. plicata
Gnaphalium uliginosum
Hedera helix
* Heracleum mantegazzianum
H. sphondylium
Holcus lanatus
* Hottonia palustris
Hyacinthoides non-scripta
Hydrocotyle vulgaris
Hypericum pulchrum
H. tetrapterum
Hypochoeris radicata
Ilex aquifolium
* Impatiens glandulifera
Iris pseudacorus
Jasione montana
Juncus acutiflorus
J. articulatus
J. bufonius
J. bulbosus
J. conglomeratus
J. effusus
J. inflexus
J. subnodulosus
Lapsana communis
Lathyrus montanus
L. pratensis
Lemna minor
L. trisulca
Leontodon autumnalis
Lepidium heterophyllum
Leucanthemum vulgare
Listera ovata
* Lolium multiflorum
L. perenne
Lonicera periclymenum
Lotus corniculatus
L. uliginosus
Luzula campestris

L. sylvatica
Lychnis flos-cuculi
Lycopus europaeus
Lysimachia nemorum
L. nummularia
Lythrum salicaria
Malus sylvestris
Mentha aquatica
Menyanthes trifoliata
Molinia caerulea
Montia fontana
Myosotis arvensis
M. laxa
M. scorpioides
M. secunda
Myrica gale
Myriophyllum verticillatum
Narthecium ossifragum
Nasturtium officinale
Nuphar lutea
Nymphaea alba
Odontites verna
Oenanthe aquatica
O. crocata
Osmunda regalis
Oxalis acetosella
Pedicularis palustris
Phalaris arundinacea
Phleum pratense
Phragmites australis
Phyllitis scolopendrium
* Picea sitchensis
Pimpinella major
Pinguicula vulgaris
* Pinus contorta
* P. sylvestris
Plantago lanceolata
P. major
Poa annua
P. pratensis
P. trivialis
Polygala serpyllifolia
Polygonum amphibium
P. hydropiper
P. persicaria
* P. polystachyum
Polypodium vulgare agg.
Polystichum setiferum
* Populus nigra x deltoides
Potamogeton crispus
P. natans
P. obtusifolius
P. pectinatus
P. perfoliatus
P. polygonifolius
Potentilla anserina
P. erecta
P. palustris

P. sterilis
Primula vulgaris
Prunella vulgaris
* Prunus cerasus
* P. laurocerasus
P. spinosa
Pteridium aquilinum
Quercus petraea
Q. robur
Ranunculus acris
R. bulbosus
R. ficaria
R. flammula
R. lingua
R. peltatus subsp. pseudofluitans
R. repens
R. sceleratus
R. trichophyllus
* Reynoutria japonica
Rhinanthus minor
* Rhododendron ponticum
Rorippa amphibia
Rosa canina
Rubus fruticosus *sensu lato*
Rumex acetosa
R. acetosella
R. conglomeratus
R. crispus
R. obtusifolius
R. sanguineus
Sagina procumbens
* Salix alba
S. cinerea subsp. oleifolia
S. aurita
S. caprea
* S. fragilis
* S. viminalis
Sambucus nigra
Sanicula europaea
Scirpus lacustris
Scrophularia nodosa
Scutellaria galericulata
Senecio aquaticus
S. jacobaea
S. vulgaris
Solanum dulcamara
Sonchus asper
S. oleraceus
Sorbus aucuparia
Sparganium emersum
S. erectum
Stachys palustris
Stellaria alsine
S. graminea
S. holostea
S. media
Succisa pratensis
* Symphoricarpos albus

* Symphytum officinale
Taraxacum officinale
Teucrium scorodonia
Trifolium dubium
T. pratense
T. repens
Triglochin palustris
Tussilago farfara
Typha latifolia
Ulex europaeus
U. gallii
Ulmus glabra
Urtica dioica
Utricularia minor
U. vulgaris
Vaccinium myrtillus
V. oxycoccus
Valeriana officinalis
Veronica beccabunga
V. catenata
V. chamaedrys
V. scutellata
Viburnum opulus
Vicia sepium
Viola riviniana

Bryophytes

Amblystegium riparium
A. serpens
A. tenax
Aneura pinguis
Atrichum undulatum
Aulacomnium palustre
Barbula cylindrica
Brachythecium plumosum
B. rivulare
B. rutabulum
Bryum capillare
B. pseudotriquetrum
Calliergon cordifolium
C. cuspidatum
C. giganteum
C. stramineum
Calypogeia muelleriana
Campylium elodes
C. stellatum
Cephalozia bicuspidata
Chiloscyphus polyanthos
Cinclidotus fontinaloides
Climacium dendroides
Conocephalum conicum
Cratoneuron commutatum var. commutatum
C. filicinum
Cryphaea heteromalla
Ctenidium molluscum

Dicranella varia
Dicranum bonjeanii
D. scoparium
Drepanocladus aduncus
D. revolvens
Encalypta streptocarpa
Eucladium verticillatum
Eurhynchium praelongum
E. schwartzii
E. striatum
Fissidens adianthoides
F. crassipes
F. cristatus
F. taxifolius
F. viridulus var. viridulus
Fontinalis antipyretica
Frullania dilatata
F. tamarisci
Homalothecium sericeum
Hookeria lucens
Hylocomium brevirostre
H. splendens
Hypnum cupressiforme
H. jutlandicum
H. mammillatum
Isopterygium elegans
Isothecium myosuroides
I. myurum
Leskea polycarpa
Lophocolea bidentata var. bidentata
Lunularia cruciata
Marchantia polymorpha
Metzgeria furcata
M. temperata
Mnium hornum
Mylia anomala
M. taylori
Neckera complanata
N. pumila
Odontoschisma sphagni
Oxystegus sinuosus
Pellia endiviifolia
P. epiphylla
Philonotis caespitosa
P. calcarea
P. fontana
Plagiochila asplenioides
P. porelloides
Plagiomnium elatum
P. rostratum
P. undulatum
Plagiothecium succulentum
Pleurozium schreberi
Pogonatum aloides
P. urnigerum
Pohlia wahlenbergii
Polytrichum alpestre
P. commune

Porella pinnata
Preissia quadrata
Pseudoscleropodium purum
Racomitrium affine
Radula complanata
Rhizomnium punctatum
Rhynchostegium riparioides
Rhytidiadelphus loreus
R. squarrosus
R. triquetrus
Riccia fluitans
Ricciocarpos natans
Scapania undulata
Schistidium alpicola var. alpicola
Sphagnum auriculatum var. auriculatum
S. auriculatum var. inundatum
S. capillifolium
S. cuspidatum
S. fimbriatum
S. magellanicum
S. palustre
S. papillosum
S. recurvum
S. squarrosum
S. subnitens
Splachnum ampullaceum
Thamnobryum alopecurum
Thuidium tamariscinum
Trichostomum brachydontium
Ulota crispa
U. phyllantha

Charophytes

Chara globularis var. virgata
C. hispida var. rudis
C. vulgaris

NOTE:

In the text, "*" denotes species which were introduced into Ireland, including those which were possibly or probably introduced (*sensu* Scannell & Synnott).

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4.2. RARE OR THREATENED SPECIES

Vascular plant species that are thought to have either a restricted distribution in Ireland, or are under threat from drainage, are listed in Table 2. These are rated as to their rarity at a national, regional or local level on the basis of their known distribution as published in the Atlas of the British Flora (Perring and Walters, 1976). Rare liverworts are also considered in Table 2 and are rated similarly, according to the recently published Atlas of the Bryophytes of Britain and Ireland, Volume 1, Liverworts (Hill et al., 1991). Distribution dot maps have not yet been published for most Irish mosses but some species are singled out for discussion because of their known rarity as published in the Moss Flora of Britain and Ireland (Smith, 1980) and the Distribution of Bryophytes in the British Isles (Corley and Hill, 1981). In the following section, note numbers refer to descriptive accounts of vegetation recorded in field notebooks submitted with this report.

4.2.1. Hottonia palustris (Water violet) Rating: National

An aquatic perennial of ponds, ditches and marshes found only at Glasdrum Lough near Cappagh White (Note 97). It has been recorded from counties Meath and Tipperary, in the Republic of Ireland, and from Down and Fermanagh in Northern Ireland, when it is considered to be native. Curtis and McGough (1988) include it in their Red List of Plants and it is a scheduled species in Northern Ireland. It is widely distributed in England and Wales and found throughout Europe.

Table 2. Rating of Selected Rare or Threatened Species

Species	No. of 10 km grid squares*					Rating
	Limerick	S.Tipp.	N.Tipp.	Munster	Ireland	
Hottonia palustris	0	0	0	0	0	National
Ricciocarpos natans	0	0	0	0	2	National
Carex acuta	0	0	0	0	8	Regional
Riccia fluitans	0	0	0	0	8	Regional
Vaccinium oxycoccus	0	0	0	1	44	Regional
Ranunculus lingua	0	0	0	1	44	Regional
Eriophorum latifolium	0	0	0	2	27	Regional
Carex curta	0	0	0	3	41	Regional
Crepis paludosa	1	0	0	3	98	Regional
Carex lasiocarpa	0	0	0	5	31	Local
Carex vesicaria	0	0	1	6	35	Local
Carex elata	1	1	0	6	37	Local
Carex pallescens	1	0	1	20	84	Local
Carex diandra	1	1	1	6	67	Local
Glyceria maxima	2	1	1	9	57	Local
Ranunculus trichophyllus	0	3	0	7	50	Local
Scutellaria galericulata	3	0	0	11	77	Local
Galium uliginosum	0	2	2	12	43	Local
Epipactis palustris	3	0	3	17	42	Local
Carex acutiformis	2	1	2	12	88	Local
Juncus subnodulosus	4	1	4	16	68	Local
Carex lepidocarpa	5	0	7	26	113	Local

* Only records since 1930 included for vascular plants, and since 1950 for bryophytes.

4.2.2. Ricciocarpos natans Rating: National

An aquatic liverwort found floating in a pond at Ballydonagh Marsh (Note 91). Only two recent records in Ireland, one from Clare and one from Meath, although formerly known from Limerick, Galway, Kildare, Dublin, Westmeath, Roscommon and Louth. A mainly eastern distribution in England and widespread in Europe.

4.2.3. Carex acuta Rating: Regional

A very large sedge of rivers, lake-margins and marshes, recorded at four localities in the catchment, i.e. Grange Marsh (Note 92), Pallas Marsh (Note 94), near Oola (Note 114) and Carron Marsh, near Limerick Junction (Note A46). Formerly fairly widely recorded in the Shannon basin and around Lough Neagh, only 8 recent records from Ireland. Widely distributed in England and Wales, although scarce in Scotland.

