

County Roscommon Hedgerow Survey Report

Staidéar Fálta Sceach Chontae Ros Comáin

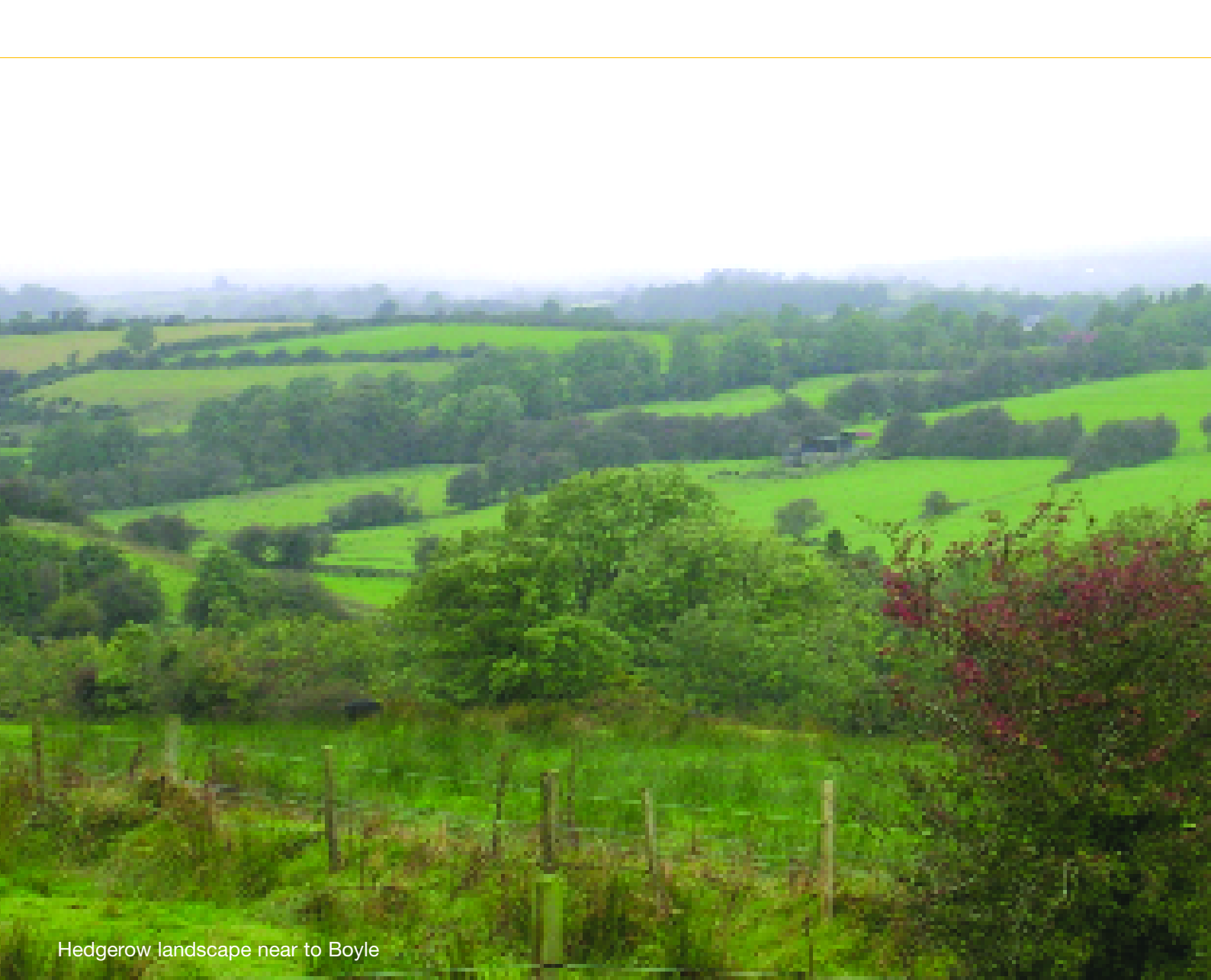
2005

Survey Report by Neil Foulkes and Anja Murray

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Hedgerow landscape near to Boyle

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Foreword *Brollach*

County Roscommon Heritage Plan 2004-2008 was prepared following public consultation around County Roscommon, in conjunction with the County Roscommon Heritage Forum. The aim of the Heritage Plan is to create and promote an increased knowledge, awareness and appreciation of the natural, built and cultural heritage of County Roscommon, and to conserve it for future generations. An objective of the Plan is to promote best practice in heritage conservation and management. Target 3.2 of the Plan is to develop, implement and evaluate a Hedgerow Conservation Policy for the County.

The County Roscommon Hedgerow Survey was commissioned in conjunction with a similar study by Westmeath County Council and the availability of data from two counties provides a useful baseline for hedgerow conservation in the midlands, which will be extended with the completion of further surveys around the country. The compilation of this data is very important when we consider one of the goals of the National Biodiversity Plan, which is “For the future to have no net loss of the hedgerow resource”. The recommendations in this report will provide useful guidance for future hedgerow conservation policy in Co. Roscommon.

Cllr. Tom Crosby, Mayor
Chairperson of County Roscommon Heritage Forum

Acknowledgements *Buíochas*

Sincere thanks are due to Neil Foulkes and Anja Murray for their dedicated enthusiasm in field survey, consultation and report writing involved in this project. Their production of a comprehensive scientific report and policy recommendations will realise significant impacts for hedgerow conservation not just on a county level but also on a nationwide basis.

The initiative of the County Roscommon Heritage Forum in prioritising this action and the support of Roscommon County Council in promoting review of policy and practice in this area is gratefully acknowledged. Thanks to the Heritage Council and Roscommon County Council for funding this survey and to Dr. Liam Lysaght for his support during the project. Thanks to Mark Kerrigan, Roscommon County Council for his assistance with production of maps. Thanks to Roscommon Library for hosting consultation sessions and to Co. Librarian Richie Farrell who assisted in research material, thanks also to Athlone Library and Librarian Gearoid O'Brien for also hosting consultation sessions.

Gratitude is also extended to the landowners who permitted access on to their land during field survey and all those who responded to the consultation process, contributing information and views that have enriched the project. Special thanks are extended to Jimmy & Erica Murray. Thanks to Bernadette Guest, Heritage Officer in Westmeath County Council for support and assistance throughout the project and to Red Eye Design, Sligo.

Cover photograph by Nollaig McKeon. Aerial photograph of Rooskey courtesy of Roscommon County Council Library Services. Other photographs by Anja Murray and Neil Foulkes.

Nollaig McKeon, Heritage Officer
Roscommon County Council

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1.0 INTRODUCTION

Hedgerows are a valuable resource in our countryside, benefiting agriculture, wildlife, the environment, tourism, and the general community. However there is no existing detailed data on the current extent, nature, variation and condition of Irish hedgerows.

In the spring of 2004 a joint project to investigate the hedgerow resource of Counties Roscommon and Westmeath was commissioned by both local authority Heritage Officers with support from the Heritage Council. The two studies have run simultaneously, and almost as the same study. The focus has been on the extent, composition, structure, condition, and management of hedgerows in the two counties. The information gathered and presented in this report is a valuable contribution to the existing knowledge base of hedgerows in today's landscape. The information will be used to further the objectives of the County Heritage Plans, to promote and strengthen positive hedgerow management and conservation in the two counties, to monitor changes in the resource over time, and as an information source for a wide range of end users in each county.

The Roscommon and Westmeath Heritage Plans both identify actions to address issues of hedgerow conservation:

ROSCOMMON

- Action 3.2.1** Establish baseline data on the county's hedgerow resource to incorporate flora, fauna and archaeological value.
- Action 3.2.2** Develop a hedgerow management plan for Co. Roscommon to cover management from seed to mature bush, traffic, safety and road works.
- Action 3.2.3** Use data gathered to inform planning policy and standard planning conditions.

WESTMEATH

- Action 6.8** Collect baseline data on the extent, composition, condition and traditional management of hedgerows in the county.
- Action 6.9** Promote the appropriate management of hedges and ditches in the county in accordance with relevant legislation by:
 - Providing information and/or training for landowners, contractors and local authority staff as appropriate
 - Producing guidelines for management
 - Reviewing policy on hedgerow/ boundary removal in the context of new development
- Action 6.12** Identify natural heritage sites of importance at a county level for consideration by Westmeath County Council in the context of Local Area Plans and Development Plans.

2.0 EXECUTIVE SUMMARY

In the spring of 2004 a joint project to investigate the hedgerow resource of Counties Westmeath and Roscommon was commissioned by Roscommon and Westmeath Heritage Offices, as part of the Heritage Plan for each County. These surveys are the first of their kind in the Republic of Ireland and are a major step towards sustainable hedgerow management and conservation in these two counties.

Roscommon's hedgerow network is a huge asset to the county, valuable in terms of agriculture, landscape, wild flora and fauna, water quality, carbon sequestration, employment, and as a material resource. Public consultations were held in order to assess people's views and concerns about the hedges of their county.

The focus of the survey has been on the extent, composition, structure, condition, and management of hedgerows in the two counties. In Co. Roscommon a total of 29 sample squares were recorded, each being 1km² in size. These samples are the same that were used for the Badger and Habitats Survey of Ireland (Smal, 1995) and the Countryside Bird Survey (Birdwatch Ireland, ongoing study).

The results of the survey estimate the total length of hedgerow in Co. Roscommon as 15,574km. Remnant hedgerows make up a further 2,165km.

Five main hedgerow types were identified according to their floristic composition. These are: hedges characterised by Willow, species poor Hawthorn Hedges, Hawthorn and Blackthorn hedges, relatively species rich hedges, and Gorse hedges. A good variation in hedgerow type was found across the county, with a high number of the tall and unmanaged Willow type hedges, and also of the Gorse type on higher land. The species rich hedge group was less common in Roscommon than in Westmeath.

Ash and Willow were found to be the most commonly occurring tree species, with non native Beech and Sycamore coming third and fourth.

Only 5% of hedges in the county were found to be 'species rich'. These figures indicate that other characteristics should also be taken on board when prioritising hedges in terms of conservation value. Roadside and townland boundary hedges were found to contain a higher diversity of native shrub species than other hedges.

A large proportion of hedges in the county are structurally very poor, with a total of 28% being either remnant or derelict. Almost two thirds of the hedges surveyed in County Roscommon were found to be long term unmanaged. The majority of the County's hedges have a significant proportion of gaps along their length, with almost a third of hedges containing more than 25% gaps. These figures are warning signals that a significant proportion of hedges in the county are under threat from abandonment, and may be lost without careful planning and intervention.

At the other end of the scale, a relatively high proportion of Roscommon's hedges are managed by pushing over, or 'crushing', with excavator machinery. Until the full implications of this new technique are known management of hedgerows with this form of machinery should be actively discouraged.

Recommendations have been made based on the Hedgerow Survey results, considered in the light of current conservation best practice. Issues that were raised as part of the consultation process have also been considered. Recommendations are made in the following topics: policy and legislation recommendations; recommendations in relation to hedgerow management in County Roscommon; infrastructural recommendations; education and awareness recommendations; and recommendations for future research. The relevance of the recommendations to each of the stakeholder groups, such as Roscommon County Council, farmers and landowners, the various state bodies, research institutions, and Teagasc, have been tabulated for easy reference.

3.0 BACKGROUND

3.1 The History of Hedgerows in County Roscommon

Under the Gaelic system of joint land ownership there was little need for permanent enclosure or fencing. Instead tillage plots were protected with fencing for one season before being moved. There is, however, some evidence to suggest that some ring forts were set with blackthorn and whitethorn. Permanent banks with or without hedges on them may also have existed.

It is the Normans who introduced the concept of land ownership. With the subsequent introduction of the Landlords System tenants had to rent fixed plots of land from the landlord. The division of land and enclosure of commons was encouraged, even in some cases enforced by landlords. These changes were often much resented by small stockowners.

By later Medieval times townlands had become the fundamental unit of land tenure. They were bounded by banks and ditches, which often had hedges too. The land within was largely unenclosed, though this was dependent on the landowner and their preferences. Townland boundary hedges thus tend to have larger banks and ditches than other hedges, and are often among the oldest hedges in the landscape. For these reasons they may also contain a more diverse flora than other, non townland boundary hedges.

Old double ditches with paths running up through them were used by pedestrians in times of flood, and were a favourite route to the fair with animals because the double ditch recognized no townland barriers (Sharkey, 1985).

It is evident from the first series Ordnance Survey maps, made in the 1820s, that by this stage much of County Roscommon's agricultural land had been subdivided in to relatively small fields, whether by banks, drains, or hedges.

We can get a good picture of the hedged nature of the land at this time from the Statistical Survey of County Roscommon (RDS) by Isaac Weld, published in 1832:

For the Barony of Roscommon:

"the produce of the soil might be considerably augmented by increasing the means of shelter. Near gentlemen's seats where hedges have been planted and preserved, ... the grass is more luxuriant, and the animals at pasture always appear more comfortable and thriving. The hawthorn grows well in every part of the barony; and it is seldom that the interval of a mile occurs, without the traces of hawthorn hedges which have been planted in former times. But it is altogether extraordinary to see, indeed I question whether it is to be seen at all, a continuous unbroken hedge of hawthorn round the fields of any of the lesser farms in the barony."

"Sometimes, for a perch or two together, continuous hawthorns may be perceived in the fences, growing in the most vigorous manner; and then, as many or more perches quite bare, or only containing insulated bushes. In short, it would appear as if from the period of the hedges having been originally formed, no manner of care had been afterwards taken; if they grew, well and good; if not, the gaps were not filled up. All through this barony, as well as through the whole county, there are examples of these abortive efforts. Near the roads and in the vicinity of the cabins, it is indeed a matter of wonder that a single hawthorn bush survives, considering of how unsparingly they are mangled for the sake of firing"

From this we can interpret that a distinction existed between the degree of hedge management by the "gentlemen farmers, who either have long leases or who occupy their own lands" and would have been in a position to "preserve" the hedges, and the hedges of the "lesser farmers", who were unlikely to have had the means or security of tenancy to instigate such upkeep of the hedges. On many holdings it appears that the hedges were never managed from the outset, and many hedges that were planted never became adequately established.

"View from Mount Prospect in the northern part of the Barony of Boyle":

"So far, trees and hedgerows give indication of progress in agricultural improvement, and enliven and adorn the scene. But beyond the hill of Crossna they become rare and the country appears in every respect more rude."

Around Tulsk:

"sometimes the traces of ancient Hawthorn hedges, marked by insulated bushes in even lines, but at very remote intervals, afford proof that in former times the subdivisions of the land were more numerous."

From this observation it appears that in this particular area there was a great deal of medieval enclosure based agricultural land development.

Mote Park:

“on one side, the entrance into the park, from the town of Roscommon, passes through numerous successive rows of old Hawthorn trees, which appear once to have belonged to hedges, but which now stand insulated [isolated].” This again indicates that hedged enclosures were developed in the earliest stages of the period of agricultural improvements. It is probable that these hedges, once planted, were inadequately maintained, if at all, leading rapidly to their demise.

Castlerea Area:

“under the old system of joint tenantry, it was not uncommon to mark out the land into ridges, for each tenant respectively, to be cultivated, at pleasure; but in the new arrangement, each lot was to be distinctly fenced off by itself: Mr. Young informed me, that as much as it was desired to supply the people with thorn quicks for the purpose, a sufficiency could not be obtained in the country. Nurseries were deficient.”

He adds as a footnote: *“considering the great want of thorns for hedges, and how much the country might be improved by shelter, it is to be lamented, that pains should not be taken to establish nurseries on every estate.”*

It is interesting to note that now, more than 170 years on, there is again (or still) the same deficiency in the availability of native quicks (young hawthorn plants) in the county!

Terminology:

Mearing (from mearim)	Mearim means measure, so mearing referred to the measure of a property, the mearing being the property boundary
Fál	Hedged ditch
Clyglas (from cladh glas)	Green ditch



Aerial view of hedgerows at Rooskey from the mid to late 20th Century

3.2 The Value of Hedgerows for County Roscommon

Based on the results of the Badger and Habitats Survey of Ireland (Smal, 1995) the current hedgerow/treerow network in Ireland is estimated to be approximately 382,000 km. This is potentially a huge asset to the country.

Landscape

Perhaps more than any other landscape element, hedgerows, along with stonewalls, endow the countryside with a distinctive and attractive appearance. In particular, regional and local variation in hedgerows contributes significantly to the distinctiveness of Roscommon's landscape character. They make up the familiar setting that is so central to cultural heritage & tourism, and give the impression of a wooded landscape

Agriculture

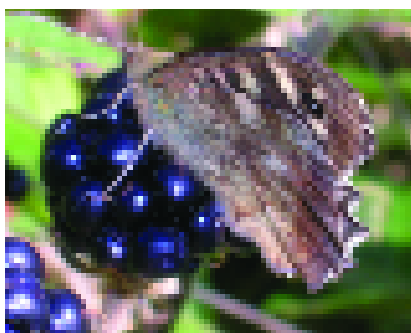
As agriculture is the basis for the existence of hedgerows, hedgerows have huge agronomic benefits, apart from their basic function as cheap and environmentally friendly stock-proof boundaries. They provide vital shelter and protection of stock and crops across the county. By trapping airborne viruses they can prevent the spread of disease between farms. Good hedgerows reduce wind speeds and thus protect against soil erosion.



Shelter value of hedgerows for livestock

Flora and Fauna

Hedgerows are an essential wildlife habitat in the modern countryside, especially in the light of the low native woodland cover in County Roscommon. Hedgerows are often the only significant wildlife habitat on many farms. They are home to a range of wild flowers, and flowering and fruiting trees and shrubs, all of which form the base of the food chain. They support invertebrates like butterflies, moths, ladybirds, beetles, bumblebees and hoverflies. In turn, two thirds of our bird species nest in hedgerows, finding essential food and shelter within. Birds of prey like Kestrels, Merlins, Owls, and Sparrowhawks use hedgerows for hunting along. Bats depend on hedgerows for shelter, roosting, and most importantly for their insect food. Hedges can also support other mammals like woodmice, hedgehogs, and badgers.



Moth on Blackberry



Badger Sett in hedgerow

Hedges as habitat corridors

The network of hedges across the country provides links between surviving fragments of other wildlife habitats, thereby allowing the movement and dispersal of species through otherwise hostile agricultural landscapes. This network is thus vital to the conservation of much of our native flora and fauna, especially in parts of the county where intensive tillage and reseeded pasture is common. The quality of any particular hedge, in terms of its height, width, density, and general structure and condition, determines the extent to which it will act as a corridor for species movement and dispersal.



