



Laois Habitats Survey 2008



Wet grassland with conifer plantation in the background in Gortahile

Report prepared for Laois Heritage Forum:

PART I: Survey Report & Results

An Action of the Laois Heritage Plan 2007 - 2011

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SUMMARY

This report contains the results of habitat mapping carried out in 2005, 2006, 2007 and 2008 in County Laois. Parts of the north east, south west and south east of the county were mapped. The land surveyed in 2005, 2006 and 2007 was fairly typical of lowland Laois and included the town of Portarlinton. In 2008 the survey focussed on the the south east of the county which included the upland region of the Castlecomer Plateau and the River Barrow adjacent to and south of Carlow town.

Information for the map was gathered through fieldwork assisted by colour aerial photographs (2000 and 2005).

Habitats were mapped principally through fieldwork. In the summers of 2005, 2006, 2007 and 2008 ecologists examined habitats field by field within the survey area. A total of 211 townlands were surveyed over four years in an area covering 351.93 sq km. Permission was always sought before survey work took place and a series of discussions took place with the IFA in 2005 to assist in informing landowners about the purpose of the survey.

Habitats were examined and mapped using methodologies promoted by the Heritage Council in 'A Guide to Habitats of Ireland' (Fossitt 2000) and Draft Habitat Survey Guidelines: A standard methodology for habitat survey and mapping in Ireland (The Heritage Council 2002). Each field or habitat was given a code on a field map. Lists were compiled of flowering plants associated with habitats and notes were compiled of noteworthy features.

Results from the marked up maps were digitised to produce computerised versions of the final maps. To date digitising has been carried out on all the land surveyed. Target notes (made in 2006, 2007 and 2008) have been linked to the digital data base.

Principal findings are:

A total of 60 habitats are present in the area of Laois surveyed. Forty seven habitats were found in 2005, in 2006 an additional eight habitats were recorded with an additional two in 2007. In 2008 three new habitats were documented. They include four new types to describe either different types of garden habitats and land under development which are not contained in the original classification (Fossitt 2000).

Most of the land is covered in two habitats; improved grassland and arable land which are typical of intensive farming systems and which are of relatively low biodiversity value. Within such intensively farmed

areas, habitats of greater biodiversity interest are found, such as hedgerows and drainage ditches. Field mapping confirmed the presence of 6.56 km of hedgerow per square kilometre.

Semi-natural habitats, some of which are of high biodiversity value, account for just over 5% the total area surveyed. These include limestone/ marl lakes, scrub, old grasslands, woodland, wetlands, bogs and fen and flush. Some habitats are only found at one or two sites. The hums (upstanding outcrops of limestone which resemble small steep hills) north of Stradbally are particularly associated with oak-ash-hazel woodland.

The 60 habitats which have been identified support 464 plant species. In the first year (2005), 349 species were found with a further 38 species being added in 2006, 57 more species were recorded in 2007, while in 2008 a further 20 species were added to the total. Species diversity varies greatly between habitats. The most valuable habitats for plants are wet grassland (>175 species) dry calcareous and neutral grassland (>154) and scrub with >153 species. Those with the lowest number of native species include amenity grassland, set aside land, spoil and bare ground, garden shrubberies and some types of woodland. A bee orchid found in a derelict quarry is a protected species under the Wildlife Act. Several other plants found are rare in the region and in Laois.

The habitat survey provides an essential report on biodiversity for parts of Laois. The map and associated statistics provide a baseline against which change can be benchmarked. Its contents can be used to inform the public about their local biodiversity and guide decisions on land use options and strategic planning. The Laois Biodiversity Action Plan requires to be informed by this survey. The vast majority of habitats in the countryside have developed as a result of some form of local development. In future local development will be required to take greater regard for biodiversity. The survey should be expanded to all parts of the county. This would increase the value of the information which has been gathered and enable informed decision making on biodiversity on a county wide basis.

The report concludes with a number of suggestions on how the results of the mapping exercise can be used to generate greater awareness of habitats and their management needs.

1. INTRODUCTION

1.1 PROJECT BRIEF

The brief requested that the study address the following tasks in each of the four years:

- Carry out a detailed field survey of habitats in selected parts of County Laois.
- Liaise with the public and landowners in the areas surveyed and ensure public awareness of the project being undertaken
- Use data collected to make recommendations on conservation priorities and any future work that should be carried out.
- Collate and make this information available for future research, through a detailed survey report and a set of raw data (including maps) as appendices.

1.2 BACKGROUND

A habitat is a defined area, which supports a collection of typical plants and animals. By mapping habitats information can be gathered about the plants and animals which are associated with an area. Habitats can vary in naturalness, depending on the extent to which they have been modified by development. They may be associated with land, freshwater or marine environments.

The Heritage Council has promoted methodologies to map habitats. A guide produced by the Heritage Council (Fossitt, 2000) lists habitats found in Ireland and a methodology has been developed to carry out mapping exercises.

The list includes 89 types associated with terrestrial and 28 with the marine environment. Habitat mapping is an important tool to identify areas of biodiversity interest. Identification of habitats is particularly important to the implementation of the most important piece of wildlife legislation which applies in Ireland; the Habitats Directive (92/43/EEC). The Habitats Directive was brought into force in Ireland through the European Communities (Natural Habitats) regulations 1997 (SI /97/094) and The Planning and Development Regulations 2001 (S.I. 600 of 2001) made under the Planning and Development Act, 2000.

Under this Directive there is a legal obligation on Ireland to protect particular habitats, so called priority and non-priority types, and species listed in annexes to this directive. Table 1 lists habitats which require protection under the Habitats Directive. Priority types include raised bogs, alkaline fen, and orchid-rich

grasslands. They might expect to be found in Laois. Non priority types of relevance to this study area are various types of wetlands. While their protection is of lesser priority internationally, they may be of national, regional and certainly of local importance.

Table 1 Habitats listed in the Habitats Directive

Priority type habitats are in bold. Reference numbers refer to numbering system in EU (2003)

<p><u>Types of freshwater habitats</u></p> <p>Natural dystrophic lakes and ponds (3160)</p> <p>Oligotrophic waters containing very few minerals of sandy plains (<i>Littorelletalia uniflorae</i>) (3160)</p> <p>Oligotrophic to mesotrophic standing waters with vegetation of the <i>Littorelletea uniflorae</i> and/or of the <i>Isoteo-Nanojuncetea</i> (3130)</p> <p>Hard oligo-mesotrophic waters with benthic vegetation of <i>Chara</i> sp. (3140)</p> <p>Natural eutrophic lakes with Magnopotamion or Hydrocharition-type vegetation (3150)</p> <p>Turloughs (3180)</p> <p>Watercourses of plain to montane levels with the <i>Ranunculion-fluitanitis</i> and <i>Callitochio-Batrachion</i> vegetation (3260)</p> <p>Rivers with muddy banks with <i>Chenopodium rubri</i> p.p. and <i>Bidention</i> p.p. vegetation (3270)</p> <p>Petrifying springs with tufa formation (Cratoneurion) (7220)</p> <p>Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)</p> <p><u>Habitats associated with grasslands and marsh</u></p> <p>Semi-natural dry grassland and scrubland facies on calcareous substrates (<i>Festuco-Brometea</i>) (*important orchid sites) (6210)</p> <p><i>Juniperus communis</i> formations on heaths or calcareous grasslands (5130)</p>

Lowland hay meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*) (6510)

Species rich *Nardus* grasslands on siliceous substrates in mountain areas (and submountain areas in continental Europe) (6230)

Calaminarian grasslands of the *Violetaria calaminariae* (6130)

Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleaea*)

(6410)

Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels (6430)

Habitats in areas dominated by heathers

European dry heaths (4030)

Juniperus communis formations on heaths or calcareous grasslands (5130)

Northern Atlantic wet heaths with *Erica tetralix* (4010)

Alpine and boreal heaths (4060)

Habitats associated with peatlands (or boglands)

Active raised bogs (7110)

Degraded raised bogs still capable of natural regeneration (7120)

Blanket bog (*if active bog) (7130)

Depressions on peat substrates of the *Rhynchosporion* (7150)

Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* (7120)

Alkaline fens (7230)

Transition mires and quaking bogs (7140)

Woodland type habitats

Old sessile woods with *Ilex* and *Blechnum* in the British Isles (91AO)

***Taxus baccata* woods in the British Isles (91JO)**

Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (Alno-padion, Alnion incarae, Salicion albae) (91EO)

Bog woodland (91DO)

Habitats associated with exposed rock

Siliceous rocky slopes with chasmophytic vegetation (8220)

Calcareous rocky slopes with chasmophytic vegetation (821)

Limestone pavements (8240)

Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Caleopsietalia ladani*) (8110)

Calcareous and calcshist screes of the montane to Alpine levels (*Thlaspietea rotundifolii*) (8120)

Caves not open to the public (8310)

While the emphasis in the Habitats Directive is on specific habitats and species it also recognises the need for management of the wider countryside. The preamble recognises that “land use planning and development policies should encourage the management of features of the landscape which are of major importance to flora and fauna”.

The Habitats Directive states (Article 3) that there are obligations on member states to maintain features of the landscape, which will improve the ecological coherence of the network of designated sites (Special Areas of Conservation or Special Protection Areas) which contain the best examples of the these priority and non priority habitats. The obligations and the type of features are highlighted in Article 10 as follows:

“Such features are those which by virtue of their linear and continuous structure (such as rivers with their banks or traditional systems for marking field boundaries (*i.e. hedgerows*) or their function as stepping

stones (such as ponds or small woods) are essential for the migration, dispersal and genetic exchange of wild species.”

As habitat mapping provides comprehensive maps of biodiversity, the location of priority and non-priority sites, link features such as rivers and hedgerows and all types of habitats (even less natural types) will be highlighted.

Global awareness of the decline in biodiversity has led to a greater focus on managing biodiversity at the local level. The Convention on Biological Diversity (CBD) drawn up in 1992 defined biodiversity as “the variability among living organisms including *inter alia* marine, terrestrial and aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems”. It can be expressed at different levels; landscape, habitats, ecosystems, species and genes.

Ireland ratified the CBD in 1996. Under Article 6 all signatories are obliged to develop a national strategy for biodiversity and to integrate the conservation and sustainable use of biological diversity with relevant sectoral or cross-sectoral plans, programmes and policies. The CBD represents a shift away from preservation of rare species and habitats. It is concerned with biodiversity in all its forms and with integrating biodiversity with development. Arising from its ratification of the CBD Ireland drew up a National Biodiversity Plan in 2002 (Department of Arts, Heritage, Gaeltacht and the Islands). This stated the need for both sectoral biodiversity action plans and plans for local areas such as Local Biodiversity Action Plans, for which responsibility was given to Local Authorities.

The wildlife, habitats, flora and fauna found in County Laois are unique to it and thus are a valuable part of its heritage. A Local Biodiversity Action plan will suggest how this heritage will be managed and developed.

Before the start of this survey, there had not been a comprehensive and detailed survey carried out of the natural environment in County Laois. Survey work had focussed on designated areas, particular habitats and areas for which development is proposed. Little was known about the general distribution of habitats within the county including man-made habitats such as those found in urban areas, along roadsides and even among the ruins of old buildings. Habitat mapping carried out in Laois through this project, will provide the first account of the location, distribution and nature of habitat diversity in the county.