4.2.4. Riccia fluitans Rating: Regional

An aquatic liverwort found at 3 sites in the catchment, i.e. Doonoor Marsh (Note 93), Pallas Marsh (Note 94) and Glasdrum Lough near Cappagh White (Note 97). A species of restricted distribution in Ireland, recently reported from only 8 10 km squares (Hill et al., 1991), these are the first confirmed records from Munster. It has a mainly southern and eastern distribution in Britain and is widespread in Europe.

4.2.5. Vaccinium oxycoccus (Cranberry) Rating: Regional

Recorded from 2 sites on abandoned cutaway bog north of Cappamore, i.e. Ballyvorheen Bog (Note 26) & Dromsallagh Bog, (Note 32), the Cranberry is fairly widely distributed in central, eastern and northern parts of Ireland, though scarce in the south and west. It is common in suitable peatland habitat in Wales, southern Scotland and northern England.

4.2.6. Ranunculus lingua (Greater Spearwort) Rating: Regional

The Greater Spearwort was recorded from 2 sites in the east of the catchment, i.e. Ballydonagh Marsh (Note 91) and Pallas Marsh (Note 94). The species is frequent in marshes, canals and reedbeds in central parts of Ireland but is rare in Munster. It has a scattered distribution in Wales, England and southern Scotland.

4.2.7. Eriophorum latifolium (Cotton-grass) Rating: Regional

A species of bogs and fens, the Broad-leaved Cotton-grass is confined to 2 sites in the east of the catchment, i.e. Philipston Marsh (Note 99) and Kilbeg Marsh (Note 101). It is widespread but rare in Ireland and has a mainly northern distribution in Britain. It occurs throughout Europe but is local in southern regions.

4.2.8 Carex curta (Pale Sedge) Rating: Regional

A slender sedge of fens and bogs found at several sites of wet cutaways around Cappamore, i.e. Ballyvorheen Bog (Note 26),

Dromsallagh Bog (Note 33), Knocknacarriga Bog (Note 21), and wet, sedge-dominated areas of reclaimed bog near Newport (Notes 81 and 83) and Kilcommon (Note A41). This species is locally frequent in the north and east of Ireland but is relatively rare in the south and west . It is widespread in northern Britain and occurs across much of northern Europe.

4.2.9. Crepis paludosa Rating: Regional

A composite of meadows and rocky banks by streams, found at 2 localities, i.e. Mulkear river near Boher (Note R8) and Newport river above Newport (Note R2), but probably more widespread in the catchment. Frequent in the north-west of Ireland but local elsewhere. It has a mainly northern distribution in Britain.

4.2.10. Carex lasiocarpa (Downy-fruited Sedge) Rating: Local

A tall, slender-leaved sedge of bogs and marshes, found only at Ballydonagh Marsh (Note 91). It is occasional in the west of Ireland and has a mainly northern and western distribution in Britain.

4.2.11 Carex vesicaria Rating: Local

A large sedge of marshes, riversides and lake-shores found at one locality on the banks of the Dead river north-east of Pallas Grean (Note 11). It is widely distributed throuthout Ireland and Britain.

4.2.12. Carex elata Rating: Local

A large, tussock-forming sedge of marshes and lake-margins, found only at Ballydonagh Marsh (Note 91). Locally frequent in central Ireland but rather rare in the south-west. It has a mainly eastern distribution in Britain.

4.2.13 Carex pallescens Rating: Local

A slender, tufted sedge of damp heaths and pastures, found at one site west of Bunkey Bridge on the Newport river (Note A23). It is occasional in the north and west of Ireland and is widely distributed throughout Britain.

4.2.14. Carex diandra Rating: Local

A slender sedge of marshes, lowland bogs and lake-margins found at 4 sites in the catchment, i.e. Ballydonagh Marsh (Note 91), Philipston Marsh (Note 99) Kilbeg Marsh (Note 101) and Ballyneill Marsh (Notes 105-109). It is locally frequent in central Ireland but rare in the south and west. It has a scattered distribution in Britain.

4.2.15. Glyceria maxima Rating: Local

A large, reed-like grass of canals, ditches and riversides, found at Glasdrum Lough near Cappagh White (Note 97). Locally abundant in central and eastern Ireland, it is rare in Munster. Widespread in southern parts of Britain.

4.2.16. Ranunculus trichophyllus Rating: Local

An aquatic species of buttercup found in stagnant water in a cut-off meander of the Dead river, north-east of Pallas Grean (Note 8). Frequent in central and south-eastern Ireland, it is occasional elsewhere. Fairly common in southern Britain.

4.2.17. Scutellaria galericulata (Skull-cap) Rating: Local

A perennial herb of lake-shores, thickets or stoney places, found at 2 sites in the catchment, i.e. Ballydonagh Marsh (Note 91) and in wet fields near Kilcommon (Note A40). Widely distributed and occasional in Ireland. Frequent in many parts of Britain.

4.2.18. Galium uliginosum (Fen Bedstraw) Rating: Local

A slender, delicate herb of calcareous fens, found at 2 sites in the catchment, i.e. Philipston Marsh (Note 99) and in wet, sedge-dominated fields near Boher (Note 42). Found mainly in central Ireland though rather rare and probably decreasing due to loss of fen habitat. Fairly widespread in Britain.

4.2.19. Epipactis palustris (Marsh Helleborine) Rating: Local

An attractive orchid of fens, lake-shores and damp pastures, found at 2 sites in the catchment, i.e. Philipston Marsh (Note 99) and Kilbeg Marsh (Note 101). Locally frequent in central Ireland, rare in southern and northern parts. The Marsh Helleborine is a scheduled species in Northern Ireland, where its habitats are threatened by drainage and

reclamation (Curtis and Mc Gough, 1988). It is locally frequent in England and Wales and is found throughout Europe, except in the Mediterranean and the extreme north.

4.2.20. Carex acutiformis Rating: Local

A large sedge of marshes, ditches and river-banks, found at 3 localities in the catchment, i.e. on the Mulkear river near Boher (Note 40), in fields near the Kileenagarriff river (Notes A1, A2) and by the Dooglasha river (Note A6), but probably more widespread. This species is frequent in the east of Ireland but rare in the west. It is widely distributed in England and Wales.

4.2.21 Juncus subnodulosus (Blunt-flowered Rush) Rating: Local

A rush species of fens and marshes, found at 2 localities in the catchment, i.e. Raheen Marsh (Note 2c) and Ballydonagh Marsh (Note 91). It is fairly frequent in central and western Ireland, though probably decreasing due to drainage, and is rare in the south. It has an easterly distribution in Britain and is virtually absent from Scotland.

4.2.22. Carex lepidocarpa Rating: Local

A sedge of fens and marshes, found at 3 localities in the catchment, i.e. Philipston Marsh (Note 99), Kilbeg Marsh (Note 101) and Ballyneill Marsh (Notes 106 & 109). It is frequent in the west and center of the country, but rare elsewhere. It is widespread in Britain.

4.3. VEGETATION TYPES ON DAMAGED LAND

A total of 144 descriptive accounts, including 106 relevés of vegetation on damaged land, were recorded in field notebooks submitted with this report. These formed the basis for the recognition of 9 principal vegetation types. The distribution of these types, together with the location of field notes, are shown on a series of 6 inch Ordnance Survey maps, also submitted with this report. Abbreviations for names of vegetation types used on these maps, as well as those for a number of sub-units, are listed in brackets below:

- Marsh and Scraw (M, S)
- Bog and Cutaway Bog (B, CB)
- Wetsedge (WS)
    - Improved Wetsedge (IWS)
- Drysedge (DS)
- Wetgrass (WG)
    - Tall Wetgrass (TWG)
- Improved Wetgrass (IWG)
- Drygrass (DG)
- Woodland and Scrub
- Conifer Plantations

Each of these types is described in the following chapter under the headings

Cowardin Classification
Dominant Species
Associated Species

Floristic composition
Substrate
Phytosociological Affinities
Distribution

The Cowardin Classification (Cowardin et al., 1976) is an attempt to define habitat types in order to facilitate comparison with others, both within and outside the catchment under study. Phytosociological Affinities draws on phytosociological accounts of Irish vegetation in White and Doyle (1982), O'Sullivan (1965, 1982) and O'Críoidáin (1988). It should be noted that as the vegetation types under discussion are broadly defined mapping units, each may contain several recognized plant associations.

4.3.1. Marsh and Scraw

Total area: 39.1 ha

Note Nos: 2c, 71, 91, 92, 93, 94, 95, 96, 98, 99, 101, 103, 104, 105, 106, 107, 108, 109, 113, 116, A24, A29a, A46 (n = 23).

Cowardin Classification

Ecosystem:	palustrine, vegetated
Class:	emergent wetland
Order:	mineral/organic
Habitat:	semi-permanently flooded, fresh, alkaline/acid.

Dominant Species

Typha latifolia, Equisetum fluviatile, Phragmites australis, Carex diandra, Carex acuta, Phalaris arundinacea, Filipendula ulmaria.

Associated Species

Menyanthes trifoliata, Carex rostrata, Carex disticha, Valeriana officinalis, Agrostis stolonifera, Galium palustre, Arrhenatherum elatius, Calliergon cuspidatum, C. cordifolium.

Floristic Composition

Marsh vegetation includes a diverse assemblage of swamp and fen communities, ranging from tall (2m) stands of reeds or bulrushes, dominated by Phragmites australis, Phalaris arundinacea, Equisetum

fluviatile or Typha latifolia, monodominant stands of clonal sedges, such as Carex acuta, C. disticha or C. diandra, to mixed swards dominated by Filipendula ulmaria and Valeriana officinalis. Most of the marshes examined suggest a poor base status, with bryophytes, where present in the ground layer, such as Calliergon cuspidatum, C. cordifolium, C. giganteum, Pseudoscleropodium purum, Rhytidiadelphus squarrosus, and in some cases Sphagnum palustre. Calcareous fens, dominated by Carex diandra. may have bryophytes such as Campylium stellatum, Drepanocladus revolvens, Philonotis calcarea and Cratoneuron commutatum, with charophytes, such as Clara globuaris var virgata, C. hispida var runderis and C. vulgaris, in the wetter areas. Marsh vegetation, though relatively small in total area (39.1 ha), contains a high proportion of the rare or threatened species found in the catchment and the following rated species are more or less confined to such habitats: - Carex acuta, C. lasiocarpa, C. elata, C. diandra, C. lepidocarpa, Ranunculus lingua, Eriophorum latifolium, Galium uliginosum, Epipactis palustris, Juncus subnodulosus, Ricciocarpos natans and Riccia fluitans.