Hedgerow running down to the River Suck

Water Quality

Hedges contribute a great deal to water quality. The root systems of hedgerow shrubs and trees regulate the movement of water through the landscape, absorbing and recycling nutrients, thus reducing the risk of pollution, whilst also reducing the potential for flooding.

Hedges also stop sediment from moving down-slope, preventing excessive siltation in waterways. Siltation is the clogging up of river beds with fine grained particles like soil. It contributes much to the deterioration of aquatic habitats, preventing Salmon and Trout from spawning where they usually would.

Carbon Sequestration

Estimating an average hedgerow width of two metres, hedgerows cover an approximate area of 764 km² of the country and play a role in meeting Ireland's obligations under the Kyoto Protocol.

Employment

A number of people derive at least part of their income directly or indirectly from the management of hedges.

A Material Resource

In respect of native and naturalised species, a significant proportion of the country's broadleaf tree resource is contained within hedgerows. These provide the raw materials for a variety of crafts, and are also a source of carbon neutral fuel.

4.0 SURVEY RATIONALE AND OBJECTIVES

4.1 The need for a Hedgerow Survey in County Roscommon

Prior to this survey the estimated length of the hedgerow network in Co. Roscommon was 10,983 km. It is a valuable cultural heritage, agricultural, and environmental resource, with a great relevance to our natural flora and fauna. Until now there has been no data on the real extent, nature, variation, and condition of the county's hedgerows. It is necessary and important to assess the extent, composition and condition of the county's hedges, in order to better understand the resource. From the findings of this survey it is possible to recommend appropriate management and conservation measures that ensure the long term sustainability of the resource.

The Hedgerow Survey provides useful information in a variety of ways:

- It gives a snapshot of the quantity and quality of the hedgerows in the county
- It identifies threats facing the resource and looks at the potential for these. Recommendations are made about dealing with various threats
- The survey identifies plant life local to the county, and looks at the different floristic types of hedges across Roscommon
- With repeat surveys this will be a useful tool in monitoring environmental change
- It allows for comparison between hedgerows under different management regimes
- Since the sampling squares for this survey are the same as those used by both the Badgers and Habitats Survey and the Countryside Bird Survey, the information from this survey may enable more detailed analysis of the results from those two surveys

The survey results and conclusions should provide a useful tool for decision makers and advisory bodies including;

Local Authority Planners
National Roads Authority
Road Engineers
Landscape Planners
Environmental Consultants, particularly in drawing up Environmental Impact Statements
Department of Agriculture
Teagasc
Farmers, Land Owners and Estate Managers
Foresters
Schools and Colleges
State Bodies – National Parks and Wildlife Service, CIE, Waterways Ireland

The Hedgerow Survey is necessary for the full implementation of the County Roscommon Heritage Plan and, in the future, for the County Biodiversity Plan.

4.2 The Aims and Objectives of the Roscommon Hedgerow Survey

- To ascertain the extent and condition of hedgerows in County Roscommon and thus the potential sustainability of the resource under present management conditions
- To determine the main threats to hedgerows in the county, and evaluate these in terms of distribution, destructiveness, frequency, and importance
- To establish the species composition of the county's hedges and classify groups of different hedge types
- To assess the variation in hedgerows in relation to region, soil types, hedge types, condition, and management
- To collect baseline data that will enable change to be monitored
- To draw up appropriate recommendations for the management and conservation of the resource according to the findings of the survey

4.3 Legislation

Various Legislative Acts, Directives, and Guidelines, (International, European, and National) reflect the importance of the Hedgerow resource and its management. These include:

International

- The Kyoto Protocol (1997)

European

- (EU) Habitats Directive (1992)
- (EU) Birds Directive (1979)
- (EC) Council Regulations
- 2078/1992 (Agri-Environmental Schemes)
- 1257/1999 (Good Farming Practice)
- (EU) Nitrates Directive (1991)

National

- The Wildlife Act (1976) & The Wildlife (Amendment) Act 2000
- National Biodiversity Plan (2002)
- National Heritage Plan (2002)
- The Roads Act 1993
- Electricity Supply Act 1927
- Communications Regulations Act 2002
- The Forestry Act 1946
- Sustainable Rural Housing: Guidelines for Planning Authorities (2005)

A summary of the provision of the main legislation

The Kyoto Protocol (1997) on anthropogenic greenhouse gases

This calls for the *"Protection and enhancement of sinks and reservoirs of greenhouse gases."*

In the process of photosynthesis hedgerow trees and shrubs take in carbon dioxide and emit oxygen. Carbon Dioxide is a major greenhouse gas.

(EU) Habitats Directive (1992)

Article 10 of the Directive states that " Member States shall endeavour in their land-use planning and development policies, to encourage the management of features of the landscape which are of major importance for wild flora and fauna. Such features are those which, by virtue of their linear and continuous structure (such as rivers, riverbanks or hedgerows) or their functions as stepping stones (such as ponds or small woods) are essential for the migration, dispersal and genetic exchange of wild species."

(EU) Birds Directive (1979)

Article 3 of the Directive states that "Member States shall take the requisite measures to preserve, maintain, or re-establish a sufficient diversity or area of habitats for all the species of birds referred to in Article 1 - i.e. -all species of naturally occurring birds in the wild state."

[European Council Regulation \(EC\) 1257/1999 - Agri-Environmental Schemes](#)

The Rural Environment Protection Scheme (REPS) specifications set down the conditions by which participant farmers in the Scheme must manage their hedgerows.

[Nitrates Directive \(1991\)](#)

In order to reduce or prevent pollution of watercourses one of the objectives of the Directive is to limit the losses of nitrates linked to agricultural activities. To this end the Nitrates Directive promotes the "Buffer" effect of non-fertilised grass strips and hedges along watercourses and ditches.

[Wildlife Act \(1976\) & Wildlife \(Amendment\) Act 2000](#)

The purpose of Section 40 of the original Act, as amended by Section 46 of the Amendment, is to protect breeding birds during the nesting season by establishing a prohibition on the cutting of hedges during the period from 1st March to 31st August (inclusive) each year.

[National Biodiversity Plan \(2002\)](#)

Produced in response to the Convention on Biological Diversity (CBD, Rio de Janeiro, 1992), the plan has a number of Actions that are relevant to Hedgerow Conservation. These include:

Action 32: "Review options on Regulation of Hedgerow Removal and Produce guidelines on Hedgerows and Biodiversity."

This should be taken in the context of paragraph 2.27 of the plan that states:

"Field boundaries, mainly hedgerows, are a particularly prominent feature of the Irish countryside and provide important habitats for a variety of species. Hedgerows have suffered significant losses. Current legal controls for their protection are limited.

For the future, the overall goal should be to have no net loss of the hedgerow resource."

5.0 CONSULTATIONS

Letters were sent to Roscommon County Council planners and area engineers and to all members of the County Roscommon Heritage Forum with information about the hedgerow survey and a consultation feedback form (see Appendix A). The Heritage Forum is composed of a range of heritage stakeholder interests, including elected members, agriculture, State agencies, tourism and community. The first batch was sent out, both electronically and by post, prior to the commencement of fieldwork, in July 2004. These letters of 6 completed consultation feedback forms were returned to us, all from Heritage Forum consultees. An updated version of the same information was sent in October 2004 with notification of the open public consultation sessions.

The consultation sessions were held in Athlone library on the 21st October 2004 and in Roscommon county library on the 22nd October, 2004. These sessions were advertised in advance in the local press and on local radio. A total of 7 individuals from County Roscommon came along, each bringing a range of local (and broader) issues to our attention. The authors also met with Kieran Kenny and Oliver Burke (CAO) of Teagasc to discuss Kieran's previous hedgerow survey work in Roscommon and other general issues related to the survey.

Consultation Feedback Forms

When asked how relevant will the survey be to you / your work / organisation, all respondents consider that the survey will yield useful information to their organisation.

Respondents from Roscommon identified particular uses for the survey findings relevant to them as follows:

- Facilitate and contribute to education for schools
- Value of hedges in forestry (both state and private) for biodiversity
- REPS planning, hedge types and appropriate species
- Enable further identification of conservation worthy hedgerows
- Refining work on hedgerows in NPWS properties

Suggested outcomes from the survey include:

- Improved hedgerow management advice for the county
- Some best practice demonstration sites to be set up around the county
- The organisation of hedge management demonstrations to help people in how hedges should be managed
- Recommendations for planting of new hedges
- That the survey results could lead to a breakdown of the value elements of hedges for the county, and should then be used to create awareness of their value to be passed on in a practical way (like a booklet)
- To protect worthwhile hedgerows while assessing planning applications
- The display of survey results in community and education centres
- Identification of hedgerows with 'historical pedigree' for comparison with later developments
- Presentation of methodology so that interested individuals can extend the survey in their own area
- A reduction in crisis management of roadside hedges during the nesting season, when much damage is inflicted on nesting bird populations. This could be achieved by a more planned approach to notification of landowners within an appropriate timeframe.

Public Consultation Sessions

Most people who came along to the sessions were particularly concerned about the removal of hedges for housing development and road widening and straightening. That too much hedge, more than necessary, is often removed, was also a concern, as are recommendations that hedges be removed in front of housing sites and replaced with concrete walls. Some were also concerned about replacement hedges, where instated, being planted with inappropriate species.

The timing of hedge cutting was another concern, and the availability of contractors outside the nesting season. Removal for field enlargement as part of agricultural development was also deemed as a threat in the county.

It was suggested to us that a County Management Plan (for hedges) be adopted to deal with these and other issues. It should incorporate a reinstatement policy for hedges that are taken out and planning permissions in relation to removal and replanting. Engineering and machine operator standards also need to be addressed. In the plan the division of responsibility between the County Council and the farming community would need to be identified and targeted.

Some who came along were seeking management advice, including new planting, species choices, seed availability, and rejuvenation options. It should be a priority, in terms of hedge conservation, to support those landowners who are planting and actively managing their hedges with practical management demonstrations.

A lack of awareness about species diversity in new planting was also identified by some of the consultees, as was the difficulty in finding local sources for native quicks (young hawthorn plants) and species such as Holly, Rowan, Spindle and Guelder Rose for planting in to hedges.

There was a good deal of interest in the wildlife values of hedges in the county, and how hedges need to be managed accordingly. (One concern raised was that the mesh size of certain brands of sheep wire fencing prevents the free movement of foxes, hares, and otters through the countryside. Under REPS whole external boundaries are often sealed with sheep wire and are thus a significant hindrance to wildlife in that area).

Some management activities on farms prescribed by the REPS were seen as being detrimental to wildlife if applied without consideration of individual circumstances. It was suggested that REPS plans should take account of local knowledge of wildlife habitats.

The implementation of the Air Pollution Act by Roscommon County Council in so far as it restricts the burning of waste brush wood from hedge cutting was also of concern.

We would like to thank all who responded to our consultation efforts.
It was a very worthwhile aspect of the survey.

6.0 METHODOLOGY AND FIELD SURVEY

The initial methodology used for this survey was the one developed by Murray for Networks for Nature (2003): Draft Hedgerow Survey Methodology. The Westmeath and Roscommon Hedgerow Surveys were seen as pilot county surveys. During the early course of the fieldwork a number of improvements were made to the working methodology, including refinement of certain definitions and modification of recording categories. More information is contained in Appendix B Field Survey Sheets.

6.1 Maps and Aerial Photographs

Discovery Series ordnance survey maps (scale 1: 50,000) were used to physically locate the samples. The new series ordnance survey maps, at a scale of 18cm to one kilometre, were used to identify features in the field. The first series Ordnance Survey maps from 1830's were also used, mainly for the identification of townland boundaries. Aerial photographs of each sample square enabled the square to be assessed in terms of general character and the presence of hedges. This made the identification of the randomly selected hedge samples more efficient. A sample of the Ordnance Survey sheets and aerial photographs used are contained in Appendices C and D respectively.

6.2 Selecting the sample

The bottom left hand 1km square of each of the Ordnance Survey ten kilometre grid squares of the county was chosen for the Hedgerow Survey, in accordance with the sampling procedure for the Badger and Habitats Survey of Ireland (Smal, 1995) and the Countryside Bird Survey (Birdwatch Ireland, ongoing study). This placement will allow for a joint assessment of these data sets in the future.

Each sample square is 1km square. For Co. Roscommon a total of 29 squares (24 full and 5 part) were selected in this way. The grid references for each square in Roscommon are listed in Table 8.1.1

Within each sample square 10 hedges were selected randomly using a transparent overlay. The points on the overlays were marked by subdividing the scaled square in to a grid, numbering the grid, and then matching randomly chosen numbers with points on this grid. The overlay was then placed on top of the aerial photographs of each square, and the hedge nearest each point on the overlay was chosen for detailed investigation. 10 hedges per sample square were selected in this way.

Where a significant portion of the sample square was covered in forestry, bog, or other non- hedged landscapes, the number of hedges recorded was adjusted accordingly. This was to ensure that the sample would not be skewed by a higher sampling density in certain areas. Where the hedge chosen on the aerial photo or map was discovered to be something other than a hedge (e.g. a tree line, a colonised drain, a vegetated bank, or a wall covered in vegetation), the next hedge nearest to the relevant point on the overlay sheet was recorded instead.

6.3 Defining hedges

For the purpose of this survey hedges are defined as

“Linear strips of woody plants with a shrubby growth form that cover >25% of the length of a field or property boundary. They often have associated banks, walls, ditches (drains), or trees”

This definition is based on Cooper & McCann (Northern Ireland Countryside Survey) and Fossitt (2001), and the Networks for Nature Hedgerow Draft Survey Methodology.

Each hedge chosen for detailed investigation by the random selection process was clearly marked and labelled with a number on the field map, with beginning and end points also marked. A length of hedge was taken as one side of a field or enclosure. End points were identified as the junction between adjacent sides of a field, or where three or more hedge lengths meet.

In a few instances end points were marked where the construction, management, or character changed suddenly and conspicuously along its length, where a clear and obvious difference in the origin of the hedge was apparent, but where no junction was evident. This is normally a result of boundary removal, where the two portions of a linear hedge once bounded separate fields.

In accordance with the Networks for Nature Draft Methodology, garden hedges have not been recorded.

6.4 Structural Recordings of Hedges

Each hedge subjected to a detailed investigation (10 hedges per sample square) was assessed along its' whole length.

Hedges that have grown in to a line of mature Hawthorn (or other) trees have not been considered as hedgerows, but as 'remnant' hedges. The assumption being that they are remains of hedgerows which have deteriorated. It is possible, based on reports from Statistical Surveys carried out by the RDS, that some may be examples of attempts at establishing hedges that were not completely successful.

Where the boundary feature is a stone wall, with some growth of hedge shrubs along its length, it is not recorded as a hedge but as a 'stone wall with hedge shrubs'. Where a stone wall has a hedge or hedge shrubs along >25% of its length, it is recorded as a 'stone wall with hedge'.

A 'Structural Field Survey Sheet' was used to record the characteristics of each hedge and its' associated features (see Appendix B). The sheet was developed from the Networks for Nature Draft Hedgerow Survey Methodology. This sheet lists categories of hedge structural attributes, associated features, and management practices. Each category has a corresponding code that is entered in to the appropriate box on the data recording grid.

Where necessary or where an obvious improvement was apparent, categories were amended or further developed during the early phase of fieldwork. Any changes have been fully documented.

The structural recordings are subdivided in to the following 5 categories: situation, structural attributes associated features, management, and trees and fruiting.

- Situation included whether the hedge was a townland or parish boundary, had an associated stream, or runs along a roadside; adjacent land use; links with other habitats; and the linearity of the hedge
- Under Structural attributes the boundary type was noted as whether the hedge was a double or single line and whether there was an associated wall. The hedge profile was also noted in to categories. Hedge height, width, percentage gaps, and basal density, and fencing were recorded
- Associated features such as bank and ditch size, bank degradation, and verge width, were also recorded based on categories.
- Current management and methods of management were noted, along with whether the boundary line along which the hedge runs was active as a boundary or redundant
- Trees, fruiting levels, and vigour of growth were recorded under the category 'Trees and Fruiting'

A copy of the Structural field recording sheet is given in Appendix B.

6.5 Floristic Recordings of Hedgerows

Two 30 metre strips were paced out along each hedge from two randomly chosen points along the hedge. The 30 metre strip is a generally accepted as an adequately representative sample size for recording woody species in a hedge. By recording woody species along a standardised length, the comparison of hedges of different lengths is made possible. As there can be much variation in species from one end of a hedge to the other, two strips were recorded. This increased sampling intensity for each hedge gives a more accurate picture of the overall species of each hedge.

The 'Floristic recording sheet' was used to record these data. In this, each species present within the length of each strip was allocated an appropriate Domin value of abundance (the Domin scale has 10 levels of percentage cover, see Appendix B).

Where other species were present in the hedge but did not fall within either strip that species was recorded as present separately from the strips.

The presence of Ivy (*Hedera helix*) at canopy level was recorded according to the Domin scale.

Tree species present in the hedge were noted, and the dominant tree species, where applicable, was underlined.

6.6 Target Notes

Where appropriate, notes were made of irregularities, special features, or notable characteristics within the sample square or about specific hedges.

6.7 Recording the Extent of Hedgerows in Samples

The original methodology for this survey proposed that the measurement of the extent of the hedgerow resource be carried out as a separate study using aerial photographs and GIS technology. This was not possible within the timescales and funding of this project. Also, it is a method which will need to be trialled to prove its accuracy as there are a number of situations where its effectiveness is questionable without ground proofing.

The problem arises if relying on aerial photography to identify hedgerows before measurement using GIS. Some examples of this are;

- Inability to differentiate between a hedgerow with trees and a bare tree line or narrow shelterbelt
- Inability to differentiate between a stone wall with briars and a low trimmed hedge
- Inability to differentiate between a woodland strip, vegetated bank or drain and an overgrown hedgerow
- Low angled light at the time of photography can significantly over or under emphasize the appearance of hedgerows (particularly managed hedgerows) leading to an inability to distinguish presence reliably

For the purposes of this survey the extent of hedgerows within a sample square was recorded by visual inspection of all linear features apparent on the relevant aerial photograph. Where aerial photographs were not available all boundary lines on the 1837 O.S. Map were investigated.