The preparation of habitat maps provides baseline information to support the preparation of the local biodiversity action plan. The resulting maps will raise awareness among landowners and the public of the usefulness of biodiversity. The information gathered can be used to inform spatial planning, specific local development initiatives such as agri-environmental measures, forestry development, the location of infrastructure, environmental education and special interest or eco-tourism.

The habitat map produced in 2005 provided the first account of habitat diversity in the county. Habitat mapping in 2006 provided information on a section of the county adjacent to the land surveyed in 2005. In 2007 habitat mapping continued to expand those areas and for the first time mapping covered designated sites of biodiversity value. Surveying of designated sites continued in 2008 and also included upland areas. While most of the habitat maps produced in 2005 were only digitised later, the results of mapping exercises in 2006, 2007 and 2008 were digitised the same year. In 2007, target notes prepared for particular sites of interest surveyed in 2006 and 2007 were linked to this database. Target notes for 2008 are also linked to the digitised maps.

A study of the underlying geology of the Castlecomer Plateau, compiled by Mary Tubridy and Associates (2008) is included in the Appendices (Appendix 10 Biogeodiversity of the Castlecomer Plateau in southeast Co. Laois) and provides a brief history of mining in the area, in addition to the biogeodiversity of the 2008 study area.

The four phases of the Laois Habitat Survey which have been completed to date provide a comprehensive account of biodiversity in a sample of the entire county. By creating a digital database it will be possible to update and integrate its results with those from other sources of habitat mapping. An important indirect result of habitat mapping which is generated solely through field work is the opportunity it offers for contacts between ecologists and landowners.

2. METHODOLOGY

2.1 APPROACH

The approach used for the County Laois Habitats Survey was based on the Heritage Council Guidelines (Fossitt 2000 and Heritage Council 2002), and drew on the experience of the surveyors in Dublin, Westmeath and Carlow.

While the brief for the survey initially (2005) specified that it would be carried out within parishes, this was reconsidered for the following reasons and townlands were selected as survey units. There are three types of parish – Civil, Church of Ireland and Roman Catholic. The Civil seemed the most appropriate but it proved difficult to find clear information regarding their boundaries. Few people identify with Civil Parishes. It was difficult to find suitable maps for the other two types of Parish and choosing an area based on religious criteria could be seen as favouring one section of the population over another. Consequently, it was decided to abandon the parish as a gross survey unit and to use townland unit instead. The townland is an clearly defined administrative and mapping unit. Within rural areas townlands are important to locate households and farms and the boundaries of townlands often run along features of biodiversity interest such as hedgerows or streams.

2.2 SURVEY AREA

The selection of townlands to be surveyed each year was made principally by members of the County Laois Heritage Forum. Selection was based on the requirement to survey a geographic spread of townlands, which would contain both typical and unique Laois habitats. Designated areas such as Natural Heritage Areas (NHAs) and SACs (Special Areas of Conservation) were omitted from the survey in 2005 and 2006, as it was considered that the biodiversity value of these areas was known and their habitats would be mapped to inform their management plans. This policy was subsequently reviewed and thus the surveys in 2007 and 2008 included designated areas. These were mainly parts of the River Barrow and Nore SAC, and included sections within Portarlinton in 2007 and adjacent to Carlow town and its environs in 2008.

During each Phase of the survey, blocks of townlands were surveyed in the north east, south west and south east of the county (Fig. 1 and Table 2). In 2005 townlands around Emo, Portarlinton & Stradbally, were surveyed. This area was extended to the county boundary including Portarlinton in 2006. In 2007 surveying continued in townlands around Ballybrittas and Stradbally. In the south west of the county habitat mapping focussed on the Aghaboe area. Townlands within that parish were mapped in 2005 and a further set were examined in 2006 and 2007.

The 2008 survey included townlands located on the Castlecomer Plateau and bordering Carlow town. During the four years (2005, 2006, 2007 and 2008), the survey mapped habitats in 211 townlands: 109 in the area to the north east of the county, 41 in the south west, and 61 in the south east, covering just over 350 km² of County Laois.

The habitat mapping rate and methodology was informed by trial surveys in 2005 in the townland of Morette, in 2006 around Portarlinton and in the townland of Clonanny and along the River Barrow SAC where it flows through Portarlinton in 2007. In 2008 the trial survey took place in the upland townland of Rossmore on the Castlecomer Plateau. These trials tested the survey methodology, clarified the requirements for mapping and allowed for the resolution in differences in interpretation between surveyors.

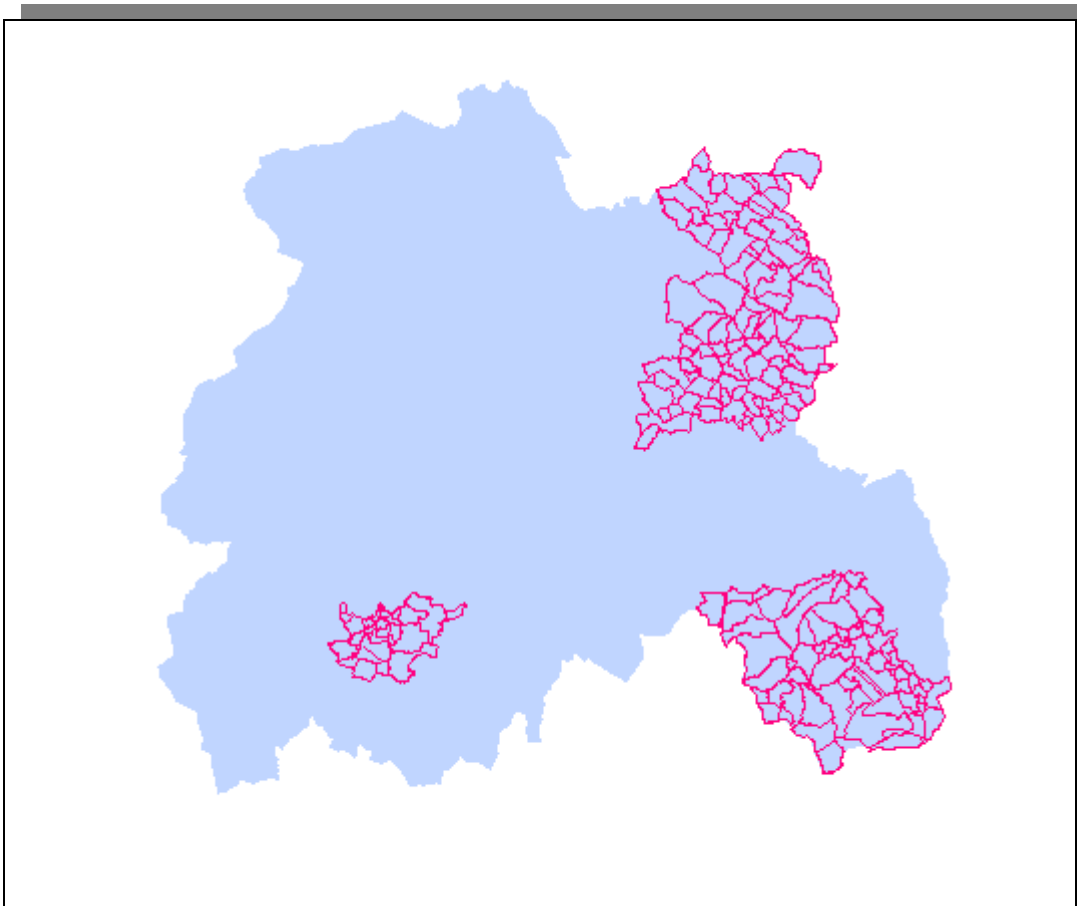


Fig. 1. Areas surveyed and digitised in Laois 2005-2008

Table 2. Townlands surveyed and digitised in Laois, 2005 - 2008.

Year and region	Townlands Surveyed		
North east 2005	Aghnahilly	Killone	
	Aghnahilly Bog	Kilmurry	
	Ballinlough	Kilteale	
	Ballycarroll	Kylespiddogge	
	Ballyduff (Ed Kilmurry)	Lamberton Demesne	
	Ballymaddock	Loughakeo	
	Ballythomas	Morett	
	Bellegrove	Park Lower	
	Cappakeel	Park or Dunamase	
	Carigeen (Ed Kilmurry)	Park Upper	
	Coolnacarrick	Powelstown	
	Dysart	Raheen	
	Garryduff	Raheenahown South	
	Garrymaddock	Raheenahown North	
	Grange Lower	Raheenanisky	
	Grange Upper	Rathcrea	
	Hophall	Rossmore	
	Killenny	Tonafarna	
North east 2006	Ballymorris	Kilbracken	
	Belan	Kilbride	
	Bracklone	Lough	
	Belan	Portree	
	Bracklone	Rathleash	
	Coolagh	Rathronshin	
	Coolroe	Rossmullan	
	Cooltederry	Tierhogar	
	Courtwood	Vicarstown (Dodd)	
	Doolough	Vicarstown (Cosby)	
	Droghill		
	North East 2007	Ballintogher	Inchacooly
		Ballyading	Jamestown or Ballyteigueduff
Ballybrittas		Killaglish	
Ballycarroll		Killeen	
Ballyduff (ed Curraclone)		Killinure	
Ballykilcavan		Kilmullen	
Ballymanus		Kilrory	
Ballynowlan		Knocknambraher	
Ballyrider		Knockphilip	

Year and region	Townlands Surveyed	
	Ballyshaneduff or The Derries	Kylebeg (ed Curraclone)
	Bawn	Kylebeg (ed Stradbally)
	Binbawn	Lea
	Blackford	Loughmansland Glebe
	Bolnagree	Mill land
	Brockley park	Monaferick
	Carricksallagh	Moyanna
	Clonanny	Newtown
	Cloسلاند or Cloneen	Oughaval
	Correel (ed Moyanna)	Park
	Correel (ed Vicarstown)	Raheenanska
	Curraclone	Raheenduff
	Derrybrock	Rathmore
	Derrynafunshin	Stradbally
	Garrans	Tullaghan
	Graigueavern	Tursalla
	Inch	Ullard or Controversyland
South west 2005	Ballygowdan	Garryniska
	Ballyhinod	Grantstown
	Bordwell Big	Kilbreedy
	Bordwell Little	Leap
	Brocka	Middlemount
	Chapelhill	Middlemount or Ballyvoghlaun
	Coolacurragh	Oldglass (Part of)
	Coolbally	Rhahandrick Lower
	Court	Rhahandrick Upper
	Curragh	Shanvaghey
	Farranville	Tinnaragh
	Garryduff	Tooreagh
South west 2006	Anster	Kilminfoyle
	Ballycolla	Legaun
	Dairyhill	Oldglass
	Fearagh	
South west 2007	Ballycolla heath	Kyle
	Ballygauge more	Kylebeg
	Cool	Moyne
	Coolderry	Rathmakelly glebe
	Killermogh	Tinnaraheen
South East 2008	Aghaterry	Garrrendenny
	Aghcross	Garrough

Year and region	Townlands Surveyed
Ardateggle	Gortahile
Ardrough or Huntspark	Graigie
Ashfield	Keeloge
Ballickmoyler	Kilcruise
Ballickmoyler Upper	Kilgory
Ballyhide	Killeshin
Ballykillen	Kylenabehy
Ballylehane Upper	Lambstown
Ballynagall	Maidenhead
Ballynakill	Mayo
Cappalug	Monavea
Clogrenan (part of)	Monure
Clogrenan	Moyadd
Clonbrock	Olderrig
Clonmore	Oldleagh
Cloonaloo	Rathillig
Coolanowle	Rossmore
Coolhenry	Rushes
Coolrain	Slatt Lower
Cooperhill Demesne	Slatt Upper
Coorlaghan	Springhill
Coornariska	Springhill (part of)
Crettyard	Stanney
Crossneen	Tinnasragh
Curragh	Towlerton
Derrymoyle	Turra
Doonane	Wolfhill
Drumagh	Woodland or Garragh
Farrans	

2.3 ANCILLARY DATA

Ancillary sources of data are listed in Table 3.