Substrate

Peat, peaty gley.

Phytosociological Affinities

The wettest, swamp-like stands of marsh vegetation belong to the Phragmition alliance, i.e. Typhetum latifoliae, Scirpo-Phragmitetum. The large, sedge-dominated stands are ascribable to the Magnocaricion alliance, i.e. Carex acuta community, Phalaridetum

arundinaceae. The Carex diandra-dominated fens are probably ascribable to the Calliergo-Caricetum diandrae association of the Caricion davallianae alliance, described by O'Críodáin (1988) from Ireland. The Filipendula ulmaria-dominated communities represent drained marshes in the catchment and are probably referable to the Filipendulion alliance of the Molinietalia. Elements of both the Valeriano-Filipenduletum and Filipendulo-Iridetum pseudacori associations appear to be present.

Distribution

Marsh vegetation is largely confined to sites at the extreme eastern and south-eastern limits of the catchment. The most important sites, named after the townlands in which they are found, are Ballydonagh, Philipston, Kilbeg, Pallas, Ballyneill, Grange and Doonoor. Marsh and Scraw vegetation is also found in association with cutaway peat at sites in the center of the catchment, particularly around Cappamore.

4.3.2. Bog and Cutaway

Total area: 482.2 ha

Note Nos: 13, 21, 26, 31, 32, 33, A14, A36, A37 (n = 9).

Cowardin Classification

Ecosystem:	palustrine, vegetated
Class:	moss/lichen/emergent/shrub wetland
Order:	organic
Habitat:	saturated, fresh, acid.

Dominant species

Calluna vulgaris, Erica tetralix, Molinia caerulea, Eriophorum angustifolium, E. vaginatum, Betula pubescens, Sphagnum capillifolium, S. papillosum, S. cuspidatum.

Associated species

Potentilla erecta, Narthecium ossifragum, Drosera rotundifolia, Vaccinium myrtillus, V. oxycoccus, Carex curta, Sphagnum magellanicum, Aulacomnium palustre, Polytrichum commune, Odontoschisma sphagni, Cladonia portentosa.

Floristic composition

Bog and Cutaway communities represent a heterogeneous grouping of vegetation types developed on acidic peat. Isolated patches of intact

bog exhibit the hummock/hollow topography of typical raised or intermediate bogs, with well developed dwarf shrub/heather layers and Sphagnum/Cladonia spps. carpets. Most bog in the catchment has been drained and cut away, however, leaving a disturbed topography and dried peat surfaces. Artificially created pools contain tall emergent communities, often with Typha latifolia, or have developed into a secondary scraw vegetation dominated by Equisetum fluviatile and sedges. The regionally rare Carex curta occurs in such situations. The drier cutaway peat surfaces are dominated by Molinia caerulea and are liable to invasion by scrub woodland species such as Betula pubescens, Salix cinerea subsp. oleifolia, S. aurita, Ulex europaeus and naturalized saplings of Pinus contorta.

Substrate

Peat

Phytosociological Affinities

Such limited intact bog that remains contains elements of the Erico-Sphagnetum magellanici association of the Calluno-Sphagnion papillosi alliance, i.e. Sphagnum-dominated vegetation of midland raised bogs. This association occurs in the Atlantic sector of Europe and is now rare. The cutaway pools contain aquatic and emergent vegetation with diverse affinities ranging from the Charetea fragilis to the Phragmitetea. Overgrown pools contain communities ascribable to the Caricion curto-nigrae alliance of the Parvocaricetea. The drier peat surfaces support vegetation transitional between the Oxycocco-Sphagnetea (bog and

wet heath class), Molinio-Arrhenatheretea (lowland grassland class) and the Franguletea (shrub-willow class).

Distribution

The largest area of bog, which has been extensively cutaway and partly afforested with conifers, is Castleconnell Bog in the north-west of the catchment. Other areas of bog and cutaway are found around Cappamore, i.e. Dromcluher Bog, Ballyvorheen Bog, Dromsallagh Bog, Knocknacarriga Bog and Kilmoylan Bog. Extensive areas of upland and mountain blanket bog occur around Keeper Hill and the Slievefelim Mountains to the north of the catchment but are not included in the proposed drainage scheme. Much of this area has been afforested.

4.3.3. Wetsedge (Table 3)

Total area: 99.5 ha

Note Nos: 15, 20, 30, 39, 42, 73, 74, 77, 78, 81, 83, 90, 90a, 114, 117, 118, A1, A2, A3, A22, A23, A28, A40 (n = 23).

Cowardin Classification

Ecosystem:	palustrine, vegetated
Class:	emergent wetland
Order:	organic/mineral
Habitat:	saturated, (temporarily/seasonally flooded), fresh, acid-alkaline.

Dominant species

Carex nigra, C. disticha, Juncus acutiflorus, Agrostis stolonifera, Calliergon cuspidatum.

Associated species

Holcus lanatus, Galium palustre, Lychnis flos-cuculi, Anthoxanthum odoratum, Filipendula ulmaria, Juncus effusus, Cardamine pratensis, Mentha aquatica, Carex panicea, C. rostrata, Ranunculus acris.

Floristic composition

A vegetation type dominated by sedges and grasses, floristically intermediate between Marsh and Drysedge. The sedges Carex nigra

Table 3. Vegetation table (unsorted) of Wetsedge relevés. Species with less than 5 occurrences are omitted.

Relevé No.	15	20	30	39	42	73	74	77	78	81	83	90	90a	114	117	118	A1	A2	A22	A23	A28	A40
Carex nigra	3	2	2	1	2	3	2	2	2	2	1	3	1	1	2	3	1	1	2		2	2
Carex disticha	3	3		2	1	3	2	2		2		2	1	3	1	3	1	2	1	2	3	1
Agrostis stolonifera	2	2	3	2	1	1	2	2		1	1	2	3	3	2	1	4	4			2	1
Holcus lanatus	1	1		1	+			1	1	1	1	2	1		3	2		2	1	1	+	1
Juncus acutiflorus	3	3		3	3		2	3	2	2	1	2	3	3	3	2					3	3
Galium palustre	1	+	+	+	+	1	2	+		1		+		2	1	1	1				2	+
Lychnis flos-cuculi	2	1	+	+	1			1		1		1	+		1	+	1	1		1		1
Anthoxanthum odoratum	1	1		1	1			3	2	1	1	1	1		1	1			1	1		1
Filipendula ulmaria	2	2		+	2	3	1	2		+			1		1	2				2	1	+
Juncus effusus	2	+	3			2	+		1		1	1	+	1			+	1		1	1	
Cardamine pratensis	1	1	+	+	1		1	1		+		+					1	1		+	+	
Mentha aquatica		+	+	+	1		1	1		2	1		2		2	1					1	+
Calliergon cuspidatum	1	3	1	1	2			4	5	2			2	2	2					2		
Carex panicea	+	+			2	+		2	1	1	3		1		1					1		1
Carex rostrata	1	+	3			2	3	+		2				1					2		3	1
Myosotis laxa	+		+	+			+			+		1			1		2	1				
Potentilla palustris		+	+			2	1			2	2					1			1			1
Ranunculus flammula			1	+	+			1		+		1		1							1	1
Ranunculus repens	1		1	1	1							2	+		2		3	3				
Festuca rubra	1				+			1			1		1		1	1			2	+		
Luzula campestris	+	+			+			1	2		+		+							1		1
Lathyrus pratensis	1	+			1			1	+						1	1			1			
Lotus uliginosus								2	2	1	1	1			2	+			2			
Angelica sylvestris	+				+			+					+			+			1			+
Equisetum palustre			+		+			2		1			1		1	+						
Trifolium repens	1				+							1			1		2	2				1
Cynusurus cristatus	+	+		1				1				1	+		2							
Succisa pratensis					+			2	1				1		+	+						1
Equisetum fluviatile		+				2	2							2					3		3	
Carex flacca					1			2			1	1			+					+		
Valeriana officinalis						1		1		+						1		+	+			
Poa pratensis	2	2		2		1		1											+			
Rumex acetosa	+								1				+				1	1		1		
Festuca pratensis		1				1		+							2		+	2				
Climacium dendroides	+	+						1								+						1
Lythrum salicaria						2				+	+		+			2						
Trifolium pratense	+	1						2					1		2							
Cirsium palustre		+			+								1		+					+		
Cerastium fontanum					+			1					1		+		+					
Plantago lanceolata					+			1	2				1							+		

and Carex disticha are usually very prominent, forming poor unfertilized and often ungrazed meadows (30-50 cm high), together with the rush Juncus acutiflorus and grasses Agrostis stolonifera, Holcus lanatus and Anthoxanthum odoratum. A colourful array of associated herbs, such as Lychnis flos-cuculi, Galium palustre, Mentha aquatica, Myosotis laxa, Ranunculus flammula, Potentilla palustris, is characteristic of this type and serves to distinguish it from other pasture/meadow vegetation types in the catchment. Locally dominant patches of other sedges occur, i.e. Carex panicea, C. rostrata, C. flacca, including the rare sedges Carex curta and C. pallescens. The bryophyte layer can be well developed, particularly Calliergon cuspidatum. Other occasionals include Calliergon cordifolium, Climacium dendroides, Rhytidiadelphus squarrosus and Pseudoscleropodium purum. Water table levels are high throughout the year and flooding is probably frequent in winter.

Substrate

Peat, peaty gley, gley.

Phytosociological affinities

Probably ascribable to the Carici nigrae-Juncetum articulati association of the Caricion nigrae alliance, described as vegetation of rheotrophic mires, acid wet grassland and drainage channels (White and Doyle, 1982). The Mulkear relevés differ, however, by the prominence of Juncus acutiflorus and the paucity of J. articulatus. Many of the more grass-rich stands, described as Improved Wetsedge on the 6"maps, may be related to the subassociation ranunculetosum repentis, recently described by O'Críodáin (1988) and reported as transitional to

the Plantaginetea class. The Carici nigrae-Juncetum articulatae is widespread in Ireland; the subassociation ranunculetosum has been recorded from mostly western counties, i.e. Donegal, Leitrim, Mayo, Galway, Clare and Tipperary (O'Críodáin, op. cit.).

Distribution

Wetsedge vegetation is most often associated with peat and peaty gley soils and is usually found around the margins of cutaway bogs. Although comparatively uncommon in the catchment as a whole, it is most frequently found near the cutaway bogs around Cappamore and Castleconnell bog. Wetsedge is also found on the upper reaches of the Bilboa river near Kilcommon.