The presence of hedgerows was marked with a solid red line on a black and white photocopy of the aerial photograph (or copy of the O.S. Map). Remnant hedgerows were recorded with a broken red line. Any other linear feature that was apparent on the aerial photograph/map was investigated and non-hedgerows were noted with a solid green line to prevent duplication of investigation. These included Vegetated Banks, Vegetated Drains, Walls with or without shrubs, Fence lines, Mini Woodland Strips. Where clear and extensive gaps occurred in hedges a green line was used to mark the gap section. This was done to minimize the over estimation of hedgerow length due to the inclusion of significant gaps.

Measurement of Extent

The extent of hedgerows was calculated using a Silva map measuring wheel to an accuracy of +/-4% on the red lines recorded during the fieldwork. Each length of hedge was measured and recorded twice and the average value being taken for the particular length. As a means of validating results from the structural survey, the length of remnant hedgerow was also recorded. Only that portion of the boundary that contained some remnant of a hedge was recorded. Some former hedge lines/ boundaries have declined to the point that only a small fraction of the original remains. It follows that the length of remnant hedgerow is likely to be underestimated.

Potential Error in Extent Values

Recording Error

- Recording non hedgerows as hedgerows
Close inspection of every hedge for the purpose of recording extent was outside the scope of the survey within the working timeframe.

Even on close inspection it was difficult, in certain cases, to determine whether a particular linear feature was or was not a hedgerow based on the survey definition. When it came to recording extent this distinction was often determined from a distance. It is possible that some features that were recorded for extent purposes as hedgerows may have been considered not to be hedgerows on closer examination. This potential error would be almost non-existent in most landscapes, but in areas on the fringes of bog-land the difference between a hedgerow and a colonized drain, or similar feature is more blurred.

- Recording of remnant hedgerows as hedgerows

Similar comments to the above apply, but in reverse. Some hedgerows that were recorded for extent purposes may on close inspection have been classified as remnant hedges. Any potential errors from the two above points are tending to cancel each other out, and overall any potential error would be deemed to be insignificant.

- Non detection of new hedges

Young hedges that would not be included on old OS Maps and that would be too small to register as distinct linear features on aerial photographs could only be recorded if detected during the field survey. The incidence of this was very low and it is not considered that new hedges would contribute to the overall hedgerow extent to any significance.

Measurement Error

- Topography/Contours

Measurement of extent was calculated using a map wheel on aerial photographs, so it was not possible to account for the extra length due to contours. On the basis of this fact the extent figures are under-estimated.

- Non linearity of scaling of photocopies

The photocopies used for recording extent were enlarged from the originals. There appeared to be a scaling error in the North/South axis of the copies resulting in a slight (approx. 1%) reduction in the length of this axis. This would result in an under estimation in the North/ South component of any hedge.

6.8 Photography

A digital camera was used to document some of the notable hedges, specific characteristics, good examples of the profile categories, species, and to demonstrate threats such as invasive species and bank degradation.

Photographs are useful for assisting explanations in presentations and reports relating to the Hedgerow Surveys.

6.9 Access and Permission

Due to difficulties in identifying ownership of all parcels of land within the sample squares and the fact that landowners may not be around during the day, permission was only sought by direct approach to landowners when present, rather than by previous contact. Where access to land was through a farm close to a dwelling, or in any other situation deemed relevant by the surveyors for their work, permission was sought where possible. Where requested, permission was granted without exception and in a number of cases landowners provided useful additional information. The fact that the sample squares are the same as those used by Birdwatch Ireland for the Countryside Bird Survey meant that a number of landowners were well primed to see surveyors at work. Their co-operation and assistance was much appreciated. The surveyors had full public liability insurance cover for their work.

7.0 DATA ANALYSIS

All the data recorded during the field survey was transferred from the field recording sheets in to a Microsoft Excel database, one for each of the structural and floristic data.

7.1 Floristic Classification of Hedge Types

A process called numerical classification was carried out on the floristic data. The classification finds groups of samples (hedges) that equate to distinct hedge types based on their floristic composition. A TWINSpan (two way indicator species analysis) classification was carried out using the software 'PC Ord' (McCune and Mefford, 1999). Data for both counties Westmeath and Roscommon were analysed together. This makes for a more meaningful distinction of hedge types across the region, with greater variation and larger group sizes.

The data set used for the classification consisted of an average recording from the two 30 metre strips for each hedge, meaning that all species recorded from both 30 metre strips along the hedge were averaged to produce one set of percentage cover figures for each hedge.

Species that occurred in less than 2 % of samples were not included in the classification process. Pseudo-species cut levels were set manually.

The output of this analysis is a 'two way ordered table' that breaks up all the samples (hedges) according to their floristic composition, based on the frequency of certain 'indicator species'. The groups are subjectively pulled out from the table by the user according to ecological understanding and indicator values. The classification process was considered a success, as 5 distinct and ecologically meaningful hedge types were drawn out from the table. These groups are presented and discussed in Section 8.2.

Both the floristic and structural characteristics of hedges in each group were fully examined using basic statistical procedures such as means (species numbers), frequency, and mode. These are presented in Section 8.0

7.2 Statistical Analyses

All the data were subjected to standard statistical analyses (frequencies of species occurrence, mean species richness, frequency of structural characteristics, etc.) and graphed using Microsoft Excel database programme.

8.0 RESULTS

8.1 The Extent of Hedgerows in County Roscommon

Grid Ref.	Sq. Ref.	Nearest Town/Village	Area km ²	Hedgerow Length km	Remnant Length km	Density km/km ²
G 800 100	R01	Lough Arrow	0.29	0	0	0
M 800 900	R08	Ballinameen	1	0	0	0
M 800 500	R23	Ballygar	0.041	0	0.08	0
N 000 500	R25	Lecarrow	1	0	0	0
N 000 300	R29	Clonmacnoise	0.475	0	0	0
G 600 000	R03	Ballaghaderreen	0.6	0.17	0.15	0.28
M 900 600	R22	Ballymurray	1	0.72	0.155	0.72
M 700 700	R17	Ballymoe	0.137	0.195	0.105	1.42
M 900 300	R28	Ballinasloe	1	1.47	0.24	1.47
M 900 400	R26	Taghmaconnell	1	2.255	0	2.26
M 900 700	R19	Kilroosky	1	2.835	1.35	2.84
M 500 700	R16	Cloonfad	1	4.38	3.115	4.38
G 900 100	R02	Keadue	1	4.715	2.235	4.72
M 800 800	R13	Tulsk	1	5.15	0.32	5.15
N 000 900	R10	Rooskey	1	5.485	0	5.49
G 900 000	R05	Carrick	1	5.575	0	5.58
G 800 000	R04	Boyle	1	5.625	2.88	5.63
M 600 800	R11	Castlerea	1	5.7	0.225	5.7
M 700 900	R07	Frenchpark	1	6.47	1.07	6.47
M 800 700	R18	Ballinaheglish	1	7.18	0.57	7.18
N 000 400	R27	Athlone	1	8.375	0.56	8.38
M 600 900	R06	Lisacul	1	8.67	2.225	8.67
M 900 500	R24	Curraghboy	1	8.725	1.4	8.73
N 000 700	R20	Lanesborough	1	9.96	0.45	9.96
M 800 600	R21	Castlecoote	1	10.515	1.69	10.52
M 900 900	R09	Elphin	1	12.125	0.17	12.13
M 900 800	R14	Strokestown	1	12.525	0.595	12.53
N 000 800	R15	Scramogue	1	13.6	0.165	13.6
M 700 800	R12	Castlerea	1	13.67	1.945	13.67
Total			25.54	156.09	21.70	Average 5.43

Table 8.1.1 Measurement of extent of hedgerow and remnant hedgerow in sample squares in County Roscommon

Table 8.1.1 shows the extent of hedgerows and remnant hedgerows in the individual sample squares of County Roscommon. The total area surveyed was 25.54km² which is 1.0% of the total area of the county.

Assuming the squares surveyed to be a representative sample of the county as a whole it can be estimated that County Roscommon has a Hedgerow length of 15,574km.

The corresponding figures for remnant hedgerows would give an estimated length of remnant hedgerow of 2,165km

The figure of 2,165km for remnant hedgerow is 12.2% of the total of hedgerow and remnant hedgerow length. This compares favourably with the results of the structural survey which found that 13.2% of sample hedgerows recorded were remnant. Assuming that the random sampling method showed no bias towards selecting short or long stretches of hedge, these results are a validation, in part, of the sampling method of the survey, as it had been anticipated that the values for remnant hedgerow length may have been slightly under-estimated (see Recording of Extent).

The density of hedgerows in the sample squares varies from 0 in three part-squares and one full square (R1,R23,R29 and R8) to 13.67km/km² in square R12 (Castlerea). R15 (Scramogue) was only marginally lower at 13.6km/km

The average figure for hedgerow density is 5.43 km/km².

Table 8.1.2 shows the distribution of hedgerow density throughout the sample. It can be seen that there is quite an even distribution of density figures through from highest to lowest. This indicates the variability of the hedgerow landscape in County Roscommon.

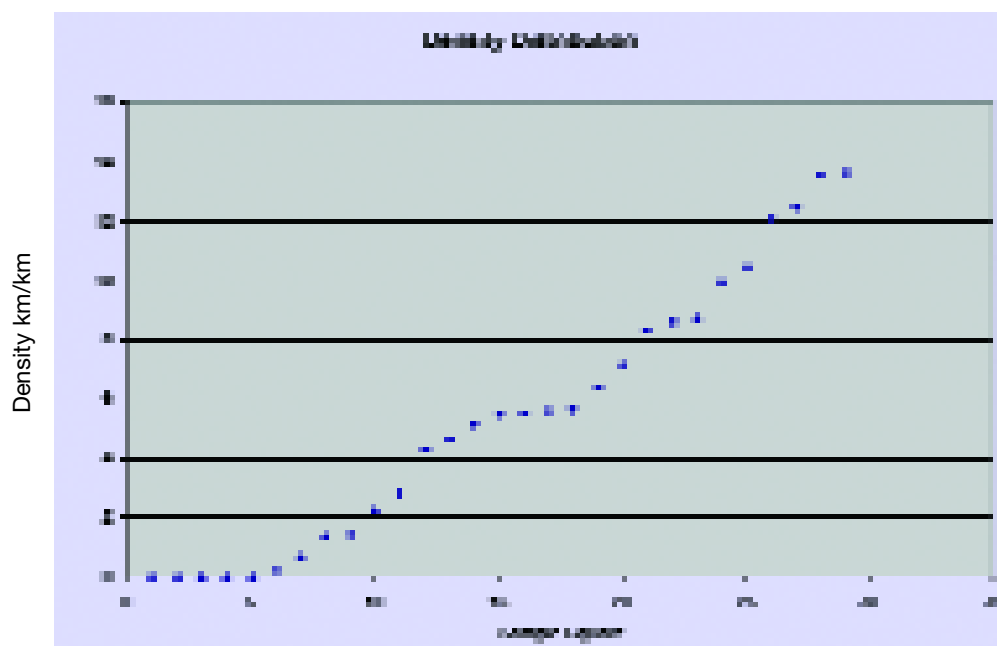


Figure 8.1.2 Distribution of hedgerow density per km² in sample squares

To put hedgerow density into context, if a 1km square block of flat land was equally subdivided into 16 square 6.25 hectare fields (15.44 acres), it would require 10km of hedgerow (or fencing).

A hedgerow density of 5.43 km/km² would, approximately, equally sub-divide the same area into 4 fields of 25 hectares (61.78 acres).

It must be noted that the average figure of density masks the actual variation in sample squares around the county. For example, 31% of the sample squares have more than 8 km of hedgerow per km².

The mean (average) hedgerow density for Roscommon, 5.4 km per km², is similar to Westmeath, which has a mean density of 5.8 km per km². It would be expected to find higher densities in Co. Roscommon than Co. Westmeath, as fields tend to be smaller in Roscommon. This is likely to be shadowed in these figures by the number of sample squares in Co. Roscommon that fall on lake and bog, where few or no hedges were recorded, bringing the overall average figure down. This variation is also reflected in the very different standard deviation figures for each county and different density distributions.

The figures compare favourably to England, which has an overall average density of 2.91 km per km² (Barr, 1993), and the County of Suffolk, a county of rolling agricultural land, has a mean density of 3.6 km per km².

As a final point, measurement of hedgerow length needs to be appraised in light of gappiness.

Badger and Habitat Survey Data

The Badger and Habitat Survey of Ireland (Smal, 1995) produced figures for hedgerow and treeline lengths using the same sample squares as the current hedgerow survey. However, definitions between the two surveys are not sufficiently consistent for a direct comparison of the two data sets.

An estimation of hedgerow length in County Roscommon based on the definitions and results of the Badger and Habitats Survey of Ireland would be 10,983 km.

It was hoped that a comparison could be made between the results from the two surveys to produce an approximation of hedgerow change during the period between the two surveys. This varies between 11 and 14 years as the Badger and Habitats Survey was conducted during the period 1989-1993.

Our results would suggest an increase of over 4500km hedgerows throughout the County in the period between the surveys. Our observations of new hedgerows (less than 20 years old) were very rare and an explanation of this variation must be sought elsewhere. In fact, observation of recent hedgerow removal far exceeded that of any new planting.

The figures produced for extent in Co. Westmeath tally much more closely with the figures of the Badger and Habitats Survey. The discrepancy between the figures produced between the two surveys in County Roscommon would suggest that any direct comparison between the two surveys is irrelevant unless the sources for the discrepancy can be deduced.

8.2 Floristic Hedge Types for County Roscommon

From the output of the TWINSPLAN classification, five main groups of hedge types were identified. These groups and their distinguishing species composition are as follows:

Group 1 Hedges Characterised by Willow

This group also has Hawthorn, and occasionally gorse and holly. The average number of shrub species for hedges in this group (i.e. mean species richness) is 3.3.

Group 2 Species Poor Hawthorn hedges

This is the most species poor of the groups, Elder is also found, and occasionally holly, but seldom other species. These hedges are likely to have been planted as single species Whitehorn, and then rapidly colonised by Elder and Holly. Elder and Holly are often the first two shrub species to colonise hedges, as both have a degree of shade tolerance and are readily spread by birds.

Group 2 probably indicates relatively young hedges. The mean species richness of this group is 2.2.

Group 3 Hawthorn and Blackthorn hedges

These are hedges that have high levels of both Hawthorn and Blackthorn, but no spindle, Guelder rose or Holly. The mean species richness of this group is 3.3.

Group 4 Relatively Species Rich hedges

This group consists of Hawthorn, Blackthorn, and Holly hedges that may also contain Privet, Spindle and some Guelder rose. This group is the most species rich hedge type, with a mean species richness of 4.2.

Group 5 (1a) Gorse Hedges

Hedges distinguished by high cover of Gorse (*Ulex europaeus*)
These also contain Hawthorn (*Crataegus monogyna*) at low levels and there is a little Holly. The mean species richness of this group is 2.7.

These groups tie in well with a separate investigation of whether certain species are indicative of Species Richness in the hedge in which they occur.

Hedges containing	Mean species number
Hawthorn	3.18
Blackthorn	3.97
Elder	3.64
Holly	3.94
Spindle	4.54
Hazel	4.56
Guelder rose	5.13

Table 8.2.1 Relationship between species occurrences and species richness

From these figures we can see that the presence of Spindle, Hazel, or especially Guelder Rose, is a good indicator of species richness in a hedge.

Geographical Distribution of Group Types

There was a slightly higher occurrence of type 2, the Hawthorn Group, in County Westmeath than in County Roscommon. The species rich group was also more frequent in Westmeath. Roscommon, on the other hand, has a higher proportion of type 1 hedges, the willow group; of type 3, the Blackthorn and Hawthorn group; and of type 5, the Gorse group.

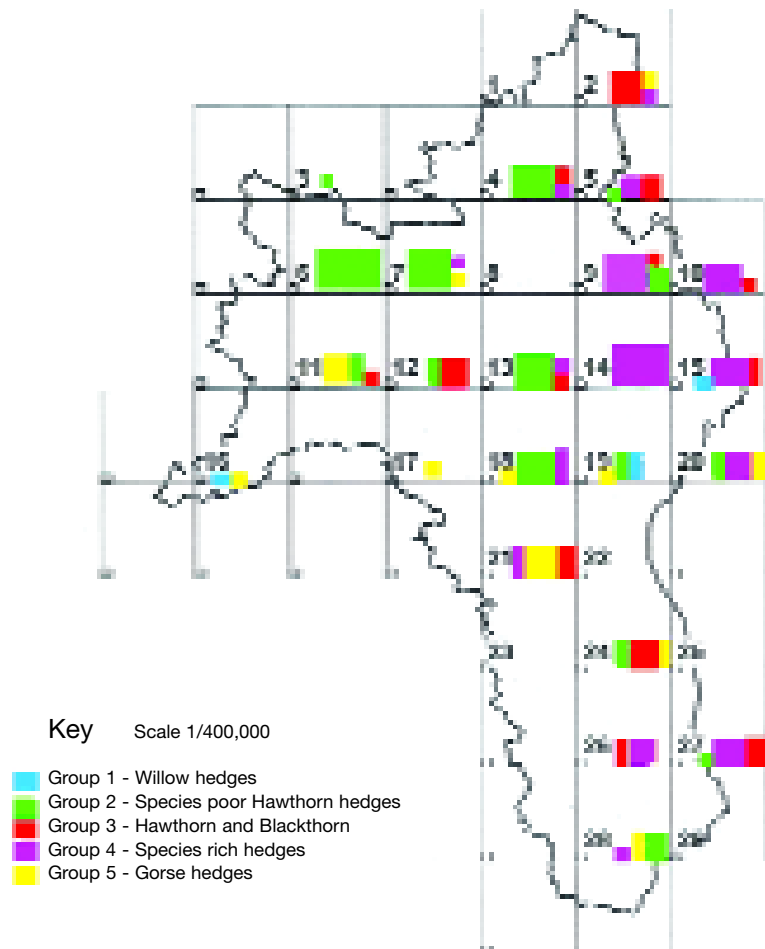


Figure 8.2.2 Distribution of hedge classification types in Co. Roscommon

Structural characteristics of each group:

As the groups are based solely on their species composition, the difference in recorded structural features for each hedge was compared across the different groups. The more notable findings are described below.

Willow Group (1)

The hedges in this group have large drains (68% have size class 4).