Table 3. Ancillary data Consulted

Data source	Information	Usefulness/value of information
Vicarstown Village Residents Association	A study of the ecology of the Grand Canal Bank at Vicarstown, Co. Laois – with a view to sensitive development (Behan, 2002)	While the Grand Canal, as a Natural Heritage Area does not come under the remit of the study the report describes relevant adjacent habitats and has good lists of flora and fauna.
Coillte	Biodiversity Areas in the Mid Tipp/Rossmore Plateau, FMU 403, 2004	No surveyed sites listed in this report fell within the survey area.
Coillte	Biodiversity Areas in the Slieve Bloom Forest Management Units 705 (FMU).	During 2005 and 2006 there was one forest area (Area no. 21, Rossmore) from the FMU report in the areas surveyed. It provided useful information about biodiversity of River Glasha. In 2007 there were two forest areas (Area no. 31, The Derries and Area no 19, Garrans) from the FMU report in the areas surveyed.
Coillte	Maps of different forest blocks in survey area.	These maps were useful as they provided clear information as to the extent and layout of the forests as well as details about forest tree species and wood history.
National Roads Design Office, Kildare County Council	EIS for M7 Heath-Mayfield Motorway	Habitat descriptions for some of townlands surveyed along motorway near Portlaoise.
Dr Evelyn Moorkens	BSBI records for Laois	The presence of species records for the following townlands: Tierhogar Level Crossing N5710 Ballymorris N5410 Carrick Hill; Cooltederry N5410 Railway bridge and part of Portarlington town N5410 ; Lea Castle N5712 provide an indication of areas of particular interest, Ballickmoyler

Data source	Information	Usefulness/value of information
NPWS	Site synopsis of designated areas in study area	Site synopsis of the following areas were examined; Grantstown wood and Lough Site code 000417; Coolacurragh woods site code 000862; Kiltale Hill 000867; Dunamase woods 001494; Rock of Dunamase 001494 – Barrow cSAC. No. 002162, Provided two extra species - <i>Catapodium rigidum</i> , Hedgerow Crane's bill
NRA report for Laois County Council (ARUP Consulting Engineers)	Environmental Impact Statement M7 Portlaoise – Castletown, M8 Portlaoise – Cullahill Road scheme.	Habitat information for the townlands of Coolnacurragh pNHA Wet willow-alder-ash woodland (WN6); Curragh (Mixed) broadleaved woodland (WD1); Ballyhinode WD1; Clogh Oak-ash-hazel woodland (WN2) and Leap (Mixed) conifer plantation (WD3), surveyed in the Aghaboe region. Some descriptions of habitats. Some information on aquatic and riparian habitats – Erkina river
Royal Haskoning and JBA (2006) Portarlinton Strategic Flood Risk Management Constraints Study	Habitat mapping using UK system in the immediate environs of the River Barrow and two small tributaries (Cemetery Stream and Blackstick Stream) near Portarlinton. Field work focussed on river in SAC.	No species added to those already recorded. Habitats mapped in area outside the scope of this study.
Eco Power	EIS report for Monavea, Gortahile re siting of wind turbines in area	Some background information useful to survey
David Bourke, Tamara Hochstrasser, Stephen Nolan and Rogier Schulte. Teagasc Environmental Research Centre, Johnstown Castle, Co. Wexford and the School of Environmental Science, UCD. Historical Grassland Turboveg Database Project. 2067 Relevés recorded by Dr. Austin O'Sullivan 1962 – 1982. Final Report.	Grassland relevés and soil data of agricultural grassland throughout Ireland.	Baseline information from 1960's to 1980's on agricultural grassland. Some of the relevés taken by Dr. O'Sullivan were in the 2008 survey area.

Data source	Information	Usefulness/value of information
Carlow County Council and the Heritage Council	Habitat Survey of Graiguecullen, Co. Carlow, carried out by Dr. Betsy Hickey	Description and species list from Wet willow-alder-ash (WN6) woodland and of recolonising bare ground (ED3) adjacent to River Barrow, part of which is in County Laois. This was useful as this site was not accessible 2008.

2.4 CONSULTATIONS

Consultations were held with landowners, the Laois Heritage Forum and farming organisations. Leaflets were produced providing information about the project (see Appendix 1). The leaflet was given to landowners, libraries, to members of the public encountered by surveyors and left in Local Authority offices and libraries.

Regular consultations were held with the Heritage Officer and Heritage Forum to discuss areas to be surveyed, local contacts, and mapping requirements. After the pilot area was mapped in 2005 a further meeting took place to discuss the results and agree on the form and scale of the field maps that would be used during the survey.

On June 29th 2005 a meeting took place with most members of the Laois Heritage Forum during which progress on the survey was outlined. There was another meeting with the Heritage Forum on July 12th 2005 where issues regarding the digitisation of the maps were discussed with the IT department in Laois County Council. This meeting provided an opportunity to meet with Neil Foulkes and Anja Murray who were working on the Laois Hedgerow survey (Foulkes and Murray 2005).

Facilitated by the IFA's representative on the Heritage Forum a presentation was made to County Executive of the IFA in the Heritage Hotel, Portlaoise on May 3rd 2005 when the aims and purpose of the habitat study were outlined and help and permission to access private land were sought from farmers and landowners. Following on from the presentation to the County Executive of the IFA a meeting was held on 2nd June 2005 with local representatives of the IFA in the proposed survey areas.

During Heritage Week 2005, 2006 and in 2007 presentations were made to the public as part of an annual seminar on Laois Heritage.

Consultations principally took place with landowners. During these contacts information was gathered on past and current land management practices, their aspirations for further development and whether they would be interested in obtaining information about the results of the survey. A list was compiled of landowners contacted and members of the public who assisted the surveyors (Appendix 2).

2.5 FIELDWORK

Habitats were principally mapped through fieldwork assisted by colour aerial photographs (2000 during 2005, 2006 and 2007, whilst the 2008 survey used colour aerial photographs produced in 2005), 6-inch OS raster maps (Ordnance Survey, 1906 edition) and vector maps (1:6,000). Fieldwork was carried out principally by Betsy Hickey assisted by Mary Tubridy and Mark Mc Corry in 2005 and principally by Betsy Hickey assisted by Mary Tubridy and Fiona MacGowan in 2006. In 2007 field work was carried out principally by Betsy Hickey and assisted by Mark Mc Corry and Mary Tubridy. Betsy Hickey was the principal surveyor for the 2008 survey, assisted by Tim Ryle, Mark Mc Corry and Mary Tubridy.

During 2006, 2007 and 2008 maps and aerial photographs for use in the field were produced at A4 size. These were gridded according to the Discovery map. As the map or photo covered 2/3 of the page, there was adequate space on each sheet to include notes, surveyor's name (s), date etc. A scale box size 50m X 50m was also shown (See Appendix 3 for a sample field survey sheet).

Before the surveyors visited the area to be surveyed aerial photographs were examined carefully. Areas of improved grassland were usually obvious. Less improved areas were then targeted for detailed field examination. Examination of the OS map sometimes indicated the presence of features of habitat interest which if then obvious on the aerial photograph were also marked on the vector map for more intensive examination in the field.

On reaching the area to be examined and before starting fieldwork, landowners were located by identifying the nearest farmhouse. They were appraised about the purpose of the survey and asked for permission to survey their land. If time allowed they were engaged in a discussion on land management practices. If the landowner could not be located and their land could not be surveyed, habitats on their land were assigned using aerial photographs or/and visual inspection from the nearest accessible area.

The land was surveyed by walking along public roads or through fields. Habitat codes were added to the vector map on a field by field basis. If the habitat being mapped was not bounded by a field boundary, its limits were identified using a combination of aerial photography and field inspection.

Lists of plant species were compiled for each habitat type. Where particularly interesting species or habitats were found, a target note was taken and the area marked with a unique number on the map. Target notes were compiled on the sites of invasive exotic species. Photographs were taken of features of interest and habitats.

Species identification and nomenclature was based on Hubbard (1992), Jermy et al (1982), Mitchell (1978), Rose (1981), Rose (1989) and Webb et al (1996).

Surveying took place over a period of 111 days during June, July and August in 2005, 2006, 2007 and 2008. The land was surveyed at an average rate of 3 km² per day, however this varied according to the location, terrain and habitat diversity. Cover varied from approximately 1–2 km² per day in areas where there was a high diversity of habitats in both rural and urban areas, to 5-6 km² per day in areas that were predominantly improved agricultural grassland.

2.6 MODIFICATIONS TO PUBLISHED METHODOLOGY


Changes to the methodology were required to describe habitat types not considered by Fossitt (2000).

These were:

- BL3D land being developed
- BL3 1 big gardens
- BL3 2 medium gardens
- BL3 3 small gardens
- ED6 setaside

All are man-made habitats. The first four occur primarily in urban areas and were identified in 2006 around Portarlinton. The fifth habitat ED6 setaside was found in 2005.

BL3D Land being developed

Land being developed refers to areas that are being developed for residential or industrial use and are temporarily in a state of flux.  The code for this habitat type is represented by an irregular pattern of tiny grey squares on a white background.

Currently garden habitats can fit into one of two categories depending on whether they are predominately (GA2) amenity grassland (improved) or predominantly ornamental/non-native shrub. These habitat designations are appropriate when the gardens being surveyed are in rural areas and/or they are sparsely distributed, in urban areas however where houses are closely packed together it is not feasible to assess each garden individually. Subsequently, it was decided to divide urban gardens and housing estate developments in rural areas into categories depending on the size of garden.

The three garden types were principally distinguished by size; big gardens BL3 1 (> than 500 m²), medium gardens BL3 2 (250 and 500 m²) and small gardens BL3 3 (<250 m²).

BL3 1 Big Gardens



The code for this habitat type is represented by pattern of small crosses outlined by the colour olive green.

BL3 2 Medium gardens



The code for this habitat type is represented by a pattern of wavy horizontal lines and the colour olive green.

BL3 3 Small gardens





The code for this habitat type is represented by squares with olive green lines on a white background


ED6 Setaside



The code for this habitat type is represented by an irregular pattern of tiny red squares on a white background.

An additional symbol was developed for ornamental hedgerows which is a sub category of the habitat ornamental trees and shrubs (WS3). Ornamental hedgerows are linear in character and the existing symbol/pattern for WS3 is area based; subsequently a dark green hatched line

() was used for hedgerows of non-native species and called WS3 A, whilst ornamental trees and shrubs became WS3 B maintained the original pattern ().