4.3.4. Drysedge (Table 4)

Total area: 42.1 ha

Note Nos: 16, 22, 72, 80, 82, 84, 85, A15, A16, A25 (n = 10)

Cowardin classification

Ecosystem:	palustrine, vegetated
Class:	emergent wetland
Order:	organic/mineral
Habitat:	saturated (temporarily flooded?), fresh, acid.

Dominant species

Molinia caerulea, Succisa pratensis, Anthoxanthum odoratum, Festuca rubra, Rhytidiadelphus squarrosus.

Associated species

Potentilla erecta, Carex panicea, Luzula campestris, Calluna vulgaris, Ulex europaeus, Carex flacca.

Floristic composition

Poor quality grassland developed on cutaway peat, usually dominated by large tussocks of Molinia caerulea. Other grass species include Anthoxanthum ororatum, Festuca rubra, Holcus lanatus and Agrostis capillaris. Sedges can be prominent in the sward, particularly Carex panicea and Carex flacca, but also occasionally Carex nigra, C.

Table 4. Vegetation table (unsorted) of Drysedge relevés. Species with less than 2 occurrences are omitted.

Relevé No.	16	22	72	80	82	84	85	A15	A16	A25
Molinia caerulea	4	2	4	1	2	4	5	4	4	3
Potentilla erecta	1	1	1	2	2	1	+	1	1	2
Anthoxanthum odoratum	2	2	2	2	2	1	1	2		1
Succisa pratensis	1	1	3	2	2	2		1		1
Carex panicea		2	1		1	1	2	+		2
Festuca rubra			2	2	3	1	1	2		1
Luzula campestris	1	1	1	2		1				+
Juncus effusus	2	1	+	1			+	+		
Rhytidiadelphus squarrosus	+	2		4	3	2				
Rumex acetosa	+		+	1	+			+		
Calluna vulgaris	1		+		+	+			1	
Ulex europaeus	1		2		1	+				1
Carex flacca		1		1	+	2				1
Holcus lanatus			1		1		1	1		1
Pseudoscleropodium purum	+	1			2	2				
Salix cinerea subsp. oleifolia	1					+	+	+		
Lotus uliginosus			+		+			+		+
Poa pratensis			+	+				1		1
Carex nigra	1	2		2						
Eriophorum angustifolium	+	+	+							
Galium saxatile	+			2	1					
Erica tetralix	+					1			+	
Angelica sylvestris	+	+					1			
Carex echinata		1	+							+
Cerastium fontanum			+	+	+					
Hypochoeris radicata				+	1					+
Filipendula ulmaria						1	1			1

echinata, C. pulicaris and C. hostiana. Apart from Succisa pratensis, which can be locally abundant, dicotyledonous herbs are generally sparce and typically straggling in habit, i.e. Potentilla erecta, Galium saxatile. A bryophyte layer can be well developed, with species such as Sphagnum capillifolium and S. papillosum in the wetter areas, and Rhytidiadelphus squarrosus and Pseudoscleropodium purum in drier patches. Like Wetsedge vegetation, this type is usually unfertilized and poor in nutrients, though probably less frequently flooded.

Substrate

Peat, peaty gley

Phytosociological affinities

This type of vegetation is ascribable to the Junco conglomerati-Molinion alliance of the Molinietalia order. Some stands may represent the Cirsio-Molietum association, whilst others are probably transitional towards the Centaureo-Cynosuretum juncetosum of the Arrhenatheretalia order.

Distribution

Drysedge vegetation is relatively infrequent in the catchment. Isolated patches are found around the drier margins of cutaway bogs, particularly Castleconnell Bog in the Newport river catchment, and occasionally around cutaways near Cappamore. The former extent of such poorly managed grassland on peat has been much reduced due to the intensive use of fertilizers. Similar Molinia/Carex-dominated

vegetation is fairly widespread in the uplands in the north of the catchment but is not included in the drainage scheme.

4.3.5. Wetgrass (Table 5).

Total area: 712.4 ha

Note nos: 2b, 4, 6, 9, 10, 11, 12, 18, 23, 27, 41, 44, 45, 49, 50, 52, 53, 58, 59, 60, 62, 63, 75, 89, 111, A7, A21, A27, A29, A32, A41 (n = 31).

Cowardin classification

Ecosystem:	palustrine, vegetated
Class:	emergent wetland
Order:	organic/mineral
Habitat:	saturated (temporarily flooded), fresh, circumneutral

Dominant species

Juncus effusus, Agrostis stolonifera, Holcus lanatus, Anthoxanthum odoratum, Ranunculus repens.

Associated species

Rumex acetosa, Ranunculus acris, Trifolium repens, Filipendula ulmaria, Carex disticha, Lotus uliginosus, Poa trivialis, Senecio aquaticus, Alopecurus geniculatus, Deschampsia caespitosa, Ranunculus flammula.

Table 5. Vegetation table (unsorted) of Wetgrass relevés. Species with less than 5 occurrences are omitted.

Relevé No.	2b	9	10	11	12	18	23	27	41	44	45	49	50	53	58	59	60	62	63	75	89	111	A7	A21	A41
Juncus effusus	1	3	2	3	1	3	1	2	3	2	2	3	4	2	3	5	4	4	1	+	4	2	3	3	2
Agrostis stolonifera	3	4	3	3	1	2	3	1	3	4	4	3	3	2	2	3	3	3	3	2	3	4	2		1
Holcus lanatus	1	1		1	2	1	3	2	1	2	1	2	2	1	2	1	1	1	2	2	1	2	1		1
Anthoxanthum odoratum		2		1	1	1	2	1	1	2	2	3	1	3		2		2	2	+	1	1	1	2	+
Rumex acetosa		+	1	+	1	1		1	+	1	1	+	+	1	1	1	+	1		+	+	1		1	
Ranunculus repens	2	1	4	3		2		2	1	3	2	1	2	1	2	2	2	2			2	2			1
Ranunculus acris	+		+		+	2		+	2	1	1	2	+	+	1	1		1			1		1		
Trifolium repens	+	+	3	2		+			+	2		1	1		2	1	+	1	2		1	+			
Filipendula ulmaria		+	+	+	2	+	2	+						1	+	1	2	1		5			1	2	
Carex disticha		+		2	1	+		2			1	1		3	+	+	+	+	1	+	1		1		
Lotus uliginosus					1	+		2	+	1	2	1	1	1	2		1	1			2			1	
Poa trivialis	2	2	1	1		1	+	1	1	2	1		+								+				+
Senecio aquaticus	2	+	1			1			1			+	2		1	1	+	+	1						
Carex nigra	+		1	2	2	+		1				+			2	1	1		+						1
Alopecurus pratensis		2	1	1	3				+	1	1	2			+	1						1	2		
Festuca rubra					2	+	3			1		2		1	2	2		1	1				1	1	
Alopecurus geniculatus	+	1	1	2				+			1		2				1		+			+			
Deschampsia caespitosa			+		2					+	+			1				2	3		1			1	
Poa pratensis				1	2	1	+	+			+	1		1									1	1	
Ranunculus flammula						1		+			+		+			+	1	+	1		1	+			
Calliergon cuspidatum			1	2		+							1		3	3	1		2						
Potentilla anserina			+		1	+				+	1					1	+						2		
Carex hirta	+									+		+		2	1					1			3		
Cynusurus cristatus	+								+	1	+		+		1							+			
Galium palustre		+	1	1				1								+	+					+			
Lychnis flos-cuculi				+		+		+							2		+		+		+				
Iris pseudacorus					+		1		1									+	2	+			+		
Lathyrus pratensis					+	+						+								+			1	1	+
Cardamine pratensis			2	1		1		2							+	1									
Cirsium palustre						1		+		1	+	1			+										
Cerastium fontanum	+		+							+	+		+												
Festuca pratensis									+							+					1	2			-

Floristic composition

Poorly managed grassland, often representing derelict pasture, dominated by tussocks of the rush Juncus effusus (occasionally also J. inflexus). A variety of grasses form a low sward between tussocks, typically moisture-loving species such as Agrostis stolonifera, Holcus lanatus, Alopecurus geniculatus and Deschampsia caespitosa, but also species such as Anthoxanthum odoratum, Poa trivialis, P. pratensis and Alopecurus pratensis. Festuca rubra can be prominent in some stands on peaty soils. Sedges such as Carex disticha, C. nigra and C. hirta are also frequently present, though usually in sparing amounts. More productive agricultural grasses are either sparce, e.g. Cynosurus cristatus, or absent, e.g. Lolium perenne. Dicotyledonous herbs such as Ranunculus repens, R. flammula, Filipendula ulmaria, Lotus uliginosus, Senecio aquaticus and Potentilla anserina, which are common associates, are indicative of damp, poorly drained conditions. Bryophytes are generally poorly developed, although Calliergon cuspidatum may be prominent in some stands.

Substrate

Gley, peaty gley

Phytosociological affinities

The majority of stands of Wetgrass can be assigned to the Molinietalia order, mostly to the Senecioni-Juncetum acutiflori association. Such vegetation is described as typical of relatively fertile, disturbed and continuously wet soils derived from limestones and

shales (White and Doyle, 1982). Some stands, in which Filipendula ulmaria and Valeriana officinalis reach dominance, may be ascribable to Valeriano-Filipenduletum association of the Filipendulion alliance.

Distribution

A widespread vegetation type found throughout the catchment. Particularly extensive stands of such Juncus-infested fields occur beside the Dead river, east of Pallas Grean.

4.3.6. Improved Wetgrass (Table 6).

Total area: 1429.2 ha

Note Nos: 1, 2a, 5, 29, 36, 37, 38, 40, 46, 47, 48, 64, 65, 66, 67, 69, 87, 88, 115, A5, A6, A9, A17 (n = 23).

Cowardin classification

Ecosystem:	palustrine, vegetated
Class:	emergent wetland
Order:	organic/mineral
Habitat:	temporarily flooded, fresh, circumneutral

Dominant species

Agrostis stolonifera, Lolium perenne, Holcus lanatus, Ranunculus repens, Alopecurus pratensis, Cynosurus cristatus.

Associated species

Juncus effusus, Ranunculus acris, Anthoxanthum odoratum, Rumex acetosa, Trifolium repens.

Floristic composition

Grass-dominated meadows or pastures, intermediate in composition and structure between the Juncus-infested Wetgrass type and the herb-rich Drygrass type. Juncus effusus is present in most stands, though sparce and non-tussock forming due to spraying or cutting. The

Table 6. Vegetation table (unsorted) of Improved Wetgrass relevés. Species with less than 5 occurrences are omitted.