The majority are long term unmanaged. The most commonly occurring drain size is 4, large drains. Group 1 hedges are associated with plentiful trees.

These results are in accordance with the fact that willow is a species that thrives in wet conditions, and that large drains are often a feature of land with poor natural drainage. Hedges on this type of land are often difficult to manage with conventional tractor-mounted equipment, thus the high proportion of long term unmanaged management category would be expected. This would also give rise to the development of trees that may have their growth curtailed in hedges that are easier to manage with machinery.

Hawthorn Group (2)

These hedges have a tendency to be less wide and less tall than hedges of other groups. There are also fewer trees found growing in hedges in this group, with one fifth of the group having no trees at all. A particularly poor basal density was recorded for this group. Most of the hedges have either no associated ditch (drain) or a small ditch. Many of these hedges are probably of relatively recent origin. The observed structural features can largely be attributed to management practices.

Blackthorn & Hawthorn Group (3)

This group has the highest proportion of hedges that are overgrown with outgrowths in their profile. It has been independently observed that hedges fitting this group often have very old, often senescent (dying) whitethorn. As the whitethorn dies the blackthorn spreads to fill the spaces, often spreading in to the field as well. These hedges may be older than group 2 hedges, but possibly not as old as group 4.

Species Rich Group (4)

There are plenty of trees growing in the hedges of this group. The most commonly occurring drain size is large drains.

Gorse Group (5)

These hedges tend to be quite low growing, and have no associated drain. The majority have no trees.

Management types were well distributed across all floristic group types. The occurrence of long term unmanaged hedges does rise significantly in group 3, Blackthorn and hawthorn hedge group (which is again fitting with independent observations), and is conversely slightly lower for group 4, the species rich group.

8.3 Species Composition of Roscommon Hedges

Shrub species occurring in the hedge layer

Hawthorn is both the most frequently occurring hedge shrub and has the highest percentage cover in all hedges. Blackthorn is found in more than half of hedges, with a relatively high mean cover. Gorse, Elder and Privet all occur commonly (each in about a quarter of hedges). Willow and Holly also occur frequently. Spindle is present at good levels, but Hazel is only found in 7 % of sampled Roscommon hedges. There were surprisingly few occurrences of Crab Apple and Guelder Rose. The frequency and abundance of these species is presented below, in table 8.3.1

Woody Species	Roscommon		Westmeath	
	% Frequency	Mean Domin abundance level	% Frequency	Mean Domin abundance level
Hawthorn(<i>Crataegus monogyna</i>)	99	8 (50–75% cover)	99	9 (76–90%cover)
Elder (<i>Sambucus nigra</i>)	26	4 (4 -10% cover)	58	4 (4-10% cover)
Blackthorn (<i>Prunus spinosa</i>)	53	6 (25 - 33% cover)	41	5 (10-25% cover)
Holly (<i>Ilex aquifolium</i>)	20	4 (4 -10% cover)	33	4 (4-10% cover)
Privet (<i>Ligustrum vulgare</i>)	24	4 (4 -10% cover)	33	4 (4-10% cover)
Spindle (<i>Euonymus europaeus</i>)	12	3 (< 4 % cover)	16	4 (4-10% cover)
Damson (<i>Prunus domestica</i>)	0.5	4 (4 -10% cover)	14	5 (10-25% cover)
Willow (<i>Salix species</i>)	19	4 (4 -10% cover)	12	4 (4-10% cover)
Hazel (<i>Corylus avellana</i>)	7	5 (10-25% cover)	10	4 (4-10% cover)
Gorse (<i>Ulex europaeus</i>)	27	5 (10-25% cover)	9	5 (10-25% cover)
Elm (<i>Ulmus glabra</i>)	< 1	3 (<4% cover)	7	3 (< 4% cover)
Beech (<i>Fagus sylvatica</i>)	2	5 (10-25% cover)	7	5 (10-25% cover)
Snowberry (<i>Symphoricarpos rivularis</i>)	3	4 (4-10% cover)	4	4 (4-10% cover)
Sycamore (<i>Acer pseudoplatanus</i>)	2	3 (<4% cover)	4	3 (< 4% cover)
Crab Apple (<i>Malus sylvestris</i>)	2	4 (4-10% cover)	2	4 (4-10% cover)
Guelder Rose (<i>Viburnum opulus</i>)	3	3 (<4% cover)	2	3 (<4% cover)
Yew (<i>Taxus baccata</i>)	0	3 (<4% cover)	0.7	3 (< 4% cover)

Table 8.3.1 The frequency of species occurrence and abundance in sampled Roscommon and Westmeath hedges

Note that this refers to woody species in the hedge layer, and does not include hedgerow trees.

Differences in the species composition of the hedges of Counties Westmeath and Roscommon:

Blackthorn occurs more frequently in Roscommon than in Westmeath, and has a higher mean cover where it occurs. Gorse occurs three times more frequently in Roscommon than in Westmeath. A higher proportion of Willow is found in Roscommon hedges. These observations tally well with the distribution of the various hedges group types in each county. There is also slightly more Guelder Rose (from 2% in Westmeath to 3% in Roscommon). Elder, on the other hand, is more than twice as frequently occurring in Westmeath than in Roscommon. Roscommon also has higher levels of Holly, Spindle, Damson, Hazel and Privet.

Trees

The most common hedgerow tree in County Roscommon is by far the Ash. Willow comes in second, then Sycamore and Beech, both non – native trees. Oak is relatively infrequent in Roscommon hedges as compared to Westmeath

Trees	Roscommon	Westmeath
Ash	50.3	61.6
Willow	10.8	7.3
Sycamore	9.6	13.9
Beech	7.2	13.9
Oak	2.4	7.9
Birch	2.4	4.6
Holly	1.8	4.0
Damson	0.6	2.0
Alder	2.4	1.3
Horse chestnut	0.6	1.3
Wild cherry	2.4	1.3
Crab apple	0.6	0.7
Rowan	0.6	0.7

Table 8.3.2 The Frequency of tree species occurrence in sampled Roscommon hedges

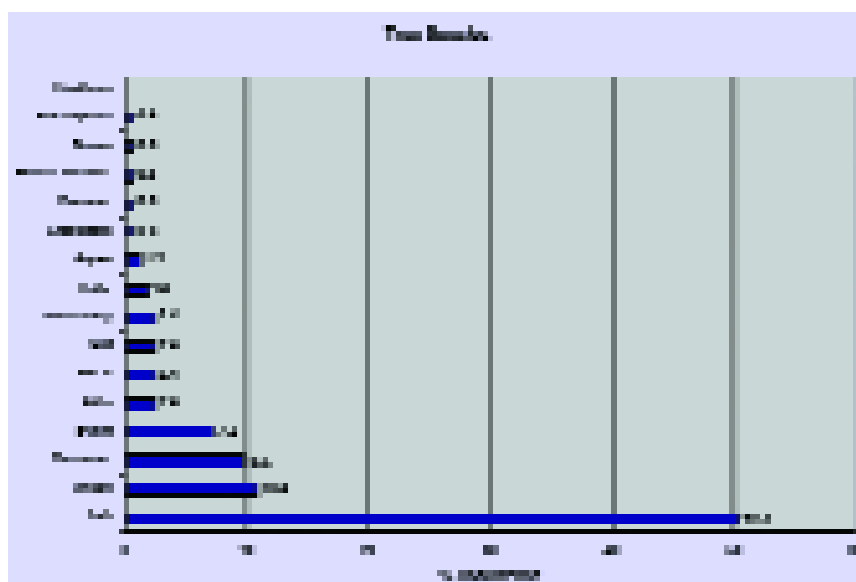


Table 8.3.2 The frequency of tree species occurrence in sampled Roscommon hedges

Tree Species Richness

There is very little diversity in the species of hedgerow trees in the county. 68% of the hedges where trees were recorded had only one tree species. Of these most (79%) were Ash trees, the rest being Willow and Beech. 22% of the hedges where trees were recorded contained two tree species, 10% had 3 species, while only 4% had 4 or more species.

Hedge Species Richness

Species richness is simply the number of species found in a 30 metre sample strip of a hedge. As two sample strips were recorded for each hedge, the average number of species from the two strips is the most representative figure of species richness for each hedge. Only native species, based on Webb (1996) are included for the calculation of species richness.

A species rich hedge, on the other hand, is defined as one that contains four or more native woody species on average in a 30m strip. This number is adapted from the UK Hedgerow Regulations, where five or more species are required for a hedge to be considered species rich in general, but only four or more are required in northern England, upland Wales, or Scotland. As Ireland's native flora is diminished from that of mainland United Kingdom, four species per 30m length seems appropriate.

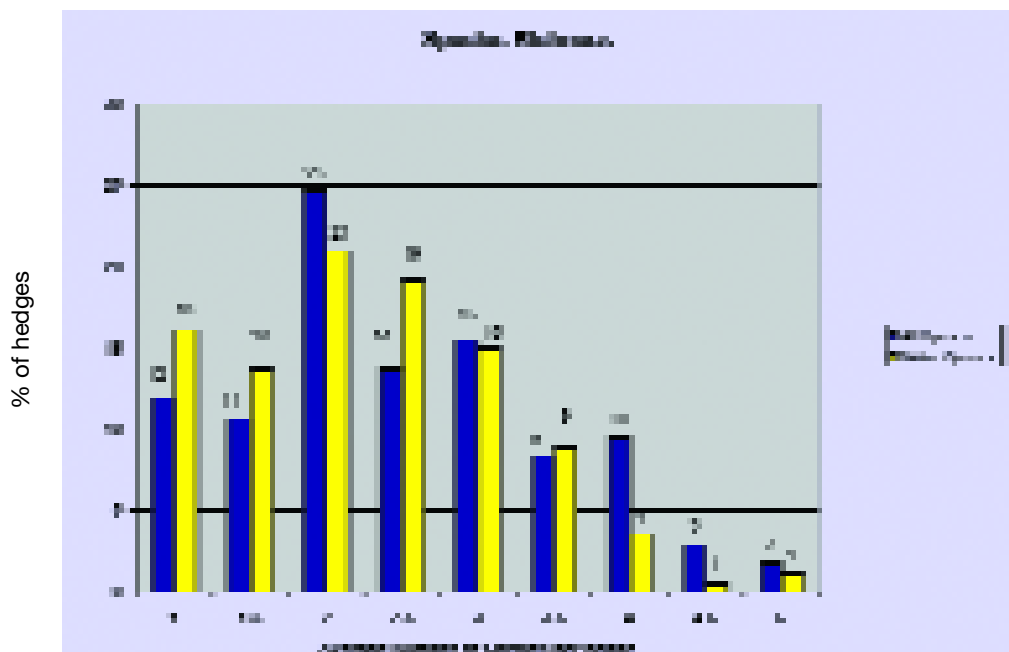


Figure 8.3.3 Percentage breakdown of (average) species numbers in hedges

Under these criteria, only 5% of hedges sampled in County Roscommon are species rich (i.e. they have 4 or more native species on average in a 30 metre strip).

It should also be noted that 19% of hedges sampled have 4 or more native species in at least 1 strip. Due to the necessity to average the species richness of both strips in each hedge, the figure of 19% does not represent the proportion of species rich hedges in the county.

Roscommon 32 out of 166 hedges (19.3%) have 4 or more native species in at least 1 strip

Westmeath 28 out of 136 hedges (20.5%) have 4 or more native species in at least 1 strip

Roscommon 9 from 166 (5.4%) have an average of 4 or more native species

Westmeath 7 from 136 (5.1%) have an average of 4 or more native species

Roscommon 49 from 166 (29.5%) have 4 or more (all) species in at least 1 strip

Westmeath 52 from 136 (38.2%) have 4 or more (all) species in at least 1 strip

Roscommon 24 from 166 (14.5%) have an average of 4 or more (all) species

Westmeath 31 from 136 (22.8%) have an average of 4 or more (all) species

The incongruity in these figures indicates the large variability in the species structure of individual hedgerows in the county. They also call in to question the suitability of using 30m as a representative measure for recording hedgerow diversity in Ireland.

These figures compare poorly to the UK, where a total of 26% of samples were found to be species rich. This is likely to be related to a greater age of hedges there, having been generally established earlier there than in Ireland. The UK figures also include wild roses in counts of species richness, which have not been recorded in this study. This may have a significant impact on the difference in these statistics.

Average (Mean) Species Richness

The average species richness for all hedges recorded in County Roscommon is 2.5

Townland Boundary Hedges

10% of all the randomly chosen hedges surveyed in Co. Roscommon were townland boundary hedges (20 hedges in total). Their mean species richness was higher than the average, with a mean of 2.9 species per 30 metre strip.

Roadside hedges and species richness

The species richness (including all species) of roadside hedgerows was compared with non-roadside hedges, and it was found that the average (mean) species richness in roadside hedges in County Roscommon was 3.0, compared to a non-roadside average (mean) of 2.4.

This confirms the results of a previous survey undertaken in Knock, Co. Mayo (Condon and Jarvis, 1989) in which the average species richness of roadside hedges in pre 1837 hedges was found to be 4.3 compared with 3.8 in non-roadside hedges. In post 1837 hedges the respective figures were 3.8 and 2.8. The figures should be considered purely as a comparison between roadside and non-roadside hedges in the two surveys. The difference in the actual values for species richness could be due as much to a different consideration of what species are counted between the two surveys (e.g. dog rose and bramble) as to a difference in species richness between the different areas.

Figure 8.3.4 gives a breakdown of overall distribution of hedgerow classification group types and compares this with just roadside hedges. As can be seen from the chart, 35% of hedges were classified as Group 4 (species rich group), but 46% of roadside hedges fall into this classification. Conversely, the species poor group (Group 2) is under-represented in roadside hedges (23% of all hedges, but just 12% roadside).

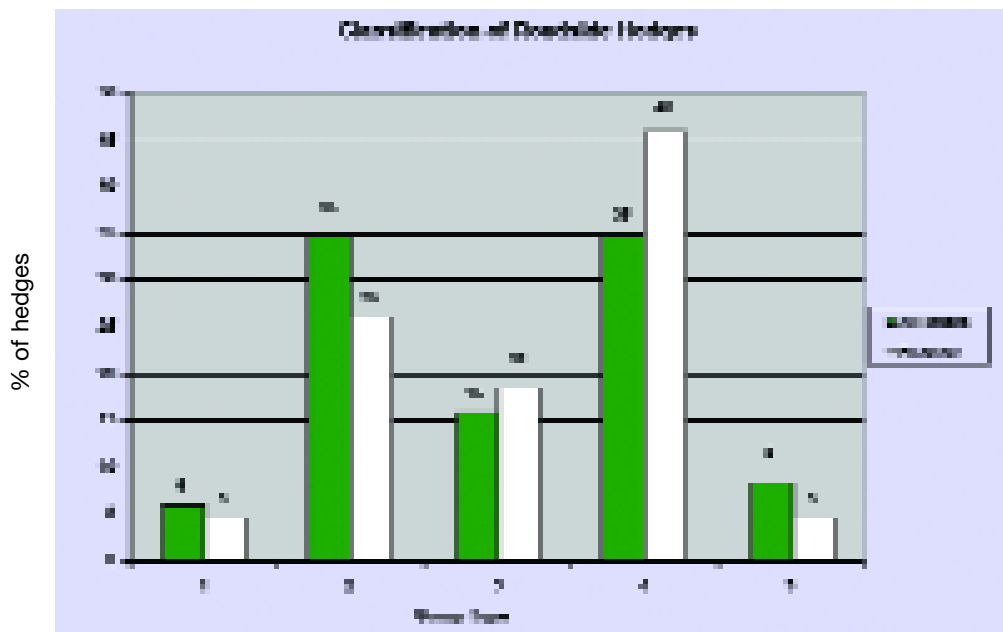


Figure 8.3.4 The occurrence of each hedge group type in roadside hedges compared to all hedges

The chart shows that group 4 hedges, the species rich group, are by far the most commonly occurring group in roadside hedges.

It may be the case that the route of many roads dates back to before the period of enclosures, and hedges along roads are more representative of hedges of antiquity than more recently established hedges. This could explain the greater species richness of roadside hedges.

8.4 Character and Condition of Hedges in County Roscommon

The character and condition of hedges has been assessed in a number of different ways, including the overall profile of each hedge, the proportion of gaps in the length of hedgerow, height, width, the density of shrub growth in the base of the hedge, and the amount of fruit produced. Information was also recorded on the boundary type and history, and on the links with other habitats.

The statistics presented in this section are discussed further in Section 9.0, Discussion. Recommendations for the management of the county's hedgerow resource in the light of these statistics are presented in Section 10.0, Recommendations.

Boundary Type

As can be seen from Figure 8.4.1, most hedges in County Roscommon are of the single line type. This would be indicative of a planted origin. 11% of hedgerows have a stone wall as part of the structure.

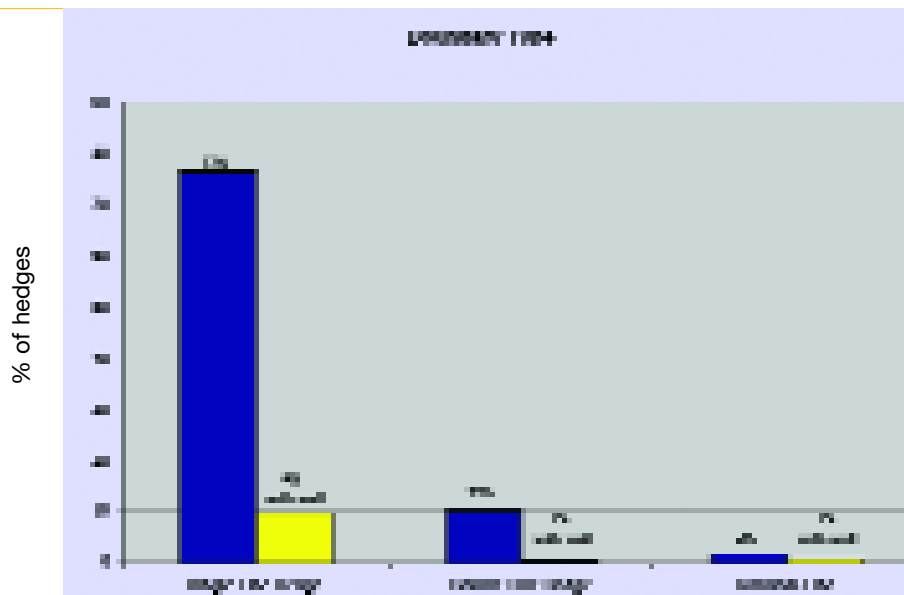


Figure 8.4.1 Boundary type of hedgerows in County Roscommon



Single Line Hedge

Townland Boundaries

Figure 8.4.2 compares Townland Boundaries with Infill hedges. From a fairly small sample it can be seen that the proportion of Townland Boundary hedges associated with a stream is significantly higher than for infill hedges. 20% of townland boundaries were streamside, compared with 2.2% of infill hedges.