New one-off houses that were not represented on the vector maps were drawn in, in their approximate location and given a different colour () but same pattern and code letters to Buildings and artificial surfaces BL3.

The location of target notes was shown on vector maps instead of GPS readings and given a 4-figure grid reference.

2.7 CONSTRAINTS

Timing affected the completeness of plant lists in surveyed habitats. While habitat types can be identified in all seasons, plants in woodlands were under recorded as they flower early in the season. As the surveyors could not access all parts of waterways the flora of areas of open water was similarly under recorded. Access was an issue in a few areas. In 2005 the size of maps made fieldwork difficult as A0 size was difficult to manage in the field. This problem was rectified in 2006 thus making fieldwork more efficient.

2.8 PROCESSING AND PRESENTATION OF RESULTS

During fieldwork, a large amount of information was gathered. This included species lists, digital photographs, annotated vector maps and target notes on individual sites. The species lists, as well as a checklist of habitat types and any landowner details, were compiled into an Excel spreadsheet within one or two days of fieldwork.

Hand-coloured maps showing habitats in the townlands were produced to accompany the report of the survey in 2005. During the early part of 2006 approximately half of the townlands surveyed in 2005 were digitised using MAPINFO. All the habitat information was digitised in 2006. This was more cost effective and efficient as the maps were produced by the principal surveyor soon after fieldwork was finished. All undigitised maps from 2005 were digitised at the same time as those for 2007 and now all townlands surveyed to date have been digitised. By linking target notes to habitats all can be directly accessed by clicking on the relevant point in the digital habitat map.

This report contains the results of the mapping projects in 2005, 2006, 2007 and 2008. It is accompanied by a hard copy of the habitat map, an excel file with target notes and a CD containing digitised results and photos.

3. RESULTS

3.1 SUMMARY

The principal results of the survey are summarised in Tables 4, 5, 6 and 7. Appendix 4 contains a complete species list of plants recorded during the 4 years. Appendices 5, 6 and 7 list uncommon species and Appendix 8 contains information about plant species in all habitats surveyed.

3.1.1 HABITAT AND SPECIES DIVERSITY

Table 4 identifies habitats in the area surveyed and total number of species recorded from these habitats.

Table 4 Habitats and associated species numbers.

Note: Habitats without an asterisk were initially found in 2005 while those with one asterisk were found the following year in 2006. Habitats with two and three asterisks indicate additional ones recorded during 2007 and 2008 respectively.

Level 1 Habitat	Level 2 Habitat	Level 3 Habitat	No. of species recorded per habitat
F Freshwater	FL Lakes and ponds	FL3 Limestone/marl lakes	20
		FL4 Mesotrophic lakes*	19
		FL5 Eutrophic lakes	38
		FL8 Other artificial lakes and ponds	11
	FW Watercourses	FW1 Eroding/upland rivers***	1
		FW2 Depositing lowland rivers	47
		FW3 Canals*	34
		FW4 Drainage ditches	72
	FP Springs	FP2 Non-calcareous springs	17
	FS Swamps	FS1 Reed and large sedge swamp**	47
FS2 Tall-herb swamp**		12	
G Grassland and marsh	GA Improved grassland	GA1 Improved agricultural grassland	40
		GA2 Amenity grassland (improved)	13

Level 1 Habitat	Level 2 Habitat	Level 3 Habitat	No. of species recorded per habitat
	GS Semi-natural grassland	GS1 Dry calcareous and neutral grassland	154
		GS2 Dry meadows and grassy verges	133
		GS3 Dry-humid acid grassland	63
		GS4 Wet grassland	177
		GM1 Marsh	45
H Heath and dense bracken	HH Heath	HH1 Dry siliceous heath***	
		HH3 Wet heath	18
	HD Dense bracken	HD1 Dense bracken	22
P Peatlands	PB Bogs	PB1 Raised bog*	33
		PB4 Cutover bog	48
	PF Fens and flushes	PF1 Rich fen and flush	24
		PF2 Poor fen and flush	14
W Woodland and scrub	WN Semi-natural woodland	WN1 Oak-birch-holly woodland	32
		WN2 Oak-ash-hazel woodland	173
		WN6 Wet willow-alder-ash woodland	63
		WN7 Bog woodland	43
	WD Highly modified /non-native woodland	WD1 (Mixed) broadleaved woodland	142
		WD2 Mixed broadleaved/conifer woodland	69
		WD3 (Mixed) conifer woodland	51
		WD4 Conifer plantation	8
		WD5 Scattered trees and parkland	21
	WS Scrub/transitional woodland	WS1 Scrub	156
		WS2 Immature woodland	37
		WS3 Ornamental/non native shrub	10
		WS4 Short rotation coppice***	1

Level 1 Habitat	Level 2 Habitat	Level 3 Habitat	No. of species recorded per habitat
		WS5 Recently felled woodland	85
	WL Linear woodland/scrub	WL1 Hedgerows	154
		WL2 Tree line	18
E Exposed rock and disturbed ground	ER Exposed ground	ER1 Exposed siliceous rock	7
		ER2 Exposed calcareous rock	33
	ED Disturbed ground	ED1 Exposed sand, gravel or till	10
		ED2 Spoil and bare ground	4
		ED3 Re-colonising bare ground	71
		ED4 Active quarries and mines*	1
		ED6 Set-aside	1
B Cultivated and built land	BC Cultivated land	BC1 Arable crops	37
		BC2 Horticultural land	4
		BC3 Tilled land	-
		BC4 Flower beds and borders	19
		BL1A Stone wall	27
		BL1B Other stone-works	9
		BL2 Earth banks	86
		BL3 Building and artificial surfaces	10
		BL3 D Land being developed*	-
		BL3 1 Big gardens*	-
		BL3 2 Medium gardens*	-
		BL3 3 Small gardens*	-

A total of 60 different habitats have been identified in the area surveyed in Laois. Forty seven habitats were found in 2005, an additional eight habitats were recorded in 2006 and a further two in 2007. Three more were recorded in 2008. These included three garden types found around Portarlinton (2006), two new freshwater swamp habitats (2007) and one heath and scrub/transitional woodland habitat (2008). Some of these are priority and non priority habitats recognised under the Habitats Directive.

In these habitats, 464 plant species are found. The most species-rich habitats (with >100 species) include dry and wet grasslands, oak-ash-hazel woodland, scrub, hedgerows and (mixed) broadleaved woodland. All of these except (mixed) broadleaved woodland are semi-natural types. Those with the highest number of species, wet grassland, oak ash hazel woodland and scrub, tend to be diverse and are usually present within mosaics of other habitats in which either wet grassland or scrub is dominant.

Among the 464 species, 33 (listed in Appendix 5) are rare regionally and locally. These include the protected bee orchid (Fig. 2); the Red Data Book species (Curtis and McGough, 1988) marsh helleborine and the regionally rare lesser butterfly-orchid, greater butterfly-orchid and mountain everlasting.



Fig. 2. Dry calcareous and neutral grassland with the rare bee orchid (protected under the Wildlife Act 1976) growing in association with quaking grass and bird's-foot-trefoil in a disused quarry, Kilbride, Co. Laois (GS1, grid square N5209, target note 7).

The Irish Branch of the Botanical Society of the British Isles (Appendix 6) recorded an additional 74 species in the study area and records compiled by the Dublin Naturalist's Field Club during an outing to Hewson Hill, Coolnacarrick provide an additional 3 species (Appendix 7).

In contrast to the presence of native plant species which are rare, reflect local ecological conditions and are under threat, four non-native plants: Japanese knotweed, rhododendron, Himalayan balsam and blue sow thistle (*Cicerbita macrophylla*) are spreading into semi natural habitats in Laois and thus threatening the local flora and fauna.

Japanese knotweed is now growing actively at thirteen locations in the surveyed area:

- Lamberton Demesne S5195 Target note 4 at which a stand about 5 m wide was seen on a road verge beside a lay by;
- Tinnarragh S3281 Target note 3, in hedge and garden of derelict house;
- Courtwood N6103 Target note 4, beside a derelict house adjacent to canal.
- Grantstown S3379 Target note 1, 10 -15 m long strip on roadway verge adjacent to Coolnacurragh wood.
- Vicarstown (Dodd) N6101 Target note 1, where 4 or 5 stands are growing on the western side of the Grand Canal.
- Cool S3881 Target note 2, growing in a topographical hollow with mosaics of reed and large sedge swamp and recently planted broadleaved woodland.
- Lea N5711 Target note 1, growing on left hand side of laneway leading to Lea graveyard. It is also spreading into the field adjacent to laneway.
- Brockley park S5897 Target note 1
- Ballykilcavan S5996 Target note 5, area 6 m x 2m growing at the border of riparian woodland with reed and large sedge swamp
- Farrans S6181 Target note 1, Japanese knotweed to left of farm gate and in bank to right of gate heading up lane towards house.
- Ashfield S6582 Target note 2, Small clump of Japanese knotweed ~2m by 5m
- Ballylehane Upper S6083 Target note 2, a small stand of *Reynoutria japonica* along the western side of narrow local road. On top of a low earth bank. The stand extends for less than 100 metres and measures 2.5 metres tall and up to 3 metres wide.
- Slatt Lower S5682 Target note 1, a patch of Japanese knotweed was recorded alongside this small watercourse FW2, to the East of the road.

Rhododendron was found growing in Garryvacum N5507 Target note 8 on cutover bog and it was also recorded by the BSBI in Grantstown S3380.

Blue sow thistles were recorded in Mayo S6175 Target note 1 and in Monavea S6275 Target note 1, growing on the roadside verge next to an abandoned dwelling.



Fig. 3 Blue sowthistle (*Ciccerbita macrophylla*), an invasive garden escape found growing in grass margin in Mayo (Grid square S6175) and in Monavea (Grid square S6275).

Unless unchecked these plants will quickly dominate the ecology of the habitats where they are now found.

3.1.2 COVER OF HABITATS (MEASURED BY AREA)

Table 5 provides information on the relative cover of principal habitats. Table 6 lists high value semi-natural types.