Relevé No.	1	29	36	38	40	46	47	48	64	65	66	67	69	87	88	115	A5	A6	A9
Lolium perenne	1	1	1	4	2	+	2	1	2	1	1	1	2	2	1	3	1	1	2
Holcus lanatus	2	2	1	1	1	1	2	2	2	1	2	1	2	2	2	2	2	2	1
Ranunculus repens	+	2		2	2	3	+	1	2	1	1	2	2	1	1	2	2	2	1
Ranunculus acris	1	2	2	2	1	2	1	2	1	1	1	1	2		2		1	2	1
Juncus effusus		1	+	1		2	+	+	1	1	2	2	1	1	2	1	2	2	1
Agrostis stolonifera		2		2	2	3	4	3	2	5	4	2	3	3	1	3	3	3	3
Anthoxanthum odoratum	1	2	2	2	1	2	2	1	1	1	1		2		2	1	1	1	
Alopecurus pratensis	1	3	1	2	1	2	2	2	+			2	2	2	1	2		2	2
Cynosurus cristatus	2	2	1	2	2	+			2		2	2	1	2	2	1	+	1	
Rumex acetosa	+	+			+	1		+	+			1	1	+	1	1	1	1	+
Trifolium repens	1	1	+			+	1	1	1		2		3	2	2	2	1		2
Cerastium fontanum	+	+	+	+	1				+				1	+		+		1	+
Poa trivialis	2	2	1	3	1				1		1			1		1			
Filipendula ulmaria	+	+	+	+	1					2		2					2	1	
Lotus uliginosus		1			1	+				+	+	1			2		1	1	
Trifolium pratense		+	1	+	1	+				1			1		2				+
Iris pseudacorus	2		+	+							+			1		2	1	1	
Bellis perennis	+	2		1	1				+		1			+					1
Alopecurus geniculatus		1	+			1	+	+	1					+			+		
Festuca rubra			2		+		+	1		+			1		2				1
Festuca pratensis			1	+					3	2	2	4	1					3	
Cirsium palustre			+				+	1		+	+	+		1					2
Carex disticha			+	+	+	+						1		1	1	1			
Carex hirta	+		+		1	+				+			+				+		
Cardamine pratensis		1	+	+	+	1			+								1		
Poa pratensis			1	1	+		1	1				+						+	
Senecio aquaticus	+				+				1		1					+		1	
Lychnis flos-cuculi		1		+	1						+				+			2	
Juncus inflexus	1		+						2	+								1	
Taraxacum officinale	+				+								+		+				+
Potentilla anserina			+	+				+			+								+

dominant grasses include several that are also common in the Wetgrass type, i.e. Agrostis stolonifera, Holcus lanatus, Anthoxanthum odoratum, Alopecurus pratensis, Poa trivialis, but in addition include more abundant Cynosurus cristatus and Lolium perenne, the latter often the result of reseeding and evidence of the "improved" nature of this grassland type. The associated dicotyledonous herbs include a mixture of typical Wetgrass indicators, i.e. Ranunculus repens, Trifolium repens, Filipendula ulmaria, Lotus uliginosus, Senecio aquaticus etc., and species more typical of Drygrass, i.e. Cerastium fontanum, Trifolium pratense, Bellis perennis, Taraxacum officinale, etc. Bryophytes are generally poorly developed or absent.

Substrate

Gley, peaty gley

Phytosociological affinities

Several stands are assignable to the Plantaginetea majoris class, probably to the Poo-Lolietum association. This is described as an association of intensively managed, heavily manured and species-poor pastures, subject to rotational grazing (White and Doyle, 1982). Others are more clearly related to the Cynosurion cristati alliance of the Molinio-Arrhenatheretea class, particularly to the Centaureo-Cynosuretum juncetosum, a community of moderate quality pastures on imperfectly drained, often gleyed soils. Some recently reseeded, Lolium-dominated stands are ascribable to the Lolio-Cynosuretum association of this alliance.

Distribution

Extremely widespread and common throughout the catchment, comprising nearly a third of the total area of damaged land.

4.3.7. Drygrass (Table 7).

Total area: 1728.8 ha

Note Nos: 2, 3, 19, 25, 28, 34, 35, 43, 51, 54, 57, 61, 76, 110, A39
(n = 15)

Cowardin Classification

Non-wetland (most of the areas described as Drygrass have been effectively drained and reclaimed).

Dominant species

Anthoxanthum odoratum, Holcus lanatus, Festuca rubra, Ranunculus acris, Trifolium pratense.

Associated species

Rumex acetosa, Plantago lanceolata, Cerastium fontanum, Alopecurus pratensis, Taraxacum officinale, Luzula campestris, Lolium perenne, Cynosurus cristatus.

Floristic composition

A variety of pasture and meadow grasslands, often rich in herbs and found on the better managed and well drained soils of the catchment. Species of the Juncaceae and Cyperaceae are scarce or absent. The most prominent grasses are Anthoxanthum odoratum, Festuca rubra, Holcus lanatus, Alopecurus pratensis, Lolium perenne, Cynosurus

Table 7. Vegetation table (unsorted) of Drygrass relevés. Species with less than 5 occurrences are omitted.

Relevé No.	2	19	25	28	34	35	43	51	54	57	61	76	110
Holcus lanatus	2	1	2	1	2	1	3	1	1	2	1	1	2
Rumex acetosa	1	1	1	+	+	+	2	1	2	1	1	+	+
Anthoxanthum odoratum	3	1	1	3	4	2	2	1	2	2	2	2	
Festuca rubra	2	2		+	1	3	1	4	4	4	2	1	+
Ranunculus acris	1	1	2	1	1	1	3		1	1	2	1	1
Plantago lanceolata	+	+	2	3	+	1	2	1	+		2	2	
Trifolium pratense	1	+	1	2	2	2	2		+	2	3	1	
Cerastium fontanum	1	+		+	1	1	1		+		+	1	+
Alopecurus pratensis	2	3	2		1	1	+			1	2		2
Taraxacum officinale	1	+	1		1	+	1	1		+		+	
Luzula campestris	+	1		1		1	1	+	1	2	1		
Lolium perenne	+	1	+	1	2	1	2					1	3
Cynosurus cristatus	2			1	2	1	2			1	2	2	
Filipendula ulmaria		+	+	1			+			+	1	2	
Bellis perennis	1	+		1	1		1					2	
Poa trivialis	2	3	1		1	1	1						
Dactylis glomerata			3	+				+		+	+		+
Lathyrus pratensis			+	+		+	+			+	1		
Trifolium repens	3	2							1		1		2
Ranunculus repens	1	+		1		1							1
Prunella vulgaris	+			+			+				+	+	
Centaurea nigra			1	1		+		2			1		
Conopodium majus			1					1	2	1	1		
Carex hirta						+	1	1	1		+		

cristatus, Poa trivialis and Dactylis glomerata. Unlike the Wetgrass and Improved Wetgrass types, species such as Agrostis stolonifera and Alopecurus geniculatus are infrequent. A wide variety of dicotyledonous herbs are characteristic of the less fertilized stands, i.e. Rumex acetosa, Ranunculus acris, Plantago lanceolata, Trifolium pratense, Cerastium fontanum, Taraxacum officinale, Bellis perennis, Prunella vulgaris, Centaurea nigra, Conopodium majus, Achillea millifolium, Heracleum sphondylium, Leucanthemum vulgare, Myosotis arvensis etc. Bryophytes are poor or absent.

Substrate

Gley, Grey Brown Podzolic, Brown Earth, Regosol

Phytosociological Affinities

Stands of Drygrass can be assigned to the Molinio-Arrhenatheretea class. Many clearly belong to the Arrhenatheretalia order, probably to the Centaureo-Cynosuretum typicum, which occurs on deep, well-drained soils derived from Carboniferous Limestone or Old Red Sandstone (White and Doyle, 1982). Others show an affinity to the Molinietalia order and several stands are probably transitional.

Distribution

Extremely widespread throughout the catchment and constituting nearly half the area of damaged land.

4.3.8. Woodland and Scrub (Table 8).

Total area: 47.4 ha

Note Nos: 14, 17, 79, 100, 102, 112, A13, A35, A38, A47 (n = 10).

Cowardin classification

Ecosystem:	palustrine, vegetated
Subclass:	deciduous
Order:	organic/mineral
Habitat:	saturated, seasonally/temporarily flooded, fresh, circumneutral/acid.

Dominant species

Salix cinerea subsp. oleifolia, Alnus glutinosa, Betula pubescens.

Associated species

Crataegus monogyna, Quercus robur, Sorbus aucuparia, Ilex aquifolium, Acer pseudoplatanus, Fraxinus excelsior, Filipendula ulmaria, Rubus fruticosus.

Floristic composition

A wide range of woodland types are encompassed within this category. Betula pubescens scrub is found colonizing cutaway peat. Alnus glutinosa woods and Salix cinerea/Betula pubescens woods are found in swampy or wet fen situations on both peat and mineral soils.

Table 8. Vegetation table of Woodland and Scrub relevés. Species with less than 3 occurrences are omitted.

Relevé No.	14	17	A38	100	102	A47	112	A13	79	A35
Salix cinerea subsp. oleifolia	2	1	2	1	3	1		2	1	1
Filipendula ulmaria	1	1	2	4	3	+	3			
Galium palustre	1	3	2	1		1			1	
Juncus effusus	1	2	1		3				2	2
Typha latifolia	+	2	2	+	2					
Angelica sylvestris	1		+	+		1	+			
Phalaris arundinacea		+	1		2	1	1			
Equisetum fluviatile	2	3	1	+						
Potentilla palustris	2	1	2	1						
Valeriana officinalis	1		2	1		1				
Mentha aquatica	1		1	1	1					
Sparganium erectum		2	1		2	+				
Carex nigra	2	1		1						
Carex rostrata	3	2		+						
Ranunculus flammula	1	1	1							
Alnus glutinosa				4	3	4	3			
Betula pubescens	2		3				3	4	3	3
Crataegus monogyna						1	1	2	2	1
Rubus fruticosus			2				1	5	3	4
Agrostis stolonifera	+	1					1		2	1
Quercus robur								1	1	2
Sorbus aucuparia								2	1	+
Ilex aquifolium								1	1	+
Lonicera periclymenum								2	1	2
Geranium robertianum							2		+	2
Pteridium aquilinum			2					1	2	
Epilobium palustre			+						+	+

Salix alba/Salix fragilis/Populus nigra x deltoides woods are found along river banks and ditches, as are Fraxinus excelsior/Corylus avellana and mixed Quercus robur/Crataegus monogyna/Ilex aquifolium woods. Many woodland types have been planted or colonized by non-native trees, i.e. Fagus sylvatica, Acer pseudoplatanus, Aesculus hippocastanum.