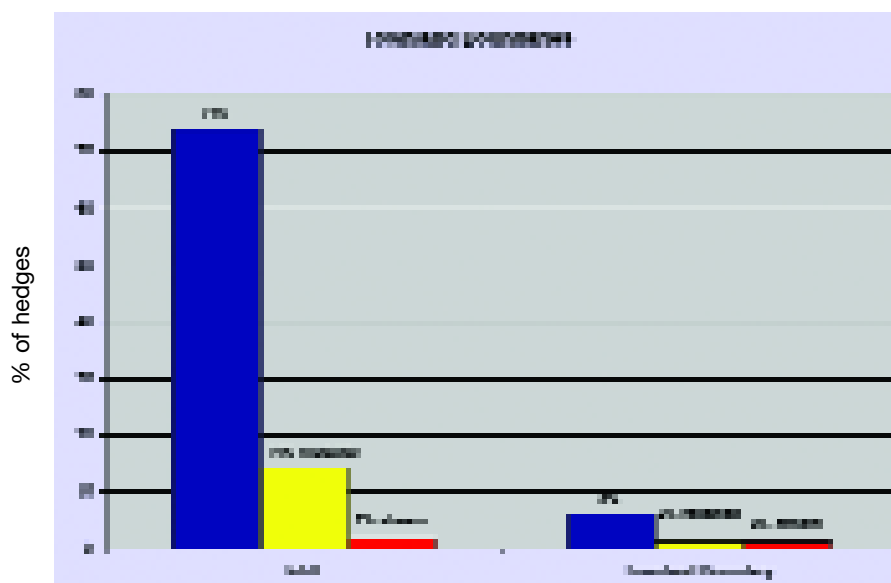


Figure 8.4.2 The proportion of townland boundary and non townland boundary (infill) hedges that are situated by roads and streams

Links with Other Habitats

The corridor role of hedgerows in facilitating the movement and distribution of wild flora and fauna through the landscape is believed to be enhanced significantly if hedgerows link into other (natural or semi-natural) habitat features. 12% of hedges surveyed in County Roscommon had end links with habitats (other than hedgerows).

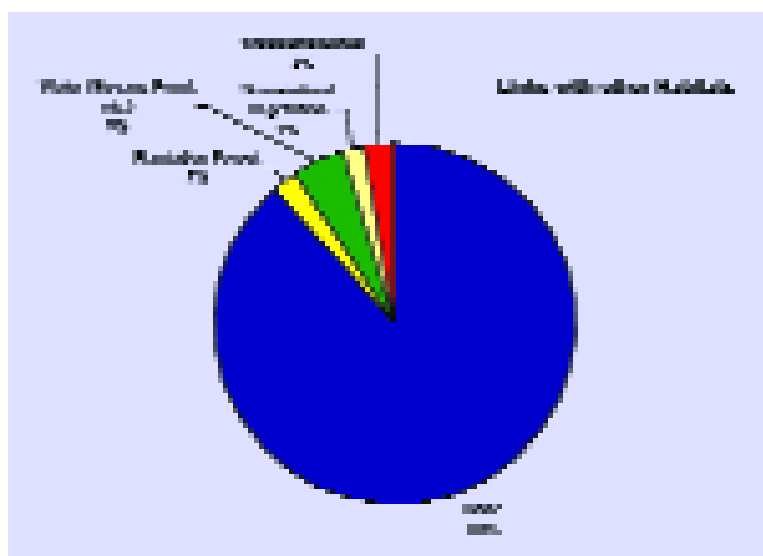


Figure 8.4.3 Hedgerow links with other habitats

Hedge Profile

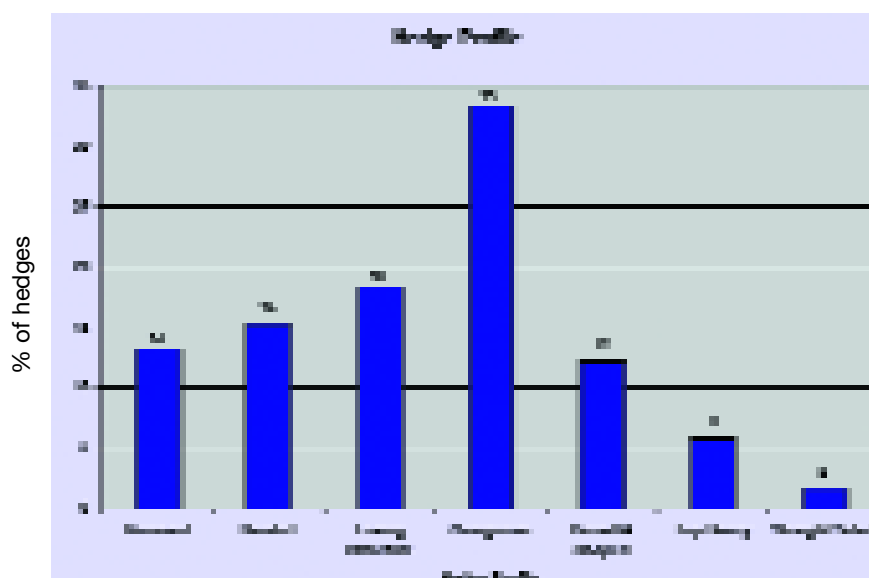


Figure 8.4.4 Proportion of hedges with different profile categories

A large proportion of hedges in the county are structurally extremely poor, with a total of 28% being either remnant (where only sparse shrubs or trees remain, covering <25% of the boundary length) or derelict (defined as where shrubs and thorns of the hedge component have mostly grown up in to trees, no longer displaying shrubby or dense growth form in the bottom 1-2 metres of the hedge). Both of these profiles are no longer functional as stock proof boundaries, although they may have additional fencing. These are very high figures for remnant and derelict hedges, indicating a serious threat to the future existence of almost one third of the county's resource.

A further 19%, almost a fifth of hedges, are in the 'losing structure' category, defined as where many of the shrubs and thorns of the hedge no longer display low dense growth, and most of the stems are visible. Hedges in this category can also be described as 'leggy' or 'scrawny'. Without careful management intervention, these hedges will soon become derelict.

One third of hedges are overgrown, a category which refers to those hedges that have been allowed to grow up tall and 'wild'. These hedges tend to have thicker and denser form than those classed as derelict or losing structure.

Gaps in Hedge Structure

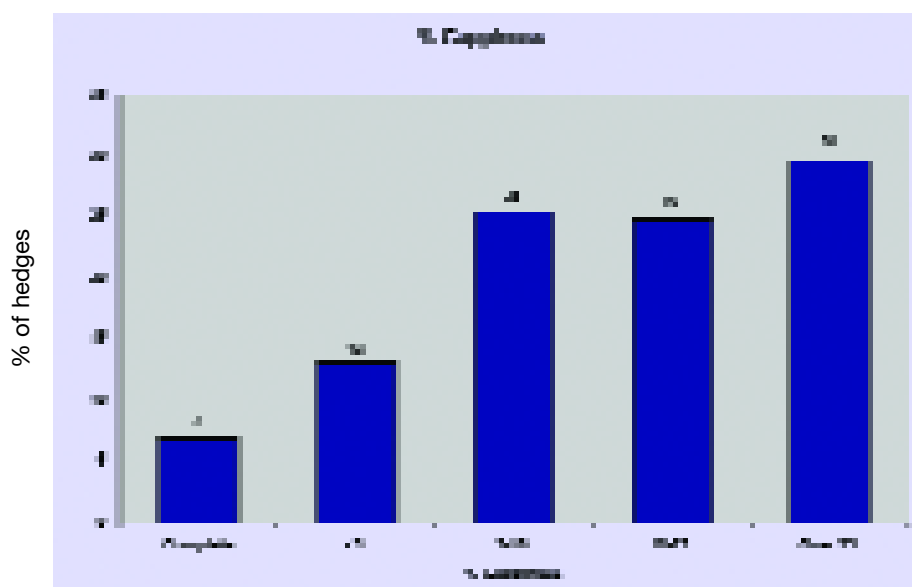


Figure 8.4.5 Proportion of hedges in different categories of percentage cover of gaps in hedge length

More than half of hedges surveyed were found to contain a high proportion of gaps in their length. Gaps are taken to be breaks in the linear continuity of the hedge. This is best assessed in the bottom 1m of the hedge. Some hedges have very distinct gaps, in other hedges the gappiness is more a result of the overall sparse number of hedgerow stems. Gaps are associated with a weak hedge structure, and are generally a symptom of the deterioration of the hedge, often caused by the demise of plants through age or inappropriate management. Most hedge functions are diminished if the level of gappiness is too high. Only a small number of hedges (7% in total) were without gaps in their structure. These figures do not include remnant hedges.

Hedge Height

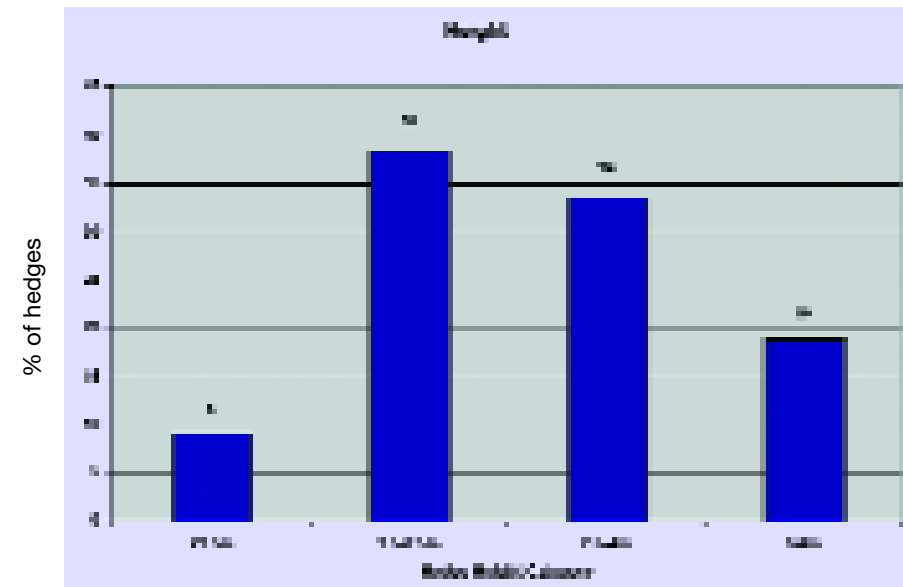


Figure 8.4.6 Proportion of hedges in different hedge height classes

Increasing hedgerow height correlates positively with increasing diversity of bird species in a hedge. Less than 10% of hedgerows in Roscommon are less than 1.5m in height.

Hedge Width

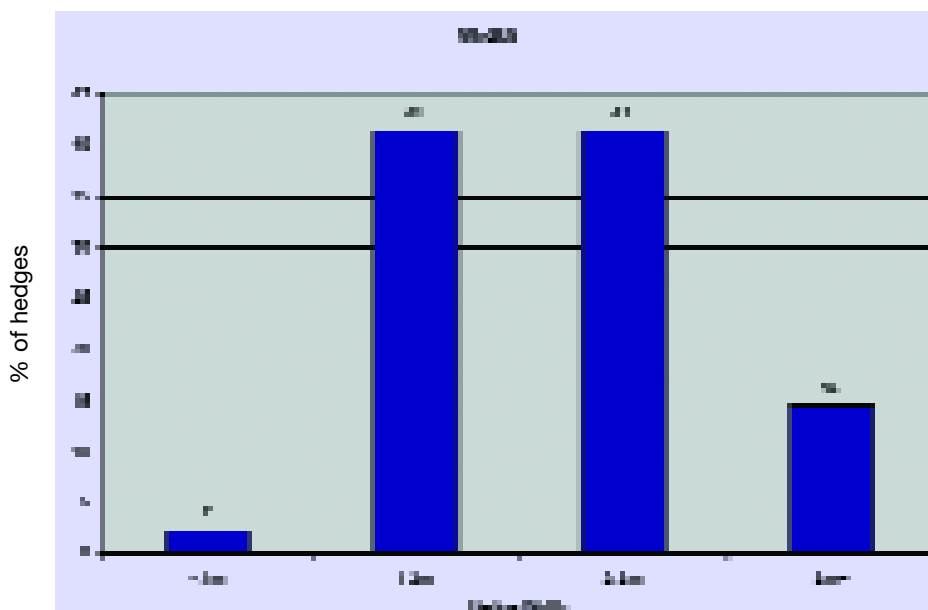


Figure 8.4.7 Proportion of hedges in different hedge width classes

In general, the wider the hedge the better it is for wildlife, although agriculturally, allowing hedgerows to occupy too much land is unlikely to be acceptable. A reasonable compromise would be not to reduce hedges below 1m in width. As the results of the survey show, 98% of hedges in Roscommon are over 1m wide.

Density of Hedge Basal Growth

Recording the density of the growth of hedge shrubs in the bottom metre of the hedge is an important indicator of the hedge structure. An open base is normally associated with a hedge that is moving toward a tree line, where functionality of the hedge itself as a stock-proof barrier is diminishing. Several studies have shown that density of growth in the hedge base influences the hedges significance for supporting wildlife.

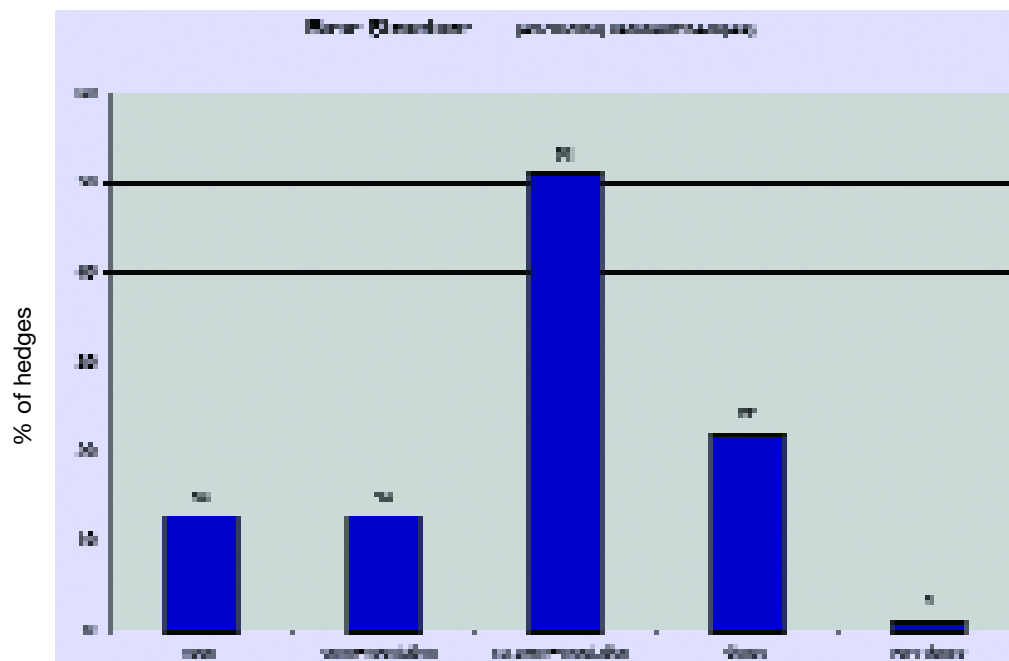


Figure 8.4.8 Proportion of hedges in different categories of basal density

The results show that over a quarter of hedges in Roscommon have an unsatisfactory basal structure with a further half having room for improvement.

Tree Abundance

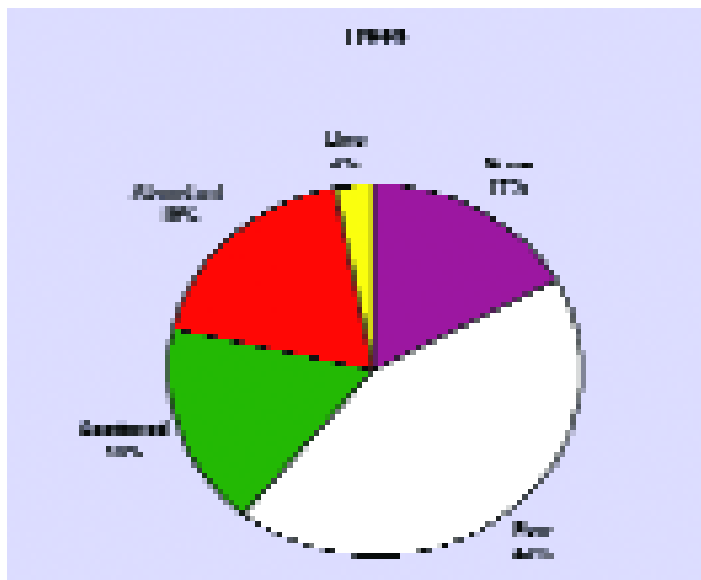


Figure 8.4.9 Proportion of hedges with different abundance levels of hedgerow trees

One third of hedges sampled in County Roscommon have no trees at all, while one quarter have few trees (defined as two or three isolated trees).

Tree Age Composition

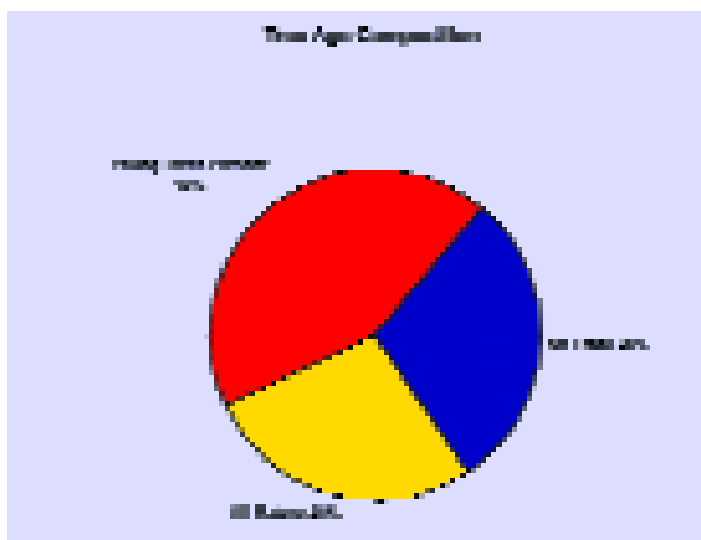


Figure 8.4.10 Tree age composition of sampled Roscommon hedges

Only 43% of the hedges sampled have young trees present. It is generally considered that to achieve sustainable levels of hedgerow trees a balance between young, medium, and older trees needs to be maintained.