Table 5. Cover of principal habitats for years 2005-2008

Habitat	Area (ha) 2005-2007	% total area surveyed	Area (ha) 2005 - 2008	% total area surveyed
Improved agricultural grassland	10993.39	47.74	19583.99	55.65
Arable crops	5708.69	24.79	6295.75	17.89
Conifer plantation	642.14	2.79	1964.24	5.58
Amenity grassland (improved)	396.51	1.72	626.35	1.78
Mixed broadleaved woodland	335.3	1.46	367.33	1.04

Habitat	Area (ha) 2005-2007	% total area surveyed	Area (ha) 2005 - 2008	% total area surveyed
Wet grassland	314.14	1.36	853.22	2.42
Buildings and artificial surfaces	278.78	1.21	425.53	1.21
Immature woodland	273.92	1.19	289.84	0.82
Scrub	207.13	0.90	334.71	0.95
Scattered trees and parkland	137.89	0.60	157.66	0.45
Oak-ash-hazel woodland	135.07	0.59	230.51	0.65
Mixed conifer/broadleaved woodland	102.2	0.44	158.28	0.45
Setaside	98.25	0.43	102.84	0.29
Dry meadows and grassy verges	79.5	0.35	142.85	0.41
Cutover bog	71.11	0.31	71.11	0.20
Large gardens	56.75	0.25	121.41	0.34
Medium gardens	51.31	0.22	96.63	0.27
Wet pedunculate oak-ash woodland	48.83	0.21	48.83	0.14
Small gardens	48.68	0.21	50.23	0.14
Land under development	44.08	0.19	89.71	0.25
Dry calcareous and neutral grassland	38.7	0.17	67.71	0.19
Recently-felled woodland	38.45	0.17	69.03	0.20
Horticultural land	35.68	0.15	39.04	0.11
Ornamental/non-native shrub	35.05	0.15	43.4	0.12
Recolonising bare ground	31.13	0.14	59.48	0.17
Mixed conifer woodland	30.09	0.13	40.8	0.12
Wet-willow-alder-ash woodland	29.14	0.13	29.88	0.08
Tilled land	26.09	0.11	26.09	0.07
Active quarries and mines	22.5	0.10	44.51	0.13

Habitat	Area (ha) 2005-2007	% total area surveyed	Area (ha) 2005 - 2008	% total area surveyed
Spoil and bare ground	16.8	0.07	39.41	0.11
Marsh	13.44	0.06	13.79	0.04
Bog woodland	10.01	0.04	10.01	0.03
Raised bog	9.31	0.04	13.07	0.04
Eutrophic lakes	6.98	0.03	8.09	0.02
Dry-humid acid grassland	5.96	0.03	153.7	0.44
Reed and large sedge swamp	4.98	0.02	4.98	0.01
Dense bracken	4.79	0.02	10.02	0.03
Wet heath	4.07	0.02	15.39	0.04
Mesotrophic lakes	3.11	0.01	3.158	0.01
Other artificial lakes and ponds	1.96	0.01	17.55	0.05
Oak-birch-holly woodland	1.82	0.01	5.15	0.01
Other stonework	1.57	0.01	1.76	0.01
Tall-herb swamp	1.4	0.01	2.61	0.01
Rich fen and flush	1.04	0.00	1.04	0.00
Exposed calcareous rock	0.97	0.00	0.97	0.00
Limestone/marl lakes	0.64	0.00	0.64	0.00
Exposed sand, gravel or till	0.28	0.00	0.78	0.00
Dry heath	0	0.00	55.4	0.16
Flower beds and borders	0	0.00	0.25	0.00
Non-calcareous springs	0	0.00	0	0.00
Poor fen and flush	0	0.00	0	0.00
Short rotation coppice	0	0.00	0.01	0.00

Linear habitats such as roads, rivers, canals, hedgerows, treelines and stone walls, which cover ~ 11% of the survey area, are not included in this table. The presence of hedgerows, treelines and stone walls is recorded by length. Roads have also been omitted, as these were not digitised. It is likely that roads account for most of the remaining 11%.

Table 6 Status of semi-natural habitats (those with * are priority or non priority types listed in the Habitats Directive)

Habitat	Area (ha) 2005-2007	% total area surveyed	Area (ha) 2005-2008	% total area surveyed
Wet Grassland	314.14	1.36	853.22	2.42
Scrub	207.13	0.90	334.71	0.95
Oak-Ash-Hazel Woodland	135.07	0.59	230.51	0.65
Dry Meadows and Grassy Verges	79.5	0.35	153.7	0.41
Wet pedunculate oak-ash woodland	48.83	0.21	48.83	0.14
Dry Calcareous and Neutral Grassland*	38.7	0.17	67.71	0.19
Wet Willow-Alder-Ash Woodland	29.14	0.13	29.88	0.08
Marsh	13.44	0.06	13.79	0.04
Bog woodland	10.01	0.04	10.01	0.03
Raised Bog*	9.31	0.04	13.07	0.04
Dry Humid Acid Grassland	5.96	0.03	55.4	0.44
Reed and large sedge swamp	4.98	0.02	4.98	0.01
Dense Bracken	4.79	0.02	10.02	0.03
Wet Heath*	4.07	0.02	15.39	0.04
Mesotrophic Lakes	3.11	0.01	3.158	0.01
Oak-Birch-Holly Woodland*	1.82	0.01	5.15	0.01
Tall-herb swamp*	1.4	0.01	2.61	0.01
Rich Fen and Flush*	1.04	0.01	1.04	0

Habitat	Area (ha) 2005-2007	% total area surveyed	Area (ha) 2005-2008	% total area surveyed
Exposed Calcareous Rock*	0.97	0.00	0.97	0
Limestone Marl Lakes*	0.64	0.00	0.64	0
Dry heath	0	0.00	142.85	0.16
Non-calcareous springs	0.00	0.00	0	0
Poor fen and flush	0.00	0.00	0	0

Semi-natural habitats take up a small proportion of the area surveyed, at just over 5%. Improved agricultural grassland and arable land together account for slightly more than 73% of the habitats measured by area. This is not surprising as the principal land use in this area is farming, leaving few areas unmanaged apart from very wet, inaccessible sites and or areas where the underlying calcareous rocks lie too close to the surface to warrant cultivation or other intervention such as fertiliser application.

Almost all of these semi-natural habitats are rare nationally, regionally, locally as this survey shows and some are listed for protection under the Habitats Directive.

Wet grassland and scrub are the two largest semi-natural habitats sharing over half the total semi-natural habitat area between them with 2.42 %, and 0.95 % respectively. These are also among the most species-rich habitats. Wet grassland habitat was the largest of all the semi-natural habitats whilst calcareous springs and poor fen and flush were the smallest. The presence of wet grassland is an indicator of particular types of local drainage conditions.

Areas of semi-natural woodland and scrub account for 0.93% and 0.95% of the total digitised. In contrast, planted non-native woodland makes up 8% of the total area. The most common type of semi-natural woodland in the area surveyed is oak-ash-hazel woodland. This is found principally on the hums and in several locations on the Castlecomer Plateau and surrounding area.

Scrub was found throughout the area surveyed in out of the way corners on farms, in disused quarries or on forts and other monument sites.

3.1.3 STATUS OF LINEAR HABITATS

The status of these habitats was measured by length and results are shown in Table 7.

Table 7 Status of linear habitats

Habitat	Length (km) 2005-2007	% of total length 2005-2007	Length (km) 2005-2008	% of total length 2005-2008
Hedgerows	1,807.07	79.10	2,853.47	76.05
Drainage Ditches	191.85	8.40	229.55	6.12
Depositing Lowland Rivers	118.44	5.18	300.64	8.01
Tree line	73.37	3.21	132.72	3.54
Ornamental Non-Native Shrubs	61.85	2.71	84.91	2.26
Stone Walls	19.32	0.85	22.03	0.59
Canals	7.03	0.31	7.03	0.19
Earth Banks	5.51	0.24	89.74	2.39
Upland/eroding rivers	0.00	0.00	32.23	0.86

The survey area contained 2,853 kilometres of hedgerows accounting for 76 % of the total digitised linear habitats. Assuming these hedgerows average 2 m in width, their approximate area is 5,706 ha. This makes them the most extensive semi natural habitat in the surveyed area approximately c. 18 times greater than the cover of wet grassland. The average length of hedgerow /square km is 8.1 for this survey and compares with 7.28 for the figure provided by Foulkes and Murray (2005).

Prior to 2008 the average length of hedgerow /square km in the study area (2005-2007) was 6.56 and it was thought that difference could be due to the particular characteristics of the two study areas, in that the area covered by the habitats survey may have represented relatively more intensively managed land compared to the average type of land in the county. The 2008 figures are greater than those presented by Foulkes and Murray (2005), which may be attributed to the upland nature of most of the survey area in 2008 which is not intensively managed nor extensively improved.

Drainage ditches comprise the next most significant linear habitat. These are traditionally associated with hedgerows. It is likely however that drainage ditches are under recorded as it is not always easy to detect drainage ditches from aerial photographs, nor was it possible to check all those outlined on the vector maps.

Depositing lowland rivers are also under-recorded particularly as some of the River Barrow was excluded from the survey in 2006 as it is within a designated area.

The remaining linear habitats in the survey (ornamental non-native shrubs, treelines, stonewalls, canals, earth banks) collectively accounted for just under 10% of the linear habitats. The figures for earth banks show an increase of 2.15% of total linear habitats from 0.24% for the years 2005-2007 to 2.39% for 2005-2008. This large increase in earth banks likely reflect the poor drainage capacity of the land found in upland areas, and the earth banks constructed from the excavated material during land improvements made through drainage and or rock and stone removal in the past.

3.2 HABITAT ACCOUNTS

3.2.1 INTRODUCTION

Summary descriptions and preliminary assessments of the principal habitats of biodiversity interest are complemented by species lists in Appendix 7 and target notes contained in an Excel database which are referenced in Appendix 8.

3.2.2 WETLANDS



(FW1) Eroding upland rivers (indigo blue solid line).

Eroding /upland rivers were recorded for the first time in 2008 in several upland locations on and in the vicinity of the Castlecomer Plateau. In all 32.23 km of eroding/upland rivers were recorded. These fast flowing rivers can be found eating through different rock types such as shales and limestone. The Fushoge River which flows through Killeshin (Grid square Killeshin S6777 Note 2, Fig. 4) and the Glasha which flows the townland of Rossmore (Grid square S6774 Note 1) are cutting into shale.

In Killeshin a number of small waterfalls and pools can be found along the Fushoge. Vegetation is seldom a feature of fast flowing eroding rivers and the only species recorded was the moss *Fontinalis* sp. growing on some boulders on the river bed in Ballynakill and Ashfield (Grid square S6382 Note 1). As the river cuts its way through the rock steep sided banks are formed and in Killeshin and Rossmore oak-ash-hazel woodland with ferns can be found growing on both sides of the Fushoge and Glasha rivers respectively.

Eroding/upland rivers were also recorded in Ballylehane Upper (Grid square S6084 Note 1) and in Doonane (Grid square S5878 Note 5).