The understorey and ground layers vary according to the soils and hydrology. On cutaway bogs the understorey can be dominated by shrubs and dwarf shrubs of Ulex europaeus, Calluna vulgaris and Erica tetralix, and by luxuriant growth of bryophytes such as Sphagnum palustre, S. papillosum, S. fimbriatum, Aulacomnium palustre and Polytrichum commune. In swampy situations cyperaceous species, such as Carex paniculata, C. rostrata and C. disticha, can be more prominent, together with tall stands of Typha latifolia, Filipendula ulmaria, Sparganium erectum, Equisetum fluviatile, Angelica sylvestris, Valeriana officinalis or Phalaris arundinacea. In drier locations the ground layer can be dominated by Rubus fruticosus, Circaea lutetiana, Hedera helix, Pteridium aquilinum, Geranium robertianum and species more typical of open pastures, such as Agrostis stolonifera, Ranunculus repens, etc. Bryophytes can be prominent, typically Eurhynchium striatum and Thuidium tamariscinum, and epiphytes can be locally abundant in humid situations, e.g. Isothecium myosuroides, I. myurum, Neckera complanata, Radula complanata, Frullania tamarisci, Metzgeria temporata, etc.

Substrate

Peat, peaty gley, gley, Brown Podzolic, Brown Earth, Regosol.

Phytosociological affinities

Woody heath vegetation developed on dry, cutaway bog surfaces and dominated by Ulex europaeus and Calluna vulgaris belongs to the Calluno-Ulicetea class. Wetter stands, dominated by Betula pubescens and Salix cinerea subsp. oleifolia, are assignable to the Franguletea class, possibly to the Salici-Betuletum pubescentis association. Alnus glutinosa woods with Carex paniculata belong to the Alnion glutinosae alliance of the Alnetea glutinosae class. Salix alba/S. fragilis woods along river banks belong to the Salicetea purpureae class, probably to the Salicetum albo-fragilis association.

Mixed woodlands on base-poor soils, dominated by Quercus robur, Q. petraea, Betula pubescens, Crataegus monogyna, Sorbus aucuparia and Ilex aquifolium, are ascribable to the Quercetea robori-petraeae class, probably to the Blechno-Quercetum coryletosum. More base-rich oak woodland, dominated by mixtures of Quercus robur, Fraxinus excelsior, Corylus avellana and Acer pseudoplatanus, belong to the Querco-Fagetea class, probably to the Corylo-Fraxinetum typicum. Derivatives of mixed woodland types are commonly found as hedgerows, dominated by Crataegus monogyna, Prunus spinosa, Rubus fruticosus, Rosa spp. and occasional trees of Quercus spp., Fraxinus excelsior and Corylus avellana etc., and are ascribable to the Primulo-Crataegetum association of the Prunetalia spinosae class.

Distribution

Betula pubescens scrub, Betula pubescens/Salix cinerea subsp. oleifolia wet wood and Ulex europaeus heaths are best developed on

cutaway bogs around Cappamore and Castleconnell Bog. Alnus glutinosa swamp woodland is also found around the margins of cutaways, but also along drainage channels. The best example of this type of woodland is found at Kilbeg Marsh, where impressive tussocks of Carex paniculata can reach 2 m in height. Salix alba/S. fragilis woodland is well developed in narrow fringes along channels and river banks throughout the catchment, particularly along the lower stretches of the Mulkear river. Mixed woodlands of Quercus spp./Betula pubescens or Fraxinus excelsior/Corylus avellana are widely planted in estates and demesnes, such as at Glenstal, and are found as a component of hedgerow vegetation, particularly in the unmanaged woodland strips between double ditches, which are common in this catchment. Excellent examples of mixed woodland are found in the lower valleys of the Bilboa and Gortnageragh rivers and in the Clare Glens, although much of these woodlands are not included in the proposed drainage scheme.

4.3.9. Conifer Plantations

Total area: 156.2 ha

Cowardin classification

Ecosystem:	palustrine, vegetated
Class:	forested wetland
Subclass:	evergreen
Order:	organic/mineral
Habitat:	temporarily flooded, fresh, alkaline/acid (farmed)

Dominant species

Pinus contorta, Picea abies, P. sitchensis, Pinus sylvestris.

Floristic composition

Monocultures of exotic conifers. Ground flora severely impoverished or absent.

Substrate

Peat, gley.

Phytosociological affinities

Not examined.

Distribution

Large conifer plantations are found on damaged land on Castleconnell Bog and on the cutaway bogs around Cappamore. Several small private plantations were noted elsewhere in the catchment. The uplands of Keeper Hill and the Slievefelim Mountains have been extensively afforested with conifers and many newly ploughed areas were seen in this region.

4.4. VEGETATION OF DRAINAGE CHANNELS AND BANKS

A total of 34 species lists were recorded from drainage channels and banks throughout the catchment. Sites were chosen to represent the range of stream orders present and lists made from walking representative 100 m sections (see Fig. 2). Although no attempt has been made to map the vegetation of drainage channels, the following types occur:

4.4.1. Drains and Ditches (Table 9).

Note Nos: 7, R12, R17 (n = 3).

First order drainage channels, generally representing modified streams or marginal field drains. A characteristic feature of this catchment is the widespread occurrence of double ditches, especially in the lowland areas, where marginal drains of adjoining fields are separated by a raised embankment, often up to 5 m wide and frequently supporting mature woodland.

The vegetation of such channels varies depending upon soil type. On alluvial or gleyed soils, which cover most of the areas described as damaged land in the catchment, the most common species are Apium nodiflorum, Berula erecta, Alisma plantago-aquatica, Glyceria fluitans, Mentha aquatica, Veronica beccabunga, Agrostis stolonifera, Callitriche stagnalis, Nasturtium officinalis, Ranunculus sceleratus etc. Much of this vegetation is ascribable to the Nasturtio-Glycerietalia order, probably to the Apio-Veronicetum beccabungae association of the Glycerio-Sparganion alliance (vegetation of the banks of small streams and ditches which may dry out in summer). Taller vegetation, dominated by

Table 9. Vegetation table (unsorted) of river cannel species lists.

Species List No.	7	R 12	R 17	R 1	R 4	R 5	R 6	R 14	R 19	R 21	R 22	R 23	R 25	24	86	A 33	R 3	R 7	R 8	R 11	R 18	85	55	70	A 19	A 20	A 26	A 30	A 31	R 13	R 16
Alisma plantago-aquatica	+																														
Callitriche stagnalis	+		+																												+
Glyceria fluitans	+																														
Ranunculus sceleratus	+																														
Potamogeton natans	+																														
Potamogeton crispus	+																														+
Lemna minor	+												+																		+
Elodea canadensis	+																	+												+	+
Apium nodiflorum		+						+																							
Veronica beccabunga		+						+																							
Nasturtium officinalis		+						+																							
Mentha aquatica		+	+																												
Iris pseudacorus		+																													
Senecio aquaticus		+																													
Berula erecta		+	+					+					+																		+
Veronica catenata			+																												
Phalaris arundinacea			+															+													
Equisetum arvense			+																												
Filipendula ulmaria			+																												
Rhynchostegium riparioides				+	+		+	+		+			+	+	+		+	+	+	+	+										
Chiloscyphus polyanthos					+																										
Brachythecium plumosum						+	+			+		+								+											
Racomitrium affine						+	+					+																			
Montia fontana							+																								
Cardamine pratensis							+																								
Fontinalis antipyretica							+														+									+	
Myosotis laxa								+																							
Amblystegium riparium								+																							
Ranunculus peltatus										+	+			+	+			+	+	+			+		+	+				+	+
Trichostomum brachydontium										+																					
Scapania undulata												+																			
Fissidens viridulus													+																		
Oenanthe crocata														+																	
Epilobium hirsutum														+																	
Cinclidotus fontinaloides																		+		+											
Sparganium erectum																		+			+										+
Schistidium alpicola																				+											
Philonotis caespitosa																				+											
Amblystegium tenax																				+											
Aneura pinguis																					+										
Fissidens crassipes																					+										
Potamogeton perfoliatus																														+	
Potamogeton pectinatus																														+	
Sparganium emersum																														+	
Polygonum amphibium																														+	

Phalaris arundinacea, Sparganium erectum, Equisetum fluviatile, Iris pseudacorus, etc. also occurs in drains and ditches and is referable to the Magnocaricion alliance. Elements of the Lemnetia and Potametea classes are also represented.

On more peaty soils, ditch vegetation is characterized by bog species such as Eriophorum angustifolium, Juncus bulbosus, Potamogeton polygonifolius and Sphagnum spp., species which suggest an affinity to the Littorelletea uniflorae class.

4.4.2. Streams (Table 9).

Note Nos: R1, R4, R5, R6, R14, R19, R21, R22, R23, R25 (n = 10).

Narrow channels (1-4 m wide), usually unmodified and representing first, second and some third order drainage channels. A steep gradient often determines a moderate to fast water flow rate and the substrate is usually gravelly or stoney, with rocks and occasional boulders. Silt deposition in such channels is uncommon, although sand and gravel bars may develop in meandering channel sections. The vegetation of the channels themselves is often limited to aquatic and semi-aquatic bryophytes (the latter growing in the splash zone or on in-stream boulders). The most frequently encountered species include Rhynchostegium riparioides, Racomitrium affine, Fontinalis antipyretica, Brachythecium plumosum, Chiloscyphus polyanthos, Fissidens viridulus, Amblystegium riparium and Trichostomum brachydontium. In fast-flowing upland streams the liverwort Scapania undulata is also found. In-stream macrophytes are generally absent,

except for Ranunculus peltatus subsp. pseudofluitans, which is widespread throughout the catchment.

4.4.3. Riffles, Pools and Glides (Table 9).

Note Nos: 24, 86, A33, R3, R7, R8, R11, R18 (n = 8).

Wide channels (10-12 (20)m wide), usually unmodified and representing fourth or fifth order drainage channels. Water flow rates are variable, ranging from fast in riffle and cascade stretches to slow in pool reaches. The substrate is usually stoney and gravelly, with rocks and boulders in the riffle sections. In some areas such channels cut down through bedrock Gravel banks and sand bars are frequent and some silt deposition may occur in slower flowing reaches.

Like the smaller order stream channels, the vegetation of these more mature river stretches is often rich in aquatic and semi-aquatic bryophytes. The most common species are Rhynchostegium riparioides, Brachythecium plumosum, Fontinalis antipyretica and Cinclidotis fontinaloides, with occasional Amblystegium tenax, Aneura pinguis, Fissidens crassipes and Schistidium alpicola. The rare Philonotis caespitosa was found in such a river section (on the Bilboa river).