Associated Features

91% of hedges are associated with a bank or wall. 71% of these are over 0.5m in height. The wall or bank are integral components of the hedge structure and the results of the recording of the condition of walls/banks in the survey paints a dim picture, with 60% of hedgerows showing evidence of degradation with 12% severely eroded.

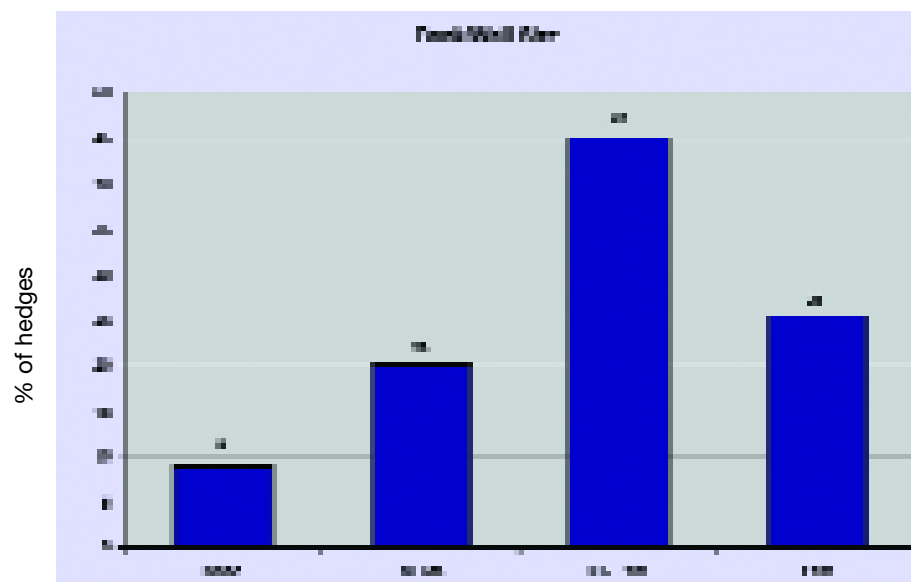


Figure 8.4.11 Proportion of hedges in the different size categories



Derelict hedge on degraded hedge bank

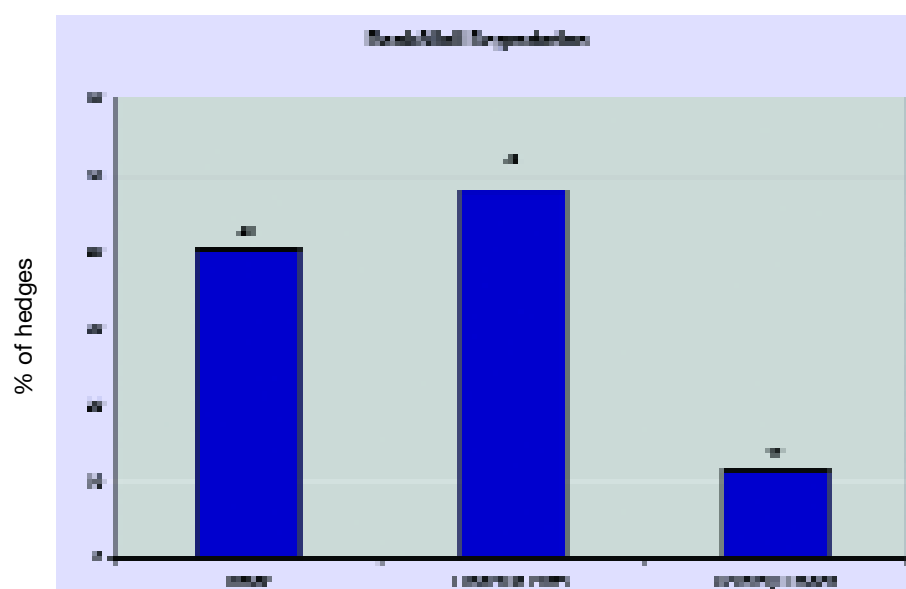


Figure 8.4.12 Proportion of hedges having degraded banks or walls

Drains

72% of hedges are associated with a drain, with almost a third of hedges having a drain of over 1m in size. A number of incidences were observed, though not recorded as part of the survey, where the drain had been damaged or blocked, causing localised water-logging that appeared to be adversely affecting the condition of the hedgerow shrubs.

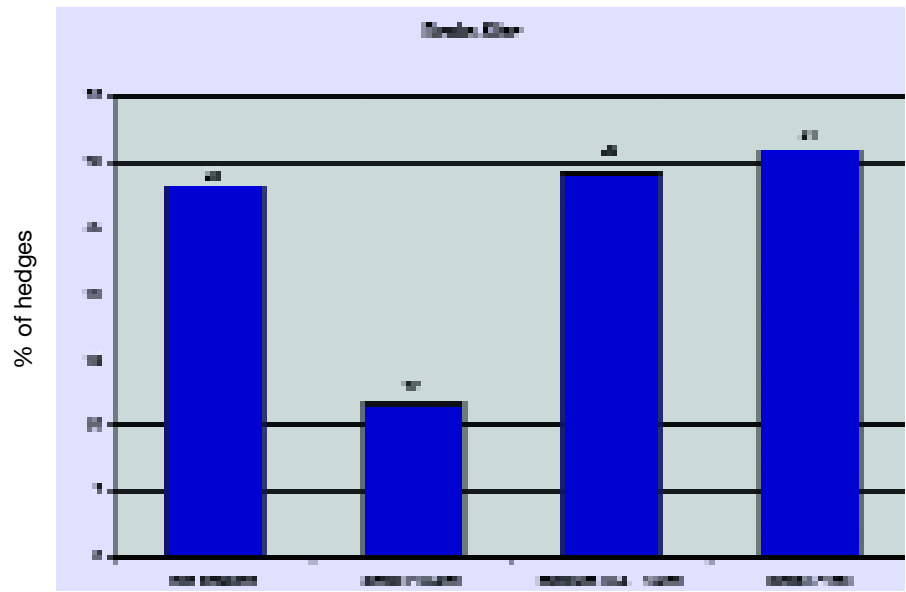


Figure 8.4.13 Proportion of hedges in different drain size categories

Fruiting

Levels of fruiting were gauged by assessing the fruiting of whitethorn which is by far the most frequently occurring and abundant hedgerow species.



Figure 8.4.14 Proportion of hedges in the different fruiting categories

Almost one half of Roscommon’s hedges show either no or limited signs of fruiting (2004 is generally considered to have been a good year for fruit production in most species). 17% of Roscommon hedges show no evidence of fruiting, compared to 30% in Westmeath. Limited levels of fruiting can be explained largely in terms of management practices and methods.

Figure 8.4.15 shows fruiting levels in hedges of different profiles. This chart corroborates research in the UK which showed that routine maintenance significantly reduces levels of fruiting in Hawthorn. It can be clearly seen from the chart that boxed or A-shaped hedges most commonly do not fruit, while overgrown hedges have average or heavy levels of fruiting.

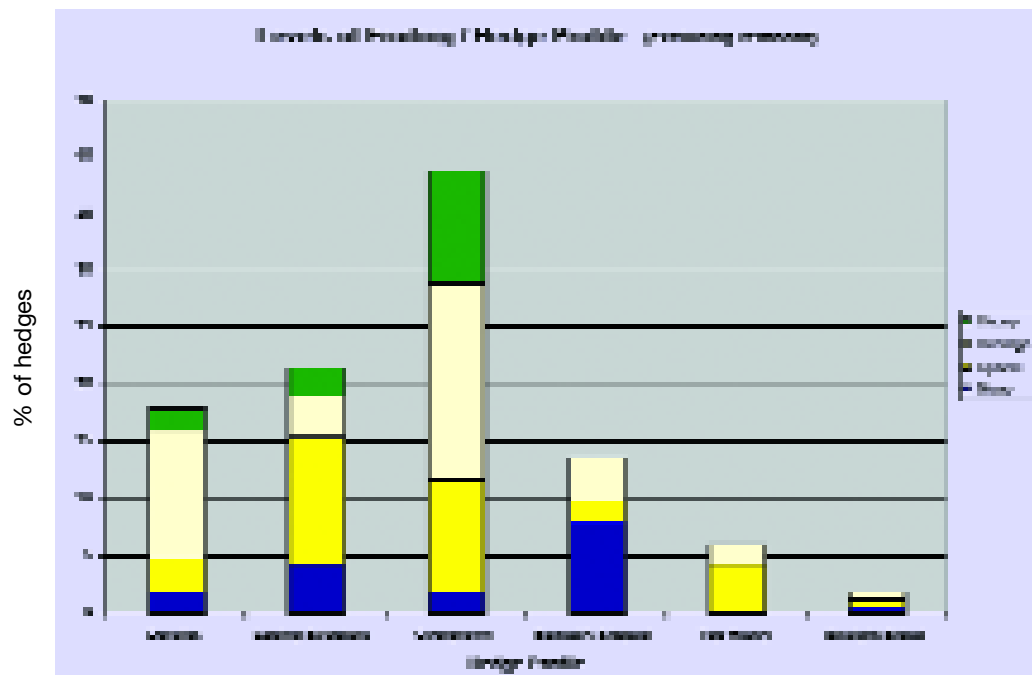


Figure 8.4.15 Level of fruiting in relation to hedge profile



Heavy fruiting of whitethorn in unmanaged hedge

8.5 Management of Hedges in County Roscommon

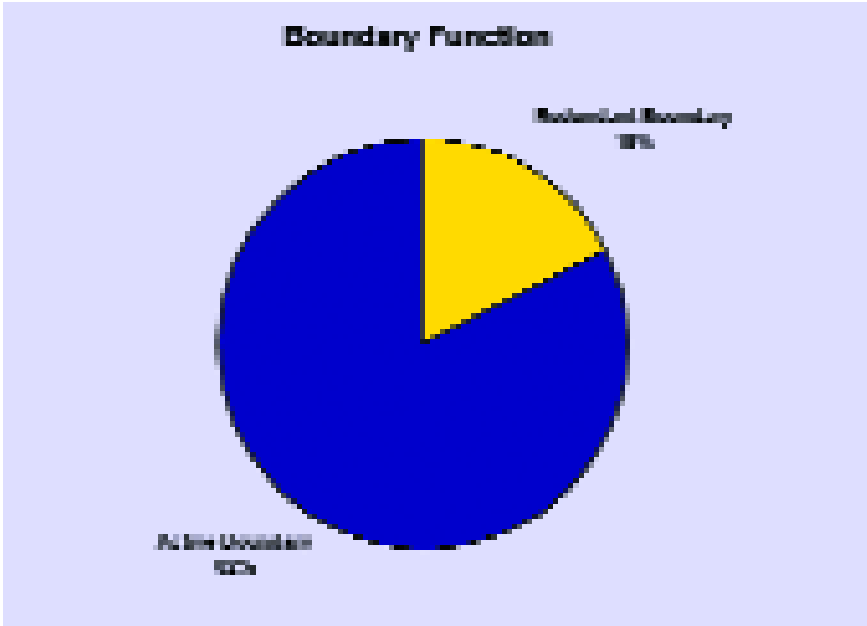


Figure 8.5.1 The proportion of boundary lines with hedges that are active or redundant as boundaries.

“Active” and “Redundant” boundaries refer specifically to the functionality of the hedge as a stock barrier. 18% of boundaries containing hedgerows are no longer functional. This is a reflection of changing agricultural practices combined with changing land ownership patterns.

The boundary function is irrespective of the functionality of the hedge which, may or may not be reinforced with other forms of fencing. Hedges along redundant boundaries may not be redundant for shelter or other roles.

The degree to which hedgerows along active boundaries are reinforced is shown in Figure 8.5.2

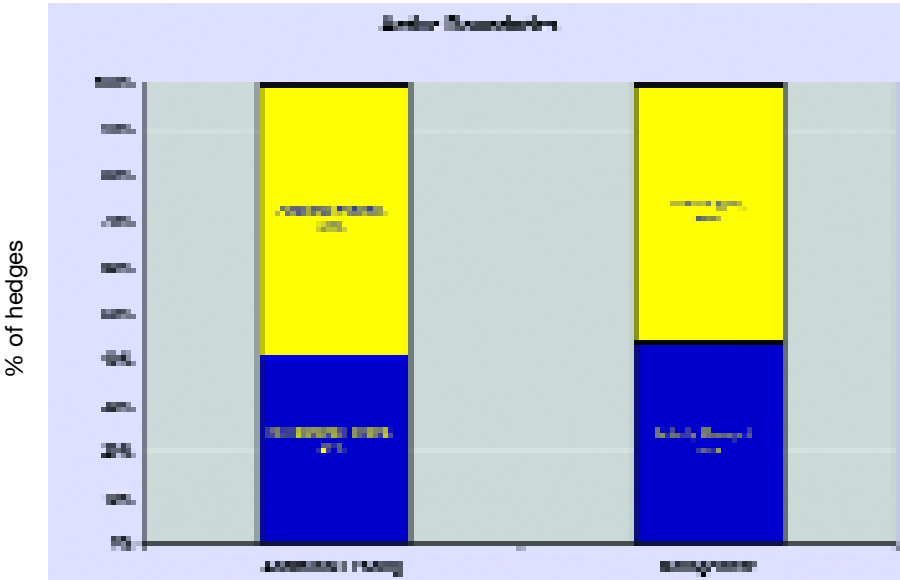


Figure 8.5.2 Fencing and management of hedgerows along active boundaries

Almost 60% of hedgerows along active agricultural boundaries are reinforced with some additional fencing. Only 44% of these hedges are being actively managed. With appropriate management most hedges are capable of being stock proof without the need for additional fencing. If this were achieved fencing costs would be eliminated and resources would be channelled into a resource with multi-functional benefits. Interestingly, 15% of redundant boundaries are still being actively managed. This raises an interesting question as to the management objectives of farmers and landowners.

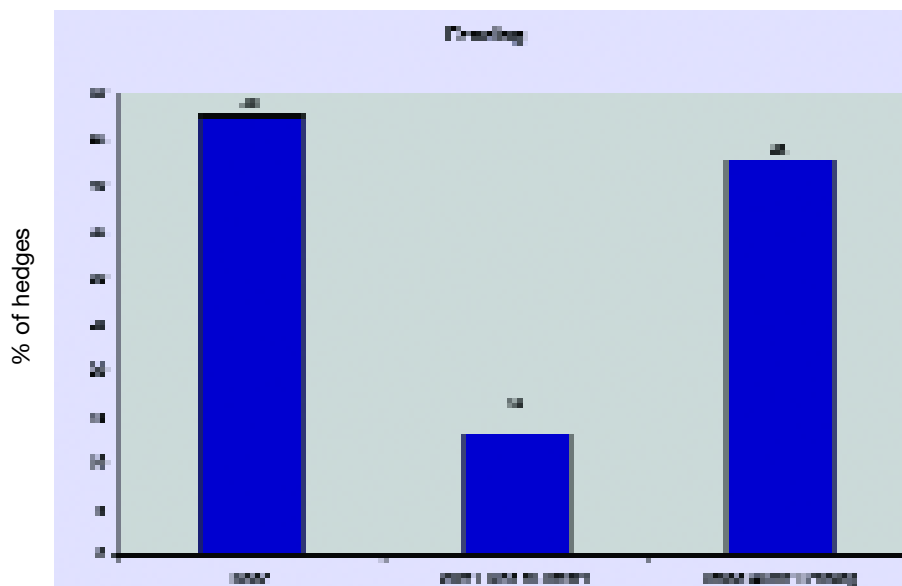


Figure 8.5.3 Additional fencing of hedgerows

13% of hedges have wire fixed to hedgerow stems. This has implications for safety, the well being of the hedge, and the cost of restoration. Wire in the hedge is capable of damaging hedge cutting machinery and makes the activity potentially unsafe. Where wire is attached to hedgerow stems it can lead to bacterial and fungal infection which weakens the structure of the plant. In the worst case it can even threaten the health of hedgerow stems. The cost of restoring degraded hedges is increased by the presence of wire which needs to be removed before work can be carried out safely.



Barbed wire fixed to hedgerow stems

Management

Hedgerows are predominantly man-made features and require a degree of management intervention to be sustainable. Figure 8.5.4 gives a breakdown of the sample by management (or lack of management). Almost two thirds of the hedges (62%) surveyed in County Roscommon were classified as long term unmanaged, with just 1% showing recent evidence of rejuvenation (3% of all managed hedges).

Abandonment of management is regarded by most experts as the principle cause of dereliction and eventually the demise of hedgerows. The two charts (8.5.5 and 8.5.6) below indicate the profile and % gappiness of long term unmanaged hedges.