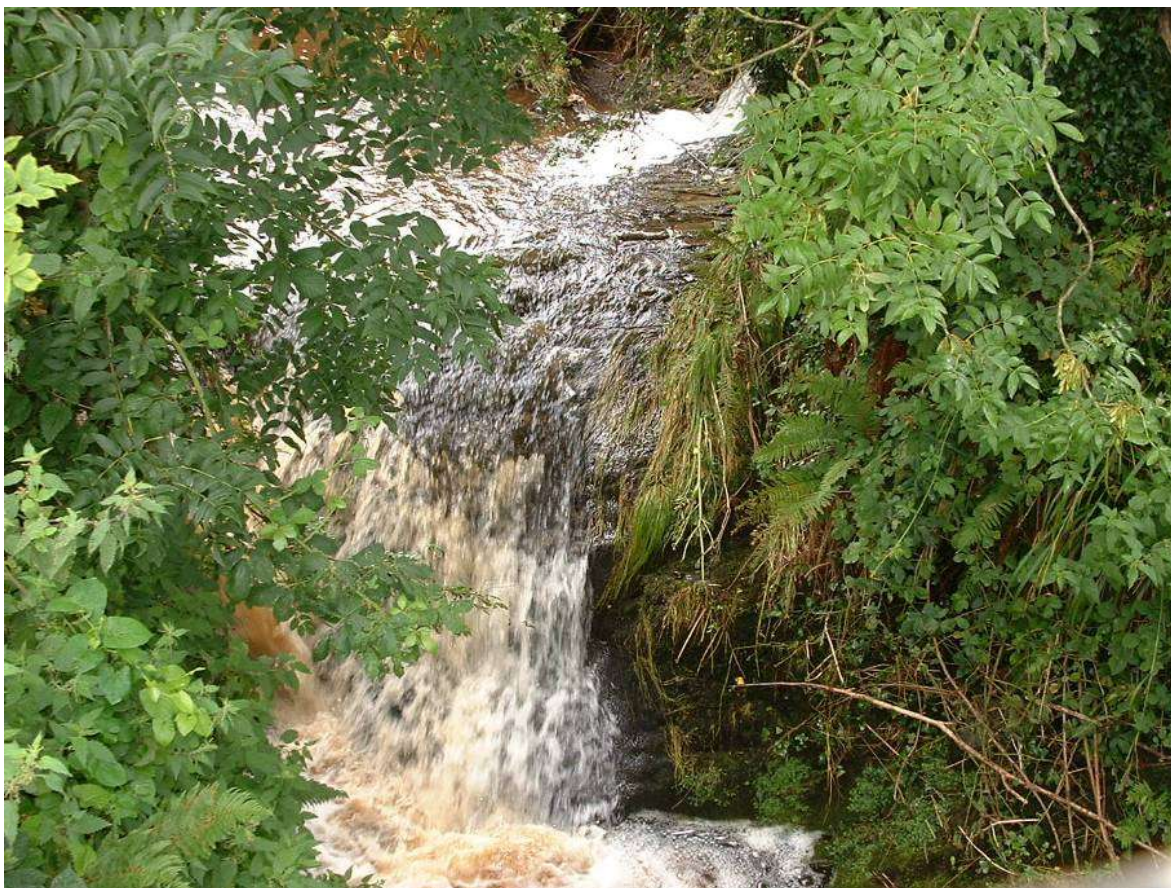


Fig. 4. Eroding/upland river (FW1) The Fushoge, in Killeshin (Grid square S6777 Target note 2) flowing through a narrow gorge with oak-ash-hazel wood on either side.

 **FW2 Depositing lowland rivers (sky blue solid line).**

300.64 km of depositing lowland rivers were recorded, this excludes much of the River Barrow because it is a designated SAC and was not included in the survey until 2007 (Table 7). Townlands with depositing lowland rivers include Garryvacum (Grid square N5506, target note 1), Courtwood (Grid squares N6002 and N6102 and target notes 1 and 2 respectively,) Vicarstown (Dodd, Grid square N6001, target note 2) and Derrybrock (Grid square S6199, target note 1,).

Depositing lowland rivers range in size from small shallow streams (Garryvacum), to large sized rivers such as The Stradbally River to larger rivers such as the Barrow (Fig. 5). The Glasha river (Courtwood Grid square N6102, target note 2) although small was free flowing with a substrate of sand and gravel and contained some small fish, whilst in Vicarstown (Dodd, Grid square N6001, target note 2) a kingfisher was observed chasing water hens along the stream. In 2008 the Rivers Douglas, Fushoge, Glasha, (tributaries of the Barrow) and parts of the Barrow to the north and south of Carlow town were surveyed. Overhanging vegetation is consistent feature of these rivers adding to their wildlife value.



Fig. 5. Depositing/lowland rivers (FW2), River Barrow flowing through the townland of Crossneen (Grid square S7175, Target note 1).

3.2.3 GRASSLANDS



GS1 Dry calcareous and neutral grassland (yellow squares on white background).

Dry calcareous and neutral grassland was found in most of the survey areas encompassing an area of 67.71 ha (Table 5). There were more examples of this habitat type in the north east and the south east of the county than in the south west. Although dry calcareous and neutral grassland occurred on its own, it also formed mosaics with wet grassland and scrub, particularly, in fields with uneven topography such as those found in Garrymaddock, Rathcrea and Kilcruise.

Dry calcareous and neutral grassland tended to be species-rich and a total of 154 different species were recorded (Table 4). Typical species found in the majority of sites included ox-eye daisy, quaking grass, yellow-wort, false-oat grass, yarrow, common knapweed and red clover. Five uncommon species were recorded in dry calcareous grassland; mountain everlasting was recorded in one site in Middlemount or Ballyvoglaun (Grid square S3278 N2 GS1), whilst adder's tongue was recorded in 2 locations (Rathcrea grid square N5902 N2 GS1 and in Garrymaddock Grid square N5702 N13 GS1), fragrant orchid was also

recorded in the Garrymaddock site while bee orchid was recorded in a disused quarry in Kilbride (Grid square N5209, target note 6, Fig. 2).

The dry calcareous and neutral grassland in the quarry (Kilbride) contained at least 65 different species and in addition to bee orchid species included carline thistle, kidney vetch, downy oat grass, yellow oat grass and marsh helleborine. Even though species numbers were high in dry calcareous and neutral grassland nearly all of the areas in which it occurs are degraded due to disturbance some of which has been caused by land reclamation or as in Kilcruise (Grid square S6184 Target note 1, Fig. 6.) where small scale quarrying of shingle occurred. The dry calcareous and neutral grassland in Kilbride was an exception as it was relatively undisturbed and was not in receipt of fertiliser.

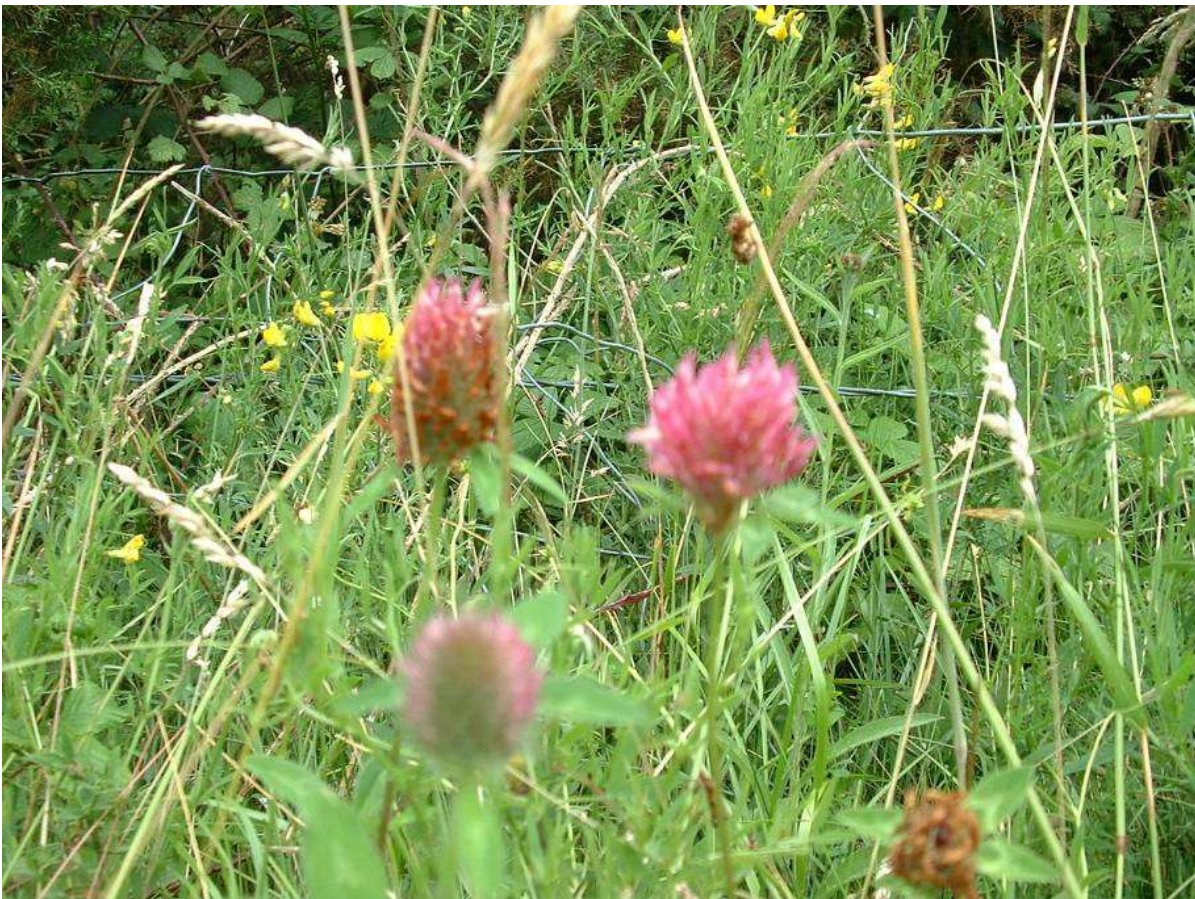


Fig. 6. Dry calcareous and neutral grassland (GS1) in a hollow not far from the River Douglas in Kilcruise (Grid square S6184 Target note 1)

 **GS2 Dry meadows and grassy verges (yellow diagonal lines slanting to the right).**

Dry meadows and grassy verges were found in at least 20 townlands, beside roads (Killone, grid square N5402, target note 3, Monavea (Grid square S6375, Fig. 7), along laneways (Rathcrea, grid square N5801, target note 9), in graveyards (Tierhogar, grid square N5510, target note 1), overlying small outcrops of limestone in Coolnacarrick (Grid square S5296, target note 1) and beside a section of disused Mountmellick Branch of the Grand Canal in Kilbride.



Fig. 7. Dry meadow and grassy verge (GS2) along the road in Monavea (Grid square S6375) with tufted vetch and wild angelica.

A total of 133 species were recorded from an area of 142.85 ha of dry meadows and grassy verge habitats (Tables 4 and 6). Of these, 39 were new species recorded in 2008. Typical species include false oat-grass, cock's-foot, crested dog's-tail, common bent-grass, Yorkshire fog, quaking grass and downy oat-grass which was found in Coolnacarrick growing on an outcrop of limestone where the habitat was not being actively managed, other than some light grazing. Forty-six species including glaucous sedge, lady's bedstraw and fairy flax were recorded from the roadside grassy verge in Killone that had been disturbed due to road realignment in the past, however many of the road side verges were species poor. The rare species mugwort was found growing in a grassy verge beside the River Barrow at Crossneen (Grid square S7147 and photograph Crossneen S7174 River Barrow SAC Mugwort 01).

**GS3 Dry-humid acid grassland (yellow diagonal lines slanting to the left).**

The total number of species recorded in dry-humid acid grassland habitats increased to 63 in 2008 compared to total of 26 species for the previous 3 years (Table 4). Prior to 2008 most of the 26 species were found in the townlands of Morett, Cappakeel, Garrymaddock and Hophall all in the north east of County Laois. In Morett (Grid square N5404, target notes 1 and 9) tussocks of the grass cock's-foot dominated while other species included purple moor-grass, silverweed and yarrow.

In Cappakeel (Grid square N5604, target note 2) Yorkshire fog, bent grasses, sweet vernal and crested dog's-tail were among the main species present. In Morett dry-humid acid grassland was in poor condition, as bramble and gorse dominated scrub, were encroaching into the fields. One of the fields appeared abandoned whilst horses grazed in the other field at the time of the survey. Dry-humid acid grassland also occurs as a mosaic with GS4 in Hophall (Grid square S5015, target note 10) in what appears to be abandoned farmland.