Ranunculus peltatus subsp. pseudofluitans is the most widespread aquatic macrophyte, often covering large areas of the channel bed. Emergent macrophytes, such as Oenanthe crocata, Epilobium hirsutum, Phalaris arundinacea and Sparganium erectum, can

occasionally be found encroaching from channel banks and colonizing in-stream sand and gravel bars.

4.4.4. Canal-like reaches (Table 9).

Note Nos: 8, 55, 70, A19, A20, A26, A30, A31, R13, R16 (n = 10).

Deep, slow to moderately flowing sections of river found mostly in the middle and lower reaches (forth and fifth order channels) of the drainage network. Such sections are man-modified, with channel sections deepened and straightened, cutting off meanders, and spoil heaped onto embankments. The substrate is usually gravelly or stoney and the water column often turbid with silt in times of peak flow.

The absence of in-stream rocks and boulders, and the frequently turbid water, makes such channel stretches unsuitable for aquatic and semi-aquatic bryophytes. Submerged macrophytes, more resistant to turbid and silty water, can include the following: Ranunculus peltatus subsp. pseudofluitans, Elodea canadensis, Potamogeton crispus, P. pectinatus and P. perfoliatus, species which suggest affinities to the Magnopotamnion alliance. Floating-leaved and emergent macrophytes, such as Callitriche stagnalis, Sparganium emersum, S. erectum and Polygonum amphibium, can colonize silt beds deposited close to the channel margins. Such vegetation may be referable to the Nymphaeion alliance.

4.4.5. Open bank vegetation (Table 10).

Note Nos: 8, 55, 70, A18, A19, A20, A30, A31, A42, A43, A45, R12, R13, R16, R18, R22 (n = 16).

The composition of bank vegetation is dependant upon the gradient of the drainage channel and in consequence upon the extent, duration and frequency of flooding. In first, second and third order channels, which often drain relatively steeply sloping ground in the upper reaches of the catchment, open bank vegetation may be heathy in character, or dominated by agricultural grasses, i.e. Wetgrass or Drygrass vegetation types. In lower river reaches, however, particularly where embanked canal-like stretches traverse relatively flat terrain, bank vegetation is strongly influenced by fluctuating water-table levels and high inputs of nutrients by silt deposition. The most common and characteristic species of such banks are Phalaris arundinacea, Urtica dioica, Dactylis glomerata, Rubus fruticosus, Epilobium hirsutum, Agrostis stolonifera, Anthriscus sylvestris, Filipendula ulmaria, Tussilago farfara, Impatiens glandulifera, Heracleum sphondylium, Brassica rapa, Reynoutria japonica etc. Scattered bushes of Alnus glutinosa, Crataegus monogyna and Salix spp. are also frequent. The distinctive umbellifer Heracleum mantagazzianum (Giant Hogweed), which infests much of the lower drainage network, particularly along the Newport river, is also typical of such open bank communities. This type of vegetation is ascribable to the Artemisietea vulgaris class, i.e. "natural and man-made vegetation with a high proportion of perennial ruderals, on nitrogen-rich, relatively stable substrates with much organic material - roadside verges, banks of canals and rivers "(White and Doyle, 1982).

Table 10. Vegetation table (unsorted) of open river bank species lists. Species with less than 3 occurrences are omitted.

Species List No.	8	55	70	A18	A19	A20	A30	A31	A42	A43	A45	R12	R13	R16	R18	R22
Phalaris arundinacea	+	+	+				+	+	+	+			+		+	+
Urtica dioica	+		+			+	+	+	+			+	+	+	+	
Dactylis glomerata		+	+	+	+	+		+				+	+		+	
Rubus fruticosus		+	+	+	+	+	+	+						+		
Epilobium hirsutum		+	+					+				+	+	+	+	+
Agrostis stolonifera			+	+		+	+	+		+		+				
Anthriscus sylvestris	+	+		+					+						+	+
Alnus glutinosa	+		+	+	+	+							+			
Filipendula ulmaria					+					+		+		+	+	+
Cirsium arvense	+				+	+	+	+								
Heracleum mantegazzianum	+	+		+	+	+										
Crataegus monogyna			+			+	+					+		+		
Cirsium palustre		+	+										+			+
Tussilago farfara		+	+		+								+			
Salix alba		+		+	+		+									
Acer pseudoplatanus		+		+	+	+										
Convolvulus arvensis			+										+	+	+	
Impatiens glandulifera			+				+	+					+			
Heracleum sphondylium					+		+					+	+			
Salix cinerea ssp. oleifolia						+	+		+							+
Iris pseudacorus						+			+	+						+
Brassica rapa	+		+										+			
Mentha aquatica		+									+				+	
Valeriana officinalis		+								+						+
Reynoutria japonica		+				+		+								
Angelica sylvestris			+									+				+
Ulex europaeus			+				+	+								
Holcus lanatus				+				+					+			
Rumex acetosa					+	+		+								
Sambucus nigra						+	+					+				
Juncus effusus								+		+						+
Arrhenatherum elatius									+				+		+	

4.4.6. Wooded bank vegetation (Table 11).

Note Nos: R1, R3, R4, R5, R6, R7, R8, R11, R14, R17, R18, R19, R20, R21, R23, R25 (n = 16).

A considerable proportion of the total channel length in the catchment is to some extent wooded, most often by a narrow fringe of trees and shrubs but also in some cases by blocks of mature broadleaf woodland. The most frequent woodland trees and shrubs found along channel banks are Fraxinus excelsior, Crataegus monogyna, Corylus avellana, Acer pseudoplatanus, Alnus glutinosa, Prunus spinosa, Betula pubescens, Sorbus aucuparia, Quercus robur etc. Several species of willows are frequent, including Salix cinerea subsp. oleifolia, S. fragilis, S caprea, S. viminalis and S. alba, and along mature river sections, towards the confluence with the Shannon, well grown specimens of Populus nigra x deltoides are prominent.

The ground flora on wooded banks is rich in species typical of broadleaf woodland. Some of the most prominent vascular species are Rubus fruticosus, Angelica sylvestris, Hedera helix, Filipendula ulmaria, Geranium robertianum, Polystichum setiferum, Carex remota, Bromus ramosus, Oxalis acetosella, Geum urbanum, Phyllitis scolopendrium etc. Bryophyte diversity is also high, reflecting the moist, shaded conditions provided by woodland cover, and the following species are frequent: Conocephalum conicum, Pellia endiviifolia, Thamnobryum alopecurum, Plagiomnium undulatum, Eurhynchium praelongum, Plagiochila porelloides, Brachythecium rutabulum. Woodland trees and shrubs also provide niches for a range of epiphytic bryophytes, typically including Neckera complanata, N. pumila, Ulota phyllantha, U. crispa,

Table 11. Vegetation table (unsorted) of wooded river bank species lists. Vascular plants with less than 3 occurrences are omitted. Bryophytes with single occurrences are omitted.

Species List No.	R1	R3	R4	R5	R6	R7	R8	R11	R14	R17	R18	R19	R20	R21	R23	R25
Crataegus monogyna	+	+	+	+		+	+	+	+	+	+	+	+		+	+
Fraxinus excelsior	+	+	+	+		+	+	+			+	+	+	+	+	+
Salix cinerea ssp. oleifolia	+	+	+	+	+		+	+			+		+	+	+	+
Corylus avellana	+		+			+	+	+	+	+	+		+	+		
Acer pseudoplatanus	+	+	+	+	+	+	+						+	+		
Alnus glutinosa		+	+	+		+	+	+						+	+	
Prunus spinosa	+		+			+				+	+	+			+	+
Salix fragilis				+		+	+				+					+
Ulex europaeus				+		+		+					+	+		
Salix caprea				+			+	+					+			
Betula pubescens						+		+					+	+		
Quercus robur		+						+	+							
Sorbus aucuparia					+			+							+	
Salix viminalis							+						+	+		
Rubus fruticosus		+	+	+	+	+	+	+		+	+	+	+	+		+
Angelica sylvestris	+	+		+	+		+		+	+	+		+	+	+	+
Hedera helix	+	+	+			+		+	+	+	+	+				+
Filipendula ulmaria		+	+	+			+	+		+		+	+		+	+
Geranium robertianum	+	+	+					+	+		+	+		+	+	
Polystichum setiferum	+	+				+	+	+	+	+	+	+				
Carex remota	+	+					+	+				+		+	+	+
Oenanthe crocata	+	+		+	+	+		+					+	+		
Bromus ramosus	+	+				+	+	+		+	+	+				
Urtica dioica	+		+	+			+	+		+				+		+
Viola sp.	+	+	+			+		+	+			+		+		
Oxalis acetosella	+	+	+					+	+			+			+	
Rumex sanguineus	+		+					+	+	+		+				+
Geum urbanum	+					+	+	+	+			+		+		
Phyllitis scolopendrium	+	+				+		+	+	+		+				
Dactylis glomerata			+			+			+				+	+	+	+
Arrhenatherum elatius			+			+		+		+			+	+		+
Heracleum sphondylium	+	+					+					+	+			+
Tussilago farfara		+	+		+		+		+					+		
Cirsium palustre		+		+					+	+			+		+	
Ranunculus repens		+			+		+	+						+		+
Veronica chamaedrys	+					+				+		+				+
Anthriscus sylvestris	+	+							+				+			+
Mentha aquatica	+	+						+					+	+		
Chrysosplenium oppositifolium	+	+			+			+	+							
Iris pseudacorus		+		+				+						+		+
Holcus lanatus		+	+						+					+	+	
Juncus effusus			+		+			+					+	+		
Rosa canina			+					+	+	+						+
Primula vulgaris	+	+						+				+				
Vicia sepium	+						+						+	+		
Sanicula europaea		+						+				+			+	
Cardamine pratensis		+							+					+		+
Pimpinella major		+				+	+				+					
Carex sylvatica		+						+	+			+				
Dryopteris filix-mas		+						+				+			+	
Valeriana officinalis			+							+				+		+
Agrostis stolonifera				+				+	+							+

Table 11. cont.