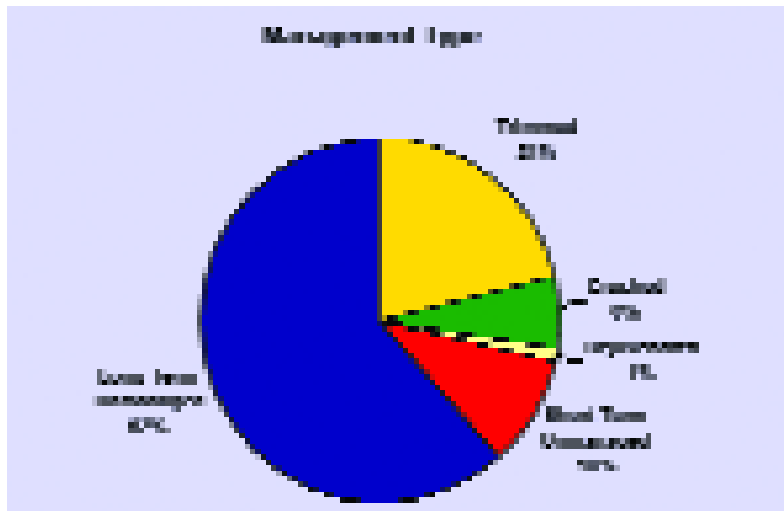


Figure 8.5.4 Breakdown of hedgerows by management type

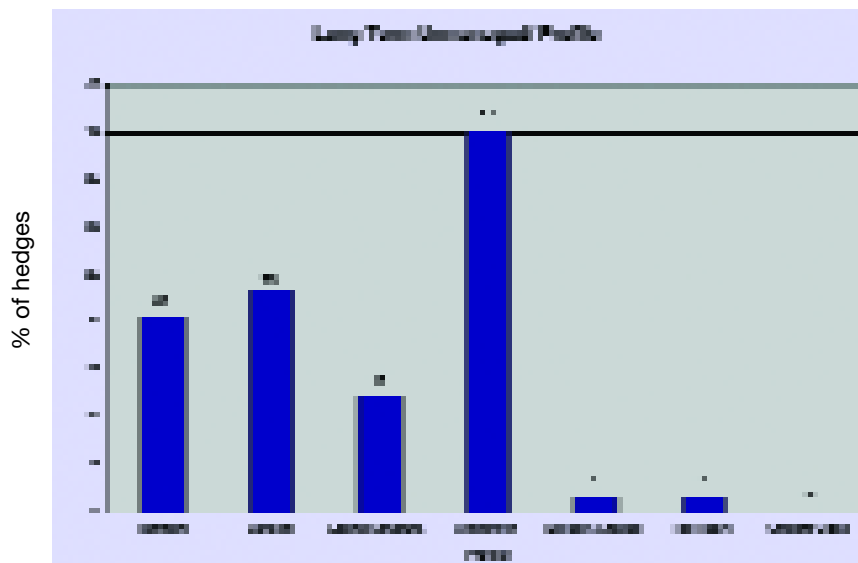


Figure 8.5.5 Proportion of long term unmanaged hedges in the different profile categories

Overall more than a quarter of hedges (28%) were classed as either remnant or derelict. This figure rises to 44% for long term unmanaged hedges. With a further 12% of long term unmanaged hedges losing structure it is to be anticipated that in the absence of increased levels of rejuvenation, over time, more hedges will move from the losing structure to the derelict category and from derelict to the remnant. Unless levels of rejuvenation are increased there will be a measure of hedgerow loss through the abandonment of management.

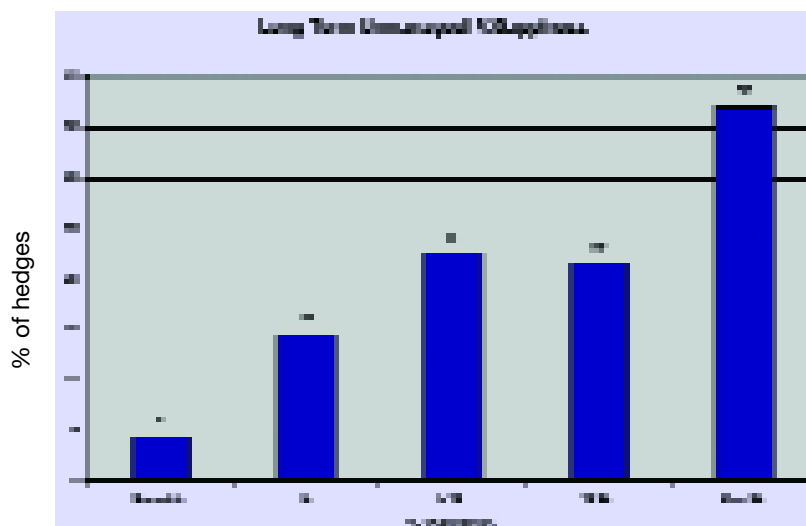


Figure 8.5.6 Proportion of long term unmanaged hedges in the different levels of gappiness categories

Levels of gappiness in long term unmanaged hedges are relatively high. 30% of all hedges had a high proportion of gaps along their length (over 25% gaps). This figure rises to 37% when only long term unmanaged hedges are considered.

Management Method

Figure 8.5.7 shows a breakdown of the type of management used where management was employed. The flail is the main management tool, responsible for over half of the management. A breakdown of the trimming profiles for routinely managed hedges showed that only 1 hedge from the 23 sampled was trimmed to the profile recommended by the REPS and Teagasc.

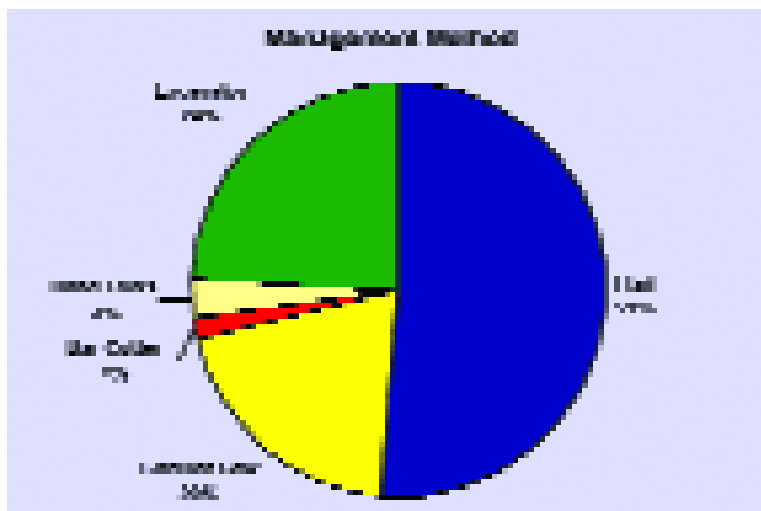


Figure 8.5.7 Proportion of managed hedges in the different management method categories

Crushing Hedges

The most significant aspect of the management statistics in County Roscommon is the use of excavator machines to push over and crush down mature hedgerows.

24% of all managed hedges surveyed used this method (compared with just 3% in Westmeath), and 11 of the 26 squares surveyed that contained hedgerows had at least one surveyed hedge that had been managed this way. Over 80% of the examples occurred in just 50% of the squares suggesting a regional bias. The use of this type of machinery for hedgerow management is covered in some detail in section 9.0 Discussion.

Hedge Rejuvenation

1% of hedges (2.7% of managed hedges) in Co. Roscommon showed evidence of having been laid, at least in part, within the last few years. The standard of the work, and as such its efficacy, would not be deemed adequate to pass a basic, internationally recognized standard assessment.

12% of the hedges surveyed showed evidence of having been laid in the past, (compared with 24% in Westmeath) indicating that, at least in certain parts of the county, this was a traditional practice.

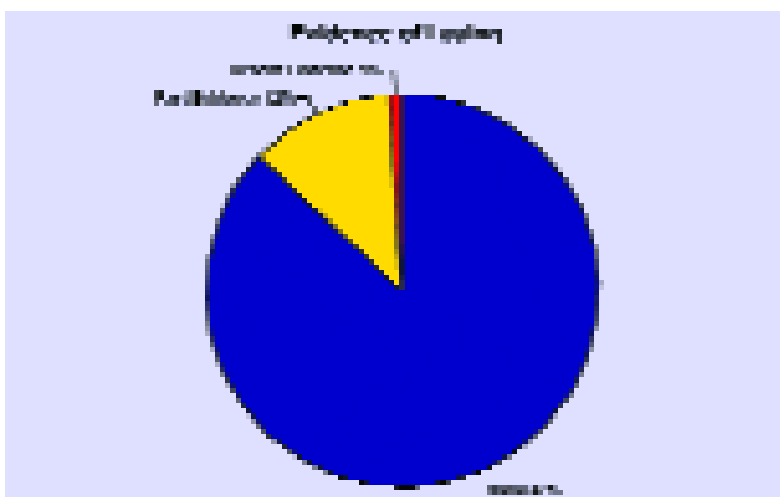


Figure 8.5.8 Proportion of hedges showing evidence of having been laid



Old laid hedgerow stem near to Castlerea

8.6 The Quality of Hedgerows in County Roscommon

The condition of Species Rich Hedges

During the summer of 2004 a survey was conducted throughout the UK on whether species rich hedges were in “favourable condition”. A species rich hedge is defined as one with at least five native woody species on average in a 30m length, but this figure is reduced to four in northern areas and four species is also deemed more appropriate to Ireland. Each hedge was assessed against nine attributes. Of these only 5 were sufficiently consistent with data recorded in our survey. These were;

1. Average height at least 2m
2. Average width at least 1.5m
3. Less than 10% gaps, with no individual gap wider than 5m
4. Base of woody component closer than 50cm to the ground
5. Less than 10% introduced non native species.

Of the 189 recorded hedges in Co. Roscommon, only 9 would be classed as species rich and of these 5 (56%) passed the above criteria (2.6% of the total hedges).

All of the above criteria can be influenced by management, leaving the potential, with appropriate management, for all species rich hedges to be in favourable condition.



Species rich hedge in good structural condition

9.0 DISCUSSION

Roscommon has an abundant network of hedgerows that are well distributed around the county. The estimated total length of hedges in County Roscommon is 15,574km, evidently a huge asset to the county. This plentiful resource is highly valued within the county, as seen from the responses of the consultations run as part of this survey.

There is a wide range of hedgerow shrub species to be found in the county, a total of 12 native species in all. While the species rich hedge group type was reasonably common in the county, the actual species diversity of the majority of hedges is quite low. Townland boundary and roadside hedges have been found to contain higher mean species richness than other hedge types. This is assumed to be due to townland boundary and roadside hedges being generally of more ancient origins and with larger banks than other hedges. Similar results have been found for roadsides in Co. Mayo (Condon & Jarvis, 1989), and for townland boundaries in Northern Ireland (Hegarty and Cooper, 1994) and Co. Kildare (Murray, 2001).

The higher species richness found for roadside hedges suggests that particular care and attention should be taken in their management, and measures should be taken to avoid their removal wherever possible. The reader is referred to recommendations 1.1-1.3 and 1.6 to 1.8 in Section 10 Recommendations. The results suggest that factors other than species richness should be taken on board when prioritising hedges in terms of conservation value.

The fact that such a small proportion of hedges in the county can be classed as species rich under the present criteria indicates that extra incentives need to be provided for the active conservation of species rich hedges as a priority. This information also suggests that factors other than just species richness need to be taken in to consideration in assessments of important or priority hedges. Other features, such as large banks or drains, associated streams, walkways, stone walls, or the presence of certain 'indicator' species, should all be taken in to account. The condition and structure of the hedge itself should also be considered (see Recommendation 1.2).

A good variation in hedgerow type was found across the county, with a high number of the tall and unmanaged Willow type hedges, and also of the Gorse type on higher land. The species rich hedge group was less common in Roscommon than in Westmeath. It will be important to establish the overall context of these group types, their frequency and distribution, on a national level. Only when this can be done will we be able to determine to what extent the importance of hedge types compares to evaluations based on species richness alone. See Recommendation 6.1.

There are a very high proportion of remnant and derelict hedges in the both Westmeath and Roscommon, which raises issues concerning the future sustainability of the Hedgerow resource in these counties. As hedgerow shrubs have a limited natural lifespan, they will generally die out over time, unless rejuvenative management is applied. In Roscommon a total of 28% of hedges surveyed were either remnant (where only sparse shrubs or trees remain, covering <25% of the boundary length) or derelict (defined as where 'shrubs and thorns of the hedge component have mostly grown up in to trees, no longer displaying shrubby or dense growth form in the bottom 1-2 metres of the hedge). These figures are warning signals that a significant proportion of hedges in the county are under threat from abandonment, and may be lost without careful planning and intervention.

Overall the height and width categories recorded are satisfactory, but the vertical and lateral structure of hedges is poor, meaning that hedges are losing quality and thus value for both agriculture and for wildlife. A lack of hedge management has been found to lead to weaken the hedge base and lead to a gappier structure (Corbitt and Sparks, 2002). Increasing levels of gaps in the hedge structure is related to lower species richness (Murray, 2001), as are smaller and lower hedges.

These factors are important in determining the agricultural value of a hedge. Continuous hedges with a good basal structure rarely need additional fencing, and good growth from the bottom of the hedge also allows it to function as a stock proof boundary on a longer time scale. Taller hedges provide more shelter for stock and crops. As hedges are functional features of agricultural landscapes and occur by their nature on private land, their meaningful survival is linked to their usefulness and thus value to the farmer.

Several studies have found that taller, wider, denser, and structurally more intact hedgerows are also preferred by most wildlife, including small woodland plants (Hegarty and Cooper, 1994; Corbitt and Marks, 1999, and Murray 2001); invertebrates (Burel, 1989), and hedgerow birds (Chamberlain et al, 2001; Arnold, 1983).

The Department of Agriculture and Food (REPS), and Teagasc recommend that when hedges are trimmed this should be done so that the hedges is wider at the base, tapering to a narrow top. This reduces self shading and helps maintain a dense base to the hedge. This is commonly referred to as the A-shaped profile. Evidence from this

survey indicates that this recommendation is not filtering down to ground level. Only 1 hedge from the 23 routinely trimmed hedges recorded was trimmed to the recommended shape. See Recommendation 5.3

As can be seen from the results of the survey, hedges that are regularly cut to a box or A-shaped profile produce less flowers and fruit than hedges which are allowed to grow unchecked. This is consistent with current research on the subject in the UK (Sparkes, 2000). However, hedges that are uncut tend to lack the dense base structure that is essential for stock control and also beneficial to the nature conservation value of a hedge. Of the 62% of hedges that are long term unmanaged only 10% have a dense base structure compared with an overall total of over 20% hedges with a dense base.

The top heavy/ undercut hedge profile appears to be becoming more common, particularly in roadside situations. Cutting appropriate hedges to this profile offers the advantages of a dense base and sides with a freer growing top or canopy which is able to flower and fruit. Where routine trimming of hedges is considered to be necessary, specifying this profile should satisfy both functional and wildlife considerations. It may prove more suitable in many situations than the A-shaped profile that is currently recommended.

The results of this survey demonstrate that improved understanding of hedgerow management issues is needed if the resource is to be managed sustainably. That greater effort is required to have a positive influence on farmer's attitudes and awareness is also one of the conclusions of Kenny (2004) in his study of hedgerows in County Roscommon.

New Hedges

Attempts at new hedge planting detected during the survey were invariably not successful. Fencing was consistently too close to the young hedge allowing excessive browsing by livestock.

REPS 3 has an optional measure for participant farmers to plant 3m/hectare/year of new hedgerow during the course of their 5 year plan. Based on figures given at the National REPS Conference (Tullamore November 2003) this could result in over 2000km of new hedgerows being planted annually under the scheme. This new planting will have to be carried out to higher standards than those observed during the survey if they are to be effective.

Another issue in relation to this potential surge in hedge planting is the availability of planting stock from Irish seed sources. Current research carried out by Jones et al (2001) indicates greater establishment success where hawthorn (whitethorn) provenance is closely matched to the planting site and that locally provenanced plants can be superior to commercially available material. The same report concludes that in Britain the current state of the commercial nursery sector is not sufficiently well regulated to ensure the necessary controls over provenance of material for hedgerow plantings. There is no information to suggest that the situation in Ireland is any better.

More information is needed on the status and production capacity of the hedgerow nursery sector in Ireland. The high level of use of excavator machines for hedge management work in County Roscommon deserves particular attention.

Crushing Hedges

The use of excavator machines to push over and crush down mature hedgerows is a relatively common technique in County Roscommon. This practice is often referred to as "Hi-Mac"ing after the name of one of the main machinery manufacturers.



Mature hedge recently crushed

24% of all managed hedges surveyed used this method compared to 3% in County Westmeath. 11 of the 26 squares surveyed that contained hedgerows had at least one surveyed hedge that had been managed this way. Over 80% of the examples occurred in just 50% of the squares suggesting a regional bias.

The use of this type of machinery for hedge management became more common with the introduction of the Rural Environment Protection Scheme (REPS) in 1994. Farmers joining the Scheme had, amongst a number of environmental protection measures, to undertake a specified linear amount of hedgerow maintenance per year during the course of their five year plans. This management had to take place outside of the bird nesting season (which runs from March to August inclusive). Much of the land in Roscommon, particularly the north of the county, would not be trafficable to the more common tractor-mounted hedge cutting machinery during the wetter winter months.

Excavator machines with caterpillar tracks are much more suitable to moving across wet, heavy or waterlogged ground. In general, the more free draining soils in Roscommon are in the south of the county. This fact is reflected in the statistics which show that 9 of the 11 squares that had an example of this form of management were above the East/West OS Reference Line M 800 (roughly a line running through Castlerea and Scramogue). Most of the hedges managed this way would not have been included in a regular maintenance programme prior to the introduction of the REPS.

The use of excavator machines to crush hedges has been prohibited by the REPS since 1999.

This form of management engenders polarized views in favour and against. Advantages put forward by proponents of this method of management are:

- That it is a relatively cheap, effective method of converting a gappy hedge into a stock-proof barrier. It is seen as “a good job”
- Greater accessibility of poorer land during the hedge cutting season

Some of the perceived problems with the use of excavators for hedgerow management are:

- It can be very destructive to the hedge. “Hedges don’t recover”
- It is not considered to be aesthetic
- Damage can be caused to the root systems of plants by the wrenching action on the stems
- There is potential destabilization of the hedge bank
- Ground disturbance can allow the introduction of undesirable vegetation
- Introduction of bacterial and fungal infection to plants is more likely through rough wounds
- A crushed hedge is essentially an old hedge lying down and cannot be equated with a more formally laid hedge from a rejuvenation perspective
- Although a crushed hedge is generally very effective as a stock barrier in the first instance, dependant on a number of factors (e.g. the original condition of the hedge, the care taken by the machine operator) the structure of the hedge after a few years may deteriorate. Crushed hedges observed during the survey often had a poor base structure, contained a lot of dead stems and were frequently overgrown with briars and nettles
- Some species (especially the Willows (*salix* spp)) may be more tolerant of this form of management and may recover more quickly enabling them to become more dominant in the hedge

Disturbingly, a significant number of farmers in the county believe that crushing a hedge with a machine is the best form of hedgerow management (Kenny, 2004).

Some landowners combine the use of an excavator machine with more conventional hedge laying practices. Rather than wrenching the stems over with the machine bucket, an operator on the ground makes a saw cut in the stem (invariably using a chain saw) to relieve some of the tension and the machine is used to pull the stem over and push it down. This would minimize or alleviate a number of the perceived problems above.