In 2008 dry humid acid grassland was recorded from several townlands on the Castlecomer Plateau including Rossmore (Grid square S6675, Target note 1, on peaty soil, Grid square S6673 in a mosaic with wet heath, recolonising bare ground hedgerows and earth banks, Target note 3), Ardateggle (Grid square S6476, Target note 2, Fig. 8) and in Monavea and Gortahile. Additional species recorded in 2008 include wild angelica, spear thistle, bird's-foot-trefoil, heath spotted orchid and squirrel-tail fescue.



Fig. 8. Dry-humid acid grassland (GS3) in Ardateggle (Grid square S6476) with common blue butterfly resting on gorse bush.



GS4 Wet grassland (yellow diamonds on a white background).

After improved grassland (GA1), Wet grassland (GS4) is the commonest type of grassland. It is found in 22 of the townlands surveyed pre 2008 and in a further 23 townlands in 2008. Most of the townlands before 2008 were in the north east section of County Laois, while in 2008 these were mostly found in the upland areas on the Castlecomer Plateau. Not only was wet grassland the most species rich habitat surveyed with a total of 171 different plant species it also covered the largest area (853.22 ha) for a semi-natural habitat (Table 4 and Table 5). Five hundred and thirty nine ha of wet grassland were surveyed in 2008.

Species composition was not the same in the different wet grassland sites, for example, in Rathcrea (Grid square N5901, target note 4) common spike-rush is dominant, in Hophall (Grid square S5905, target note 1) sharp-flowered rush is the most abundant species while in Garryduff (Grid square S3182, target note 14) the grassland is dominated by jointed rush and meadowsweet while purple moor-grass, Yorkshire fog and purple loosestrife were species with a frequent occurrence. Garryvacum (Grid square N5507, target note 7) has the most species diverse wet grassland of the areas surveyed with 55 different species counted from the site which was adjacent to an area of cutover bog and scrub.

The rare species columbine (Appendix 5) was also recorded from this area in Garryvacum along with marsh arrowgrass, rough hawkbit and common cotton-grass. Dairyhill and Ballymorris were also species rich with 34 and 33 species respectively. There are also some particularly good examples of wet grassland in Garrymaddock (Grid square N5703 target note 4); Park or Dunamase (Grid square S5198 target note 7); Rathcrea (Grid square N5901 target note 4); Garryduff (Grid square S3182 target note 14) and Curragh (Grid square S3481 target note 2). In 2007, 32 additional species were recorded from wet grassland. These included broad-leaved marsh orchid, brown sedge, false-fox sedge, greater tussock sedge, tall fescue, wild angelica and common flea bane in Inch (Grid square S5997, target note 1, fig.9).

Tall sedge-dominated wet grassland in Jamestown or Ballyteigueduff (Grid square N5907, target note 1), were it grew in association with purple moor grass and tufted hair grass. In Coolderry (Grid square N5312, target note 1), parts of the broad-leaved herb component dominated the grassland and contained abundant Marsh Orchids. Purple Moor-grass and black bog-rush also occurred but were generally restricted to areas adjacent to drains that divided the fields. Rossmore (Grid square S6575 Target note 1) was the most species rich of the sites surveyed in 2008 and included species such as heath orchid, creeping forget-me-not and ragged robin. A further 16 species were added to wet grassland in 2008.



Fig. 9. Wet grassland (GS4) in Inch, Co. Laois (Grid square S5997, target note 1). At least 49 species were recorded in this wet grassland meadow including wild angelica, greater tussock sedge, tall fescue and meadowsweet.

3.2.4 HEATH AND BOG



HH1 Dry siliceous heath (brown horizontal lines on a white background).

Dry heath habitat was found for the first time in 2008 with a total of 55.5 ha recorded. Dry heath is usually found on poor dry acidic soils in either upland or lowland regions. To date in County Laois this habitat has been found only in upland parts of the Castlecomer Plateau, in the townlands of Mayo, Monavea, Gortahile, Ardateggle (Fig. 10), Coorlaghan, Rossmore and Clogrennan.

Dry siliceous heath is typically composed of low growing ericaceous shrubs (at least 25%) such as ling heather along with herbaceous species and grasses. Thirty five species were recorded from the 7 townlands with the most species occurring in Rossmore (Grid square S6674, Target note 1) when 21 different plants found including bog rosemary and cranberry. Other species included ling heather, bog asphodel, bilberry and wavy-hair grass.



Fig. 10. Dry siliceous heath (HH1) in Ardateggle (Grid square S647612, Target note 1) dominated by ling heather.



HH3 Wet heath (brown squares on white background).

Wet heath habitats are found in Morett, Garrymaddock, Ardateggle, Rossmore and Ballylehane Upper where a total of 26 different plant species were recorded, eight of which were recorded for the first time in 2008. In Morett wet heath is found in 3 areas and on one of the sites (Grid square N5404, target note 2), the heath appeared to have developed on cutover bog that had previously been reclaimed for grass but now seems to be abandoned as there were no signs of grazing or other disturbance. Shrub species typically associated with wet heath such as ling and cross-leaved heath were absent, but the vegetation is dominated by purple moor-grass with frequent black bog rush, however, brambles and gorse were encroaching (Fig. 11). In Garrymaddock (Grid square N5404, target note 11) wet heath is found forming a mosaic with WN2 (oak-ash-hazel woodland) on the wetter parts of the site, near the river Glasha, where birch, willow and ash scrub were frequent. The overall area of heath is however small with all of the areas comprising about 15 ha, most of which was recorded in 2008.



Fig. 11. Wet heath (HH3) habitat in Morett (Grid square N5404, target note 3), dominated by purple moor-grass, which is being invaded by brambles and gorse scrub.



PB1 Raised bog (violet horizontal lines).

Until 2008 raised bog occurred only in Garryvacuum (Grid square N5507, target note 10, fig. 12). It covered an area of 9.3 ha which came to 0.1% of the total area currently digitised (Table 6). It was adjacent to cutover bog (PB4) which was about 2 – 3 m lower than it. There was a conifer plantation growing to the south west of the bog while the cutover bog was almost surrounded it to the north and east. The surface of the bog was fairly dry and peat was exposed in places but no rain had fallen for a considerable time. Ling heather dominated the vegetation which was growing in association with deer grass, bog asphodel, bog rosemary and horsetail cotton-grass. Downy birch was scattered over the bog which is being grazed by deer (Fig. 12). A second area of raised bog habitat (Rossmore, Grid square S6674, Target note 2) was recorded in 2008 bringing the total to 13.07 ha. A total of 33 species are found on raised bogs, 32 of which were found prior to 2008. Bilberry was the only new species recorded in 2008, where it was a component of a *Cladonia portensis* and ling dominated site. The bog is being invaded by trees which are causing it to dry out resulting in low sphagnum cover.



Fig. 12. Raised bog (PB1) habitat in Garryvacum (Grid square N5507 target note 10), with ling and deergrass among the species found there.

3.2.5 WOODLAND AND SCRUB



WN2 Oak-ash-hazel woodland (green vertical parallel lines).

Oak-ash-hazel woodland is found throughout the survey area in both the north east the south west and the south east of County Laois. Up until 2008 it was typically found on base-rich sites where drainage was good or on limestone outcrops and was particularly associated with the hums (upstanding limestone outcrops that form steep rounded hills) which occur in the Stradbally area. Two of the largest areas of oak-ash-hazel woodland were in Killeale/Park Upper and in Park or Dunamase (Grid squares S5498/S5498 and S5198 respectively, and target notes N3/N3 and N6 respectively), whilst the smallest is in Kilbride (< 0.5 ha, grid square N5210, target note 3), in general the majority were less than 5 ha in size.

In 2008 oak-ash-hazel woodland was found throughout the south east survey area, on the banks of depositing/lowland rivers in Ballynakill, Ashfield (Grid square S6382 Target note 1) and Kilcruise (Grid square S6284, target note 1, fig. 13) on the slopes adjacent to eroding/upland rivers, in Rossmore (Grid square S6774 Target note 1) and on low lying ground in Ballickmoyler (Grid square S6579 target note 1) adjacent to conifer woodland.

A total of 135 ha of oak-ash-hazel woodland were surveyed during the period 2005-2007, which was just over half a percent of the total area surveyed, a further 95 ha were recorded in 2008 bringing the total area to 230.51 ha, however as a % of the total area surveyed oak-ash-hazel woodland showed a slight reduction to 0.45% (Table 6).

Oak-ash-hazel woodland is species rich (173 species, table 4). Hazel is the dominant tree and/or shrub species and is present in almost all the woodlands surveyed. Pedunculate oak is fairly rare and prior to 2008 it was found in only 7 woodlands, in the townland of Park or Dunamase (Grid squares S5198, S5298 and S5398), in Courtwood (Grid square N6102, target note 1,) but not in great numbers, in Kylebeg (Grid square S5896, target note 2), in Garrans (Grid square S5997, target note 1,), and in Park (Grid square S6096, target note 1). Mature oak dominated the woodland in Park which is a semi-natural woodland managed commercially in the Native Woodland Scheme. It is also part of the Stradbally Hills pNHA (1800). Several large patches have been replanted and contain immature conifer plantation and there are several other sections that are mixed and contain mature conifers and non-native broadleaves (Beech, Sycamore and Sweet Chestnut).

A total of 63 species were recorded from the woodland in Park including hawthorn and spindle.

Oak, beech and sycamore were also found in oak-ash-hazel woodlands. Ash and hawthorn are found in most sites, and spindle is fairly common. Yew was present in the wood in Courtwood, not far from the Fort of Dunrally. At least 8 different ferns were seen including lady fern, hart's-tongue fern, soft and hard shield ferns, black spleenwort and common polypody. Other ground flora species included herb robert, herb bennet, bluebell, wood sanicle, arum lily, enchanters nightshade, wood sedge and false brome.

The Oak-ash-hazel woodland in Kiltale/Park Upper and the 3 woods in Park or Dunamase are designated NHAs. These have fences around their perimeters to prevent farm animals from gaining entry, and as a result there is no excessive grazing pressure. The three woods in Park or Dunamase all contain mature trees of ash, beech, sycamore and oak and most are over 30 m tall. These woodlands are quite old and a number of beech have fallen in recent years, (Grid square S5198, target note 6). There were some signs of regeneration in all three but mainly of ash and sycamore with the latter being the most prolific.

In Kiltale/Park Upper, hazel was the main tree/shrub species present along with hawthorn, willow, ash, blackthorn and the occasional holly, seedlings of mountain ash were also found. Growth of scrubby species in particular bramble and blackthorn are beginning to take over parts of the wood making access difficult. Wood sorrel, enchanter's nightshade, woodruff and bugle were among the species (31 in all) present.



Fig. 13. Oak-ash-hazel woodland (WN2) beside the River Douglas in Kilcruise (Grid square S6284, Target note 1)

Although not an NHA, the wood on Killone hill (townlands of Killone, Kilmurray and Ballythomas) is species rich (34) and overall shows few signs of disturbance. Hazel was the main tree/shrub species while ash and hawthorn were frequent. Other woody species included beech, spindle, holly, blackthorn and dog rose but only in small numbers. There was very little bare ground in this wood as there were no farm animals present, however deer are known to browse here but grazing pressure is low. Wood sanicle and bluebells were abundant on the woodland floor, while woodruff and soft shield fern were also frequently found. The grass wood melick was also found though only occasionally.