Species List No.	R1	R3	R4	R5	R6	R7	R8	R11	R14	R17	R18	R19	R20	R21	R23	R25
Blechnum spicant					+			+	+						+	
Epilobium hirsutum							+	+						+		+
Galium aparine						+			+			+			+	
Hypochoeris radicata							+		+				+		+	
Deschampsia caespitosa								+		+				+	+	
Lonicera periclymenum								+	+			+			+	
Conocephalum conicum	+	+				+	+	+	+		+	+		+		+
Neckera complanata (e)*	+	+			+			+		+	+	+			+	+
Ulota phyllantha (e)	+			+		+		+			+	+		+		+
Hypnum cupressiforme (e)	+	+		+				+			+			+	+	+
Ulota crispa (e)		+			+			+		+	+	+		+		+
Pellia endiviifolia	+	+					+	+			+	+				+
Thamnobryum alopecurum	+	+				+		+	+			+				
Isothecium myosuroides (e)	+	+			+			+			+				+	
Metzgeria temperata (e)								+		+	+	+		+		+
Plagiomnium undulatum	+	+				+		+				+				
Frullania tamarisci (e)	+	+		+	+			+								
Radula complanata (e)		+			+			+				+		+		
Eurhynchium praelongum					+			+		+	+					+
Plagiochila porelloides	+								+	+		+				
Brachythecium rutabulum	+							+				+				+
Amblystegium serpens						+					+	+				+
Mnium hornum	+							+				+				
Rhytidiadelphus triquetrus		+						+							+	
Lophocolea bidentata								+	+		+					
Fissidens taxifolius								+	+		+					
Frullania dilatata (e)												+		+		+
Homalothecium sericeum (e)		+		+												+
Cryphaea heteromalla (e)											+	+				+
Rhizomnium punctatum	+	+														
Thuidium tamariscinum		+						+								
Brachythecium plumosum		+		+												
Plagiochila asplenioides		+						+								
Pellia epiphylla					+			+								
Barbula cylindrica						+					+					
Atrichum undulatum					+			+								
Lunularia cruciata						+										+
Eurhynchium striatum								+		+						
Isopterygium elegans								+	+							
Cinclidotus fontinaloides						+										+
Isothecium myurum (e)								+				+				
Hypnum mammillatum (e)								+				+				

* (e) = Epiphyte

Hypnum cupressiforme, H. mammellatum, Isothecium myosuroides, I. myurum, Radula complanata, Frullania tamarisci, F. dilatata, etc. Tree roots and overhanging branches, which trap silt, also provide niches for species such as Amblystegium riparium, A. serpens, Barbula cylindrica, Cinclidotus fontinaloides, Plagiomnium rostratum, Encalypta streptocarpa, Leskea polycarpa etc.

Several plant communities are represented along wooded river banks, The most widespread are the willow woods, ascribable to the Salicion albae alliance, and the ash-hazel woods, ascribable to the Corylo-Fraxinetum association of the Querco-Fagetea class. Thorny scrub vegetation, dominated by Crataegus monogyna and Prunus spinosa, is referable to the Primulo-Crataegetum association of the Rhamno-Prunetea class.

4.5. SITES OF SCIENTIFIC INTEREST

Eight sites of scientific importance have been selected for discussion in the following chapter, i.e. Ballydonagh Marsh Complex (a complex containing three poor fens - Ballydonagh, Grange and Pallas), Philipston Marsh, Kilbeg Marsh, Bilboa Valley, Ballyvorheen Bog, Dromsallagh Bog, Ballyneill Marsh and Doonoor Marsh. These have been rated as to their importance at local or regional levels according to criteria used by an Foras Forbartha (Cabot et. al., 1981). The results of this are given in Table 12.

4.5.1. Ballydonagh Marsh Complex

Rating: Regional importance

Description

A series of three small, basin fens, relatively poor in calcium judging by the ecology of the flora. The largest and most important fen is Ballydonagh Marsh itself, which contains a mosaic of poor-fen and swamp communities and several patches of open water. Several rare species are found at this site, including Ranunculus lingua, Carex lasiocarpa, C. elata, C. diandra, Scutellaria galericulata, Juncus subnodulosus and the only station in the catchment for the nationally rare liverwort Ricciocarpos natans (a new county record for South Tipperary). Other species of note, recorded from pools, include Potamogeton obtusifolius, Fontinalis antipyretica, Chara globularis var. virgata and Chara hispida var. rudis.

Table 12. Rating of Sites of Scientific Interest

	Ballydonagh Marsh Complex	Philipston Marsh	Kilbeg Marsh	Bilboa Valley	Ballyvorheen Bog	Dromsallagh Bog	Ballyneill Marsh	Doonoor Marsh
Only area of its type	-	-	-	-	-	-	-	-
One of a few such localities	-	L	L	L	-	-	-	-
Recognised importance	-	-	-	-	-	-	-	-
Fine example of its kind	L	R	R	R	L	L	-	-
Specialized educational importance	R	R	R	R	L	L	L	L
General educational importance	L	L	L	R	L	L	L	-
Overall rating	R	R	R	R	L	L	L	L

R = Regional importance

L = Local importance

Grange Marsh, just north and downstream of Ballydonagh, is notable for a large, monodominant stand of Carex acuta, a species rated of regional importance. Pallas Marsh, further north again, has been partially damaged by recent drainage and reclamation activities. Nonetheless, it still retains wet, swampy areas at its northern extremity, from which the following rare species were noted: Carex acuta, Ranunculus lingua and Riccia fluitans.

Value

This series of small wetlands, at the very eastern limit of the catchment, represent the best examples of poor-fen communities in the area. Such communities are rare in the catchment in general. The occurrence of such a relatively large number of rare species, including aquatic bryophytes of regional and national importance, make these marshes of specialized educational interest.

4.5.2. Philipston and Kilbeg Marshes

Rating: Regional importance

Description

Two small marshes near Philipston House, south of Cappagh White, representing the only examples of rich-fen vegetation in the catchment. Philipston Marsh supports a dense Phragmites australis reedbed and patches of Salix cinerea subsp. oleifolia scrub on its northern margins. The southern part is flushed with calcareous groundwater issuing from the base of a gentle slope. This area supports a very species-rich

mosaic of Carcion davallianae communities, amongst which were found several rarities, including Eriophorum latifolium, Epipactis palustris, Galium uliginosum, Carex diandra and C. lepidocarpa. Typical rich-fen bryophytes, such as Campylium stellatum, Drepanocladus revolvens, Ctenidium molluscum, Fissidens adianthoides, Philonotis calcarea, Cratoneuron commutatum etc., are largely confined to Philipston and Kilbeg Marshes within the Mulkear catchment.

Kilbeg Marsh supports a fine stand of Alnus glutinosa fen carr woodland, with large Carex paniculata tussocks beneath the canopy, on its eastern margin. The western part appears to have been cutaway in the past and is now dotted with small, shallow Chara-dominated pools. Open swards of rich fen communities occupy the "islands", from which the following rarities were recorded: Eriophorum latifolium, Epipactis palustris, Carex diandra, C. lepidocarpa.

Value

These presently undisturbed rich-fens support an unusual and diverse assemblage of plant communities and are thus of general educational value. Specialist interest lies in the occurrence of several rare flowering plants and a rich variety of bryophyte species.

4.5.3. Bilboa Valley

Rating: Regional importance

Description

The lower valley of the Bilboa River, particularly the steeply graded section for about 5 km above its confluence with the Gortnageragh River, represents an excellent example of a relatively undisturbed and undrained river system. The river itself contains an interesting bryoflora, with Schistidium alpicola var. alpicola and Philonotis caespitosa recorded from in-stream boulders, both new to county Limerick. The valley sides support patches of semi-natural broadleaf woodland, dominated by a variety of tree species, including Fraxinus excelsior, Corylus avellana, Quercus robur, Sorbus aucuparia, Betula pubescens, Alnus glutinosa, Crataegus monogyna, Salix caprea, Ilex aquifolium and Prunus spinosa. The ground layer in these woodlands is often open, with a typically rich mixture of woodland herbs and ferns. Bryophyte diversity is high, especially along the numerous tributary streams which run through the woodlands.

Value

A valuable section of undisturbed river channel, with many natural features, and enhanced by exceptionally fine stands of semi-natural broadleaf woodland along the valley sides. The bryophyte flora is of specialist educational importance.

4.5.4. Ballyvorheen and Dromsallagh Bogs

Rating: Local importance

Description

Two similar areas of formerly cutaway bog, now regenerating and supporting a variety of acidophile peatland communities. Ballyvorheen Bog contains some wet areas with good Sphagnum cover. Species of note include Vaccinium oxycoccus and Carex curta, both rated as regionally rare, and the bryophytes Sphagnum fimbriatum and Splachnum ampullaceum.

Dromsallagh Bog also demonstrates good Sphagnum regeneration and supports tall Calluna vulgaris dwarf shrubs, indicating a relatively undisturbed condition. Several bog pools and cutaway pools occur at this site, adding to its diversity with species such as Potamogeton natans, P. polygonifolius, Menyanthes trifoliata, Potentilla palustris, Utricularia minor and Chara spp. Swampy cutaway areas around the southern margin support Phragmitetea and Caricion curto-nigrae communities and notable species such as Carex curta, Sphagnum fimbriatum, S. squarrosum and Calliergon cordifolium. Vaccinium oxycoccus occurs around the northern margins.

Both sites are being invaded by Betula pubescens scrub woodland and isolated shrubs of Rhododendron ponticum were seen in places.

Value

The continuing loss of virgin peatland in Ireland, particularly raised bogs, makes these regenerating cutaways of ever increasing importance. Ballyvorheen and Dromsallagh Bogs are two of the best examples in the catchment and appear not to have been disturbed in recent times. The occurrence of several rarities at these sites adds to their educational value.

4.5.5. Ballyneill Marsh

Rating: Local importance

Description

A series of small kettlehole depressions filled with poor-fen vegetation and some patches of open water. Aquatic communities include species such as Lemna minor, L. trisulca, Potamogeton natans and Chara spp. Surrounding scraw vegetation contains Typha latifolia, Equisetum fluviatile, Menyanthes trifoliata, clumps of Carex paniculata and bryophytes such as Calliergon giganteum and Marchantia polymorpha. Notable species of the neighbouring fen communities are Carex diandra and C. lepidocarpa. The flushed margins of the marsh show a calcareous influence by the presence of bryophytes such as Campylium stellatum, Philonotis calcarea and Plagiomnium elatum.

Value

Locally important for the scarcity of poor-fen habitat generally throughout the catchment. The occurrence of the locally rare sedges Carex diandra and C. lepidocarpa adds to its value.

4.5.6. Doonoor Marsh

Rating: Local importance

Description

A small swamp, dominated by patches of Equisetum fluviatile, Iris pseudacorus, Sparganium erectum and Phalaris arundinacea. The site is notable for the occurrence of the regionally rare Riccia fluitans.

Value

Of specialist educational value for the occurrence of Riccia fluitans.

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