Hewson's Hill in Coolnacarrick is another oak-ash-hazel woodland worth noting. Forty-nine species of higher plants (8 were different to those recorded for the County Laois survey) were recorded during a field trip to the wood by Dublin Naturalist's Field Club led by Dr Howard Fox in April 1997 (Appendix 5), as well as 79 lower plants. A record of the fauna present on the hill was also made which included 3 snails (rounded snail, white lipped snail and the common door snail), several butterflies and moths, 10 different bird species including blue and grey tit, skylark and wren, and mammals including the hare, badger and pygmy shrew.

Ash dominated woodland was found in Ballybrittas (Grid square N5808, target note 1, which had some mature beech in the canopy. Other species included holly and hazel and the ground flora was dominated by ivy. This woodland had also been surveyed as part of the Native Woodland Scheme.

**WS1 Scrub (bright green diamonds on a white background).**

Scrub is found throughout the survey area in Co. Laois, including dry sites such as outcrops of limestone and disused quarries, in wet areas, in corners of improved agricultural grassland and abandoned houses. In Morett (Grid square N5402, target note 1) scrub can be found growing around the edge of what probably was an old ring fort as well as in a number of other locations. The main woody species found in scrub habitats included gorse, hawthorn, blackthorn, willows, bramble, hazel and birch. In some sites single species dominated while in others various combinations of species existed. Species diversity in scrub habitats is considerable with at least 156 species recorded (Table 4) including species found in shaded woodland type habitats such as arum lily, broad buckler fern, great wood rush and herb robert to those found in wetter open sites such as cotton grass, horsetails, meadowsweet, purple moor-grass and wild angelica. Scrub habitat accounted for 0.82 % (334.71 ha) of the total area of habitats surveyed to date and is the second largest area of semi-natural habitat recorded so far in the survey (Table 4). Heath spotted orchid and fragrant orchid were among the thirty two species recorded from wet scrub in Kiltrory (Grid square S5798, target note 1.), that was dominated by grey willow, downy birch and gorse. Ringlet butterflies were also recorded. In Garrendenny it is part of a mosaic of habitats that have formed on an abandoned opencast coalmine (Grid square S6075, fig.14) and is dominated by gorse.



Fig. 14. Scrub (WS1) growing in an abandoned coalmine in Garrendenny (Grid square S6075).

3.2.6 EXPOSED ROCK



ER1 Exposed siliceous rock (horizontal red lines on a white background).

Exposed siliceous rock was surveyed for the first time in 2008 and was found in one location in Farrans in an abandoned quarry (Grid square S6082, target note 2, fig. 16). Nine species were recorded but this was from some distance as it was not possible to get close due to the pond in front of it. Identified species included gorse, honeysuckle, ivy, saxifrage and tormentil. Ferns and grasses were also growing on the rock face but it was not possible to accurately identify them.



Fig.16. Exposed siliceous rock (ER1) in Farrans (Grid square S6082, target note 2), with scrub growing on top of the banded shale rock face.

3.2.7 CULTIVATED AND BUILT LAND

———— Earth banks (BL2) (single grey horizontal line)

Before 2008 the total length of earth bank habitat was 5.51 km or 0.24% of all linear habitats, however this increased by more than 16 times to 89.74 km in 2008 and represented 2.39% of the linear habitats in the survey area (Table 7). Earth banks were ubiquitous throughout the south east of County Laois and were found in most townlands along road and lanes (Clogrennan (Part of), (Grid square S6473, target note 1, fig.17), in Kilcruise (Grid square S6183, target note 1) and in Farnans (Grid square S6181, target note 2). Fifty six species were identified from earth bank habitats and included woody species such as hawthorn, ash, blackthorn, bilberry and holly. Yew was recorded in Farrans (Grid square S6181, target note 2), and is a fairly new addition to the earth bank according to the landowner. Herbaceous species include knapweed, foxglove (fig. 17), bush and tufted vetch along with several ferns such as hard fern, broad buckler fern, male fern and lady fern.



Fig. 17. Earth banks (BL2) flanking either side of laneway in Clogrennan (Part of), (Grid square S6473BL2).

4. RECOMMENDATIONS

4.1 GENERAL RECOMMENDATIONS

Information from this survey is principally of value in revealing the nature of the biodiversity interest in Laois. The results can be used to compare the status of biodiversity with other areas where such surveys have taken place, provide a baseline to inform discussion and policy-making on biodiversity and/or inform future research on other aspects of biodiversity. Any discussion or review should be informed by a comprehensive habitat map of the entire county.

For example discussions could take place between stakeholders regarding the desired cover of particular habitat types in particular areas or the maintenance of links between them. Unless habitat mapping is available for the entire county these discussions can only focus on specific areas.

The information in the baseline survey provides an evaluation of the status of biodiversity in the surveyed area. The findings that 1) there is a relatively small cover of semi-natural habitats in the wider countryside and 2) linear features such as hedgerows and drainage ditches are important habitats and linking features should be communicated to the public, landowners and policy makers. It vindicates the priority given to research on habitats, hedgerows, eskers and derelict wetlands by the Laois Heritage Forum and the urgent need to extend the survey to other parts of the county and initiate action projects to appropriately manage surviving good quality examples of these rare types of habitats.

In the short term the priority is to highlight the results of the mapping project to the general public and to stakeholders (landowners and planners) who are making decisions on land use. The secondary priority is to continue to gather such information on other parts of the county, particularly areas under pressure from development.

The initiatives suggested here should be used as a basis for discussion. While some could be initiated directly by the Heritage Forum, their active promotion by other organizations even independently of the Heritage Forum should be pursued.

4.2. INFORMATION AND AWARENESS RAISING

Target audience: the public/landowners/householders

In the short term, organise a demonstration of the digital and hard copy habitat map to landowners who allowed their land to be surveyed and local IFA. This should be done before launching a countywide

campaign. A limited demonstration could be provided at the annual Heritage Seminar. A public information campaign, initiated and promoted by the Heritage Forum could include some or all of the following:

- Production of a leaflet highlighting low cover of semi natural habitats, listing towns and townlands surveyed, and stating where maps can be viewed.
- Promotion of the principal results in local newspapers.
- A display of hardcopy maps in relevant local libraries in a temporary exhibition.
- Put maps and report on council web site.
- Use the results of this and other relevant studies to start the process of setting up a local Biological Records Centre. This could be web based or developed through the library service (section on local biodiversity in the Local Studies Section of the Library).
- The habitat maps should be publicised to relevant Tidy Towns groups and other community/development organisations operating within or adjacent to survey areas.
- Provide brief summary guidelines for farmers on appropriate management of habitats.
- Provide brief summary guidelines for gardeners

Target audience: schoolchildren

- Brief locally-based specialists who go into schools as part of the Heritage Council/INTO “Heritage in Schools” Scheme to encourage them to incorporate the results in their educational programmes in local schools.
- Liaise with geography teachers (through the Laois Education Centre) to use the habitat map as a teaching tool to explore local habitats.

Target audience: advanced students/specialists/advisors/Local Authority staff e.g. planners

- Expand habitat mapping exercise to other parts of the county.
- Develop a training programme targeting planners to enable them use the habitat map and associated information as an aid to strategic planning and development control. This may involve manipulation of the data base or further interpretation to make it useful to planners.
- Provide a presentation to REPS planners, organised in conjunction with Teagasc to inform them of the value of habitat maps to their REPS advisory service.
- Ensure results of habitat mapping are fully integrated with County Council’s own GIS.
- Promote additional survey work (for fauna, breeding birds) in townlands examined for this survey. Following habitat mapping in 2007 there is potential for research on ecological corridors linking habitat areas of importance inside and outside designated areas. As digital data sets are used increasingly by researchers to locate survey sites there will be greater interest in the Laois data set.
- Ensure that surveyors observe similar protocols when contacting landowners and all results are provided in an appropriate form for local usage.
- Promote research to utilise and add value to habitats database i.e. integrate with FIPS/EPA soils/subsoils data base, local geology (from GSI) and 1st edition OS mapping.
- Continue to liaise with environmental NGOs and all interested members of the public to exchange information on biodiversity.

4.3 MANAGING CHANGE

Suggested initiatives include:

- Support Teagasc and REPS planners to provide a targeted advisory service for landowners who have good examples of semi-natural habitats. The priority of identifying hedgerows for retention and enhancement on farms by REPS and Heritage Forum should be maintained.
- Development of a list of good examples of semi-natural habitats in the county, starting with woodlands, after informing owners individually of the proposal to develop such a list.
- Support Teagasc to develop training materials for REPS courses which are relevant to Laois habitats.
- Organise for the removal of invasive species such as Japanese knotweed and rhododendron starting with one site in 2009.
- Carry out habitat mapping in areas which are the subject of strategic plans (Local Plans, Development Plans etc) and use the results to inform an SEA (Strategic Environmental Assessment) of the draft plans which are produced.
- Encourage the Council's Roads Department to cease the practise of spraying grass verges and banks and consider trimming, which is equally effective and less harmful to biodiversity.

4.4 PARTNERSHIP WITH THE STATUTORY AUTHORITIES

Suggested initiatives include:

- Encouragement to NPWS to provide habitat mapping for the lands which have been designated by NPWS, thus expanding the coverage of habitat mapping in the county.
- Promotion of the Native Woodland Scheme with Woodlands of Ireland and the Forest Service.
- Promotion of wetland management with the Fisheries Board in the context of the Water Framework Directive
- A policy statement on biodiversity and habitat biodiversity in the County Development Plan which recognises the current low level of cover of semi-natural habitats and objectives to maintain habitat diversity, manage habitats owned by the Local Authority sustainably, provide information and ensure that development has regard for biodiversity values.
- Preparation of a County Biodiversity Plan in association with the Heritage Forum.
- Survey Local Authority-owned land to develop management guidelines for habitats under its direct control.

5. CONCLUSIONS

Fieldwork in the first 4 years of the Laois Habitat Survey has revealed the presence of 60 habitats (including four not included in Fossitt, 2000) and 464 species.

The study provides a unique snapshot of the natural heritage in representative areas of both lowland and upland Laois. An impressive diversity of habitats and flowering plants is present. While most of the land is covered in habitats of low biodiversity value, the survey work has revealed that just over 6% of the land is covered in habitats of relatively high biodiversity value. Most townlands have habitats of some biodiversity value. Some have habitats which are rare locally, nationally and even internationally. However the overall cover of semi-natural habitats of particular value for biodiversity is low.

The survey results are a resource which will assist all stakeholders to make informed decisions. The role of the Laois Heritage Forum is to publicise this resource to all relevant individuals and agencies to inform local strategic planning and the preparation of a County Biodiversity Action Plan. It also has potential to inform the preparation of Strategic Environmental Assessment and Appropriate Assessment of plans and programmes which is required under EU legislation. As more of the county is surveyed, researchers will be increasingly interested in obtaining access to results.

The survey should be expanded to all parts of the county. This would increase the value of the information which has been gathered and enable informed decision making on biodiversity on a county wide basis.

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