The health and safety implications of working in this fashion should be thoroughly examined.

There is insufficient data from the results of this survey to draw any definite conclusions on the effectiveness or otherwise of crushing hedges but 13 of the 16 examples were recorded as losing structure.

Taken in the context of the low overall levels of hedgerow maintenance in the county the need for practical, cost effective methods of hedgerow maintenance is significant. However, practicality and cost must be tempered with effectiveness at delivering desired results in terms of hedgerow qualities. In this respect the jury must be out on the use of this technique. See Recommendations 4.6 and 6.12 in Section 10.

Changes to the Rural Environment Protection Scheme were brought in during 2004. REPS 3 introduced new options for participant farmers including hedgerow restoration and planting.

The optional measures for hedgerow rejuvenation specify that farmers are to rejuvenate 2m/hectare/year during the course of their 5 year plan. Based on figures given at the National REPS Conference (Tullamore November 2003) this could result in over 1100km of hedge being rejuvenated annually under the scheme.

Hedge laying is a skilled activity and the skill base will need to be developed. Only 2% of hedges recorded showed evidence of rejuvenation in the recent past, and the standard of the work was poor. The fact that 12% of the hedges in County Roscommon recorded showed evidence of laying in the past (possibly 40 years or more ago in most cases) indicates that the technique was traditional. More opportunities for training need to be made available to farmers and landowners who wish to undertake this type of work, especially in connection with the REPS.

Hedgerow Trees

Dependent on the functional requirements for the hedge, hedgerow trees can have both positive and negative influence.

The encouragement of the retention of hedgerow saplings or the planting of hedgerow trees is standard advice in the UK where results of previous Countryside Surveys have indicated a decline in the hedgerow tree population (a 3% decline between 1990 and 1998, with a 40% decline in the 1-4 year old category). Equivalent data does not exist in Ireland.

Ash

Ash occurred in 50% of hedges in the sample and is by far the most prevalent tree species. It is a natural colonizer of hedgerows. REPS has encouraged farmers to allow a proportion of saplings to remain uncut during routine maintenance work. Routine maintenance regimes carried out on hedgerows that have a proportion of young Ash trees tend to favour the growth of Ash over the thorny species. This is particularly evident underneath overhead cables where hedges are topped on a regular basis.

Observation of Ash in hedgerows during the fieldwork indicates that many have been cut back in the past with the result that trees are multi-stemmed. Since ash is prized as good firewood it is very likely that Ash of a suitable size would have been cut out of hedgerows in the past to provide fuelwood. It would also have been traditionally utilized for tool handles.

Other Species

No other species is present in more than 11% of hedges. The question needs to be asked as to whether this breakdown of species frequency is a desirable feature, or would it be better in the interests of biodiversity and landscape quality to encourage the development of a more balanced selection of native tree species in hedgerows.

To some extent the prevalence of Ash is self-perpetuating. If Ash is the tree species most often retained in hedgerows it has an increased opportunity to seed into other hedges in the locality.

Roadside Trees

The view has been expressed to the authors by more than one road engineer that there should be no trees growing within falling distance of a public road. This is an extreme view, but is difficult to dismiss from purely from a health and safety perspective. Over 70% of roadside hedges surveyed contained hedgerow trees. It was outside the scope of the survey to determine the condition of trees, but it can be stated as an undeniable fact of life that all of those trees will have to come down at some point. This view must be weighed against the enormous aesthetic and wildlife value of roadside trees.

Healthy trees are of little danger to road users, and can in some circumstances be of benefit. (e.g. – trees can alleviate the blinding effect of low angled sunlight; the microclimate under mature trees can keep road surfaces drier and also reduce the amount of frost on the road). Roadside trees can be subject to unintentional “management” during the course of ordinary hedgerow management work. The Ash tree shown below was photographed during surveying work.



Ash tree damaged by shape saw

The result of the, presumably unintentional, cut with a shape saw is a weakness in the structure of the tree which could make it more likely to be unstable. Similar damage is often inflicted on trees when ivy is cut.

Responsibility and hence liability, for the safety of roadside trees rests with the landowner. The costs of dealing with unsafe trees can be considerable. Reports from around the country suggest that there is a measure of pre-emptive felling of roadside trees by landowners concerned that they may be considered negligent if the trees were to fall and cause injury or damage. This is an issue that requires some attention at the strategic rather than the fire-brigade level.



Aesthetic value of roadside Trees

Hedgerow Loss

In addition to the significant threat of the loss of hedgerows through deterioration in quality, removal is also threatening the resource. A report by the Department of Environment: "Urban and Rural Roles" (2001) estimates that 420km's of hedgerow were removed in Ireland to facilitate sight-line requirements to new rural dwellings in 1999 alone.

By far the dominant subject in relation to the public consultation phase of the project was concern over the removal of hedgerows to accommodate sight line requirements in new housing and other developments.



Hedgerow removal for field expansion

Concern was expressed that the hedgerows were being replaced with walls or non-native vegetation. This would be inconsistent with the recommendation of the National Heritage Plan, which states that “For the future, the overall goal should be to have no net loss of the hedgerow resource” (paragraph 2.27).

Research is needed to investigate the practicalities of physically moving mature hedgerows. If this can be done without diminishing substantially the qualities of the hedgerow then this could become a recommendation within planning consents where existing hedgerows are interfering with new sight-line requirements.

Hedgerow Quality

The results of the survey indicate significant potential for improvement in hedgerow quality.



Fine example of a mature and diverse hedgerow

A report by Robinson (2002) which assessed post war changes in farming and biodiversity in Britain concluded that whilst reduction in habitat diversity was important in the 1950's and 1960's, reduction in habitat quality is now probably more important. Biodiversity Action Plans need to reflect the importance of quality in relation to the value of habitats.



Derelict hedge with potential for improvement

In assessing hedgerow quality it must be borne in mind that many hedgerows which are considered to be of relatively poor quality may have the potential, with management changes, to become hedgerows of higher quality. Actual condition should not obscure potential.

Air Pollution Act

Certain hedgerow management activities give rise to quantities of woody/bushy material (often referred to as brush or brash) which needs to be disposed of. Traditionally this would have been done by burning. Often piles of brush are stacked and allowed to dry out for a few weeks or months before being burned. During this time the pile is becoming a habitat in its own right. Burning at this stage can be very detrimental to any wildlife that has become dependent on the pile (see photo).

Anecdotal evidence suggests that a number of local authorities, including Co. Roscommon, are interpreting the Air Pollution Act (1987) in a manner which has resulted in the prohibition of the burning of such material. Consistency in interpretation of the Act is important. Some clarification is needed.

Alternative options for disposal are:

- (i) Building into a pile and leaving to biodegrade
- (ii) Chipping or shredding
- (iii) Removal to land fill



Piled brush cut from hedgerow becomes a habitat over time

The first option takes up an area of land which most farmers are reluctant to give up. The second has a cost factor and is also dependent on the availability of suitable machinery in the area. The third is not only expensive but is inconsistent with attempts to limit the amount of biodegradable material going into land fill.

Wider Ecological Context

Hedgerows are a semi-natural component of the landscape and are thus affected greatly by other landscape elements. There is a high proportion of undesirable non native species in our hedges that are the result of colonisation from seed stands in the landscape. The use of Sycamore, in particular, in forestry plantations is one such problem. Sycamore is a non native tree with a limited wildlife value and is an aggressive coloniser of hedges and native woodlands, often causing a good deal of damage. See recommendation 1.14 in the next section.

Affordability

Given the current climate in farming, it is unlikely that the cost of maintaining the existing hedgerow resource can be met through that sector alone. As hedges benefit the wider community and environment, should the responsibility for their upkeep fall solely on farmers? As a country, can we afford to subsidise the management of all of our hedges to best practice standards? If not, rather than spreading limited resources inadequately in an extensive manner, it would be advisable to target resources towards particular hedges and hedge types, therefore ensuring the sustainability of a reduced but higher quality resource.

10.0 RECOMMENDATIONS

The recommendations included in this section are based on the results of the survey, considered in the light of current conservation best practice. Issues that were raised as part of the consultation process have also been considered.

These recommendations all relate to recommendations for the management and conservation of the resource in the county. Some will be relevant to Roscommon County Council and others to the various stakeholders in the hedgerow resource, including State and Semi-State bodies, Farmers, Advisory Agencies etc.

The relevance of the recommendations to each of the stakeholder groups is tabled at the end of each of the recommendations subsections.

10.1 The Context of Hedgerow Conservation

In relation to hedgerows, the term ‘conservation’ does not simply relate to their retention, but to their retention in a condition that is conducive to their multifunctional benefits.

Change has been a constant feature of the Irish Landscape. It is an insufficient reason to try and conserve hedges just because they are there. Instead, their continuing role needs to be assessed in the context of the changing needs of agriculture, the environment and landscape.

For example, whilst wire fencing has reduced the need for hedges as stock enclosures, and shifts in fuel consumption have reduced their value as fuel sources, the importance of hedges for shelter and maintenance of soil quality is more highly regarded. The role played by hedges in maintaining water quality is insufficiently understood, but, in the light of current research in Europe, may be very significant.

In recent years the conservation of our natural and cultural heritage has gained importance, as reflected in current environmental and conservation policy (see Section 4.3 Legislation concerning Hedgerows) and the REPS scheme. Within the context of these changes, the wildlife and aesthetic aspects of hedgerows must be regarded.

Changes in the Common Agricultural Policy are expected to reduce livestock numbers in Ireland considerably. It is yet to be seen how this will affect land utilisation. Will farmers maintain stocking density and put surplus land into forestry or other alternative enterprises, or will the same land be farmed more extensively? Either option has consequences for hedgerows.

The level of native woodland is another such dynamic factor. Hedgerows are considered to be sub-optimal woodland edge habitat for wildlife. Most of the species that utilize hedgerows would be more at home in native woodlands. If, in any region, the area under native woodland were to increase significantly, the need for hedgerows as habitats in that area may diminish, yet their importance as habitat corridors in order to maintain viable populations of woodland wildlife would increase.

The key to a successful hedgerow conservation policy is that it is formulated in an appropriate and relevant context. This applies from management requirements for a single hedge up to policy decisions at a National (or even European) Level.

The ecological value of a hedgerow or a network of hedgerows, in any given situation is relative to its wider environmental context. A species rich hedgerow in an area well populated with similar hedges may be of lower relative importance in its setting, than a less diverse hedge in an intensively farmed area with few hedges or other semi-natural features.

If hedgerow conservation is to be more than just aspirational then a series of practical, cost effective conservation measures needs to be put in place. There are a number of issues which complicate the design of such measures.

- Some of the desirable qualities of hedgerows are subject to value judgements
- Hedgerows are a multi-functional resource. In the absence of a full cost/benefit analysis it is not possible to determine what constitutes a cost effective measure
- Fencing off and leaving alone, which may be an effective method of conservation for certain habitats and structural features, is not an option for most hedgerows. Hedgerows are man-made features of the landscape and

the majority need a degree of appropriate active management to ensure their long term viability– leaving them alone can be appropriate in the short term, but is not a sustainable long-term option

- Most hedgerows are private property. Ownership of hedgerows lies in the hands of thousands of farmers and land owners
- The variable type, condition and regional differences make uncomplicated management guidelines difficult to frame
- A large percentage of the current network has fallen in to disrepair over a period of decades. Reparation of degraded hedgerows involves substantially higher costs than would be incurred if appropriate maintenance had been more timely
- Lack of knowledge/skill base
- Prior to the introduction of the REPS in 1994 the main agricultural trend for hedgerows was either for their abandonment or removal. Declining agricultural functional value led to a fall off in the practical knowledge and skills to manage hedges appropriately
- Relevance of the resource to the modern landscape
- The value of the hedgerow resource to the modern environment is fairly well documented. However, the relevance of a land division system that dates back 200 years is questionable

The number of farms in Co. Roscommon has declined from 10,500 in 1855 to 3,437 at the time of the last CSO census in 2000. Agricultural methods have changed significantly, especially in relation to mechanisation. Also, the decline in the number of people engaged in agriculture is of consequence

10.2 Policy and Legislation Recommendations

Recommendation reference numbers are to the left of the text

Local Planning

- 1.1 To comply with the National Heritage Plan, hedgerow removal to facilitate development should be kept to an absolute minimum and where unavoidable, a requirement for mitigation planting should be incorporated into the planning consent.
- 1.2 Greater consideration should be paid to individual hedgerows in light of their particular qualities and characteristics. For example townland boundary hedges, hedges with large associated structural features and hedges with good species richness or containing particular species indicative of species richness should be protected more stringently in roads, construction, and other development operations.
- 1.2a Incentives for the conservation of “species rich” hedges in favourable condition should be available to landowners not participating in the REPS. This could be done through Local Authorities, NPWS or the Heritage Council.
- 1.3 The retention, re-location, or re-establishment of hedgerows in planning consents could be the subject of a bond sought by the Local Authority from those seeking the planning permission. The bond to be returned on the successful retention, re-location or re-establishment of the hedgerows concerned within a given period.

Relocation of Hedgerows

- 1.4 Techniques should be investigated for the re-location of mature hedgerows as part of a thoroughly researched and costed project. Roscommon County Council could be proactive in initiating and implementing such a project.
- 1.5 If no practical or cost effective means can be found to move existing hedgerows, then planning conditions should indicate that a replacement hedge of similar length and species composition to the original should be established as close as is practical to the original, linking in to existing adjacent hedges. Native plants of a local provenance should be used for any such planting.

Roadside Hedgerows

- 1.6 Although roadside hedges make up only a small portion of the overall hedgerow quantity, the fact that they are at the front line of public perception of hedgerows, and that they tend to be particularly species rich due to historic factors, would suggest that special emphasis should be placed on their appropriate maintenance.
- 1.7 Cutting during the hedges’ growing season will weaken the shrubs over time, doing more damage to the hedge than cutting when the shrubs are dormant. This, in addition to the protection of nesting birds during the summer months (1st March – 31st August under the Wildlife Amendment Act 2001), should determine the cessation of any summer cutting of hedgerows unless absolutely necessary for safety reasons.

Cutting hedgerows during the growing season is potentially damaging to the health of hedgerow shrubs and to much wildlife dependent on the hedge. All of the relevant stakeholders listed in Table 10.1 should commit to eliminating the cutting of hedges during the period indicated in the Wildlife Amendment Act (2001) (1st March to 31st August) except where absolutely necessary for safety reasons.

- 1.8 A log should be kept by the local authority (or other body) detailing all hedge cutting carried out during the bird nesting season as stated in the Wildlife Amendment Act (2001). Details to include are the date of cutting; machine operator details; location; landowner; length of hedge cut and precise justification for management. This will provide a useful record for the council in the case of any complaints or actions taken.

Hedge cutting standards

- 1.9 All mechanical hedge cutting carried out by or for Local Authorities, State or Semi-state bodies, or as part of State subsidized programmes (E.g. REPS) should be carried out only by operators who have achieved the Teagasc proficiency standard MT 1302 – Mechanical Hedge Trimming.

To allow sufficient time for candidates to take the test a lead in period will be required. Some discussion will be required with Teagasc to determine their capacity for training and certification before an introduction date is set.

- 1.10 The Teagasc module MT 1302 – Mechanical Hedge Trimming should be reviewed on an ongoing basis to ensure that it is fully compliant with current best practice and remains consistent with standards in operation in other member states of the EU.

Hedgerow Planting

- 1.11 The use of locally provenanced native plant species should be specified/used for any hedgerow planting. Encouraging a diversity of native hedge species, especially those species that are less common in the county such as Spindle, Hazel, Crab Apple, and Guelder Rose is recommended.
- 1.12 Management recommendations for Irish hedges need to be based on an accurate assessment of the Irish situation. The encouragement of the retention of hedgerow saplings or the planting of hedgerow trees through agri-environmental schemes or by advisory bodies needs to be on the basis of statistical evidence or research that indicates that this is necessary or desirable.
- 1.13 Where hedgerow trees are planted only native species should be used.

Wider Landscape

- 1.14 Forest Biodiversity Guidelines should include consideration of the potential impact of the new forestry on the wider ecology in the locality. This includes the choice of species and potential colonisation of hedges (for example Sycamore).

Targeting Resources

- 1.15 Unless there are very specific management objectives, resources should not be directed into hedgerows that form part of redundant field boundaries.

Air Pollution Act

This act may be relevant to land owners who wish to dispose of woody residue from hedge cutting by burning. A clarification of the interpretation of the relevant section is needed

- 1.16 Consistency is required in the interpretation of the Air Pollution Act by different local authorities and this interpretation should be communicated to farmers, landowners and contractors. If the burning of hedgerow waste is to be prohibited the infrastructure for acceptable alternative methods of disposal needs to be developed.

Stakeholder Group	Recommendation reference number															
	1.1	1.2a &b	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	1.12	1.13	1.14	1.15	1.16
Agri/Environmental Consultants		*				*			*		*	*	*		*	
Community Groups		*					*	*			*		*			
Department of Agriculture		*				*			*		*	*	*		*	
Developers	*	*	*		*	*	*	*			*		*			
Environmental NGO's																
Farmers/Landowners	*	*				*	*	*	*		*		*		*	*
Forest Service/Foresters	*	*				*	*	*	*		*	*		**	*	
Heritage Council		*										*				
Local Authority	**	*	*	*	*	*	*	*	*		*	*	*			**
Management Professionals				*		*	*	*	*							*
National Parks & Wildlife Service		*					*	*	*		*					
Research Institutions				*				*				*				
Semi-State Bodies	*	*				*	*	*	*		*		*			
Teagasc		*		*		*			*	*	*	*	*		*	
Tourist Sector						*										

Table 10.1 Relevance of policy and legislation recommendations to particular stakeholders

Cost Benefit Analysis

- 2.1 A full cost/benefit analysis of the hedgerow resource should be carried out in order to aid the formulation of future policy options in hedgerow conservation.

In order to deal systematically with these issues and recommendations a Hedgerow Management Plan for the County should be drawn up by Roscommon County Council. This would facilitate the implementation of improved practices in relation to development, policy and planning where hedgerows are involved, and would be an innovative, practical, and achievable approach to dealing with the range of issues that are highlighted in this report.

Repeat Survey

- 2.2 In order to monitor the resource, to assess trends in the development and condition of the county's hedgerows, a repeat hedgerow survey for the county should be carried out no later than 2014.

Survey Methodology

- 2.3 The revisions to the original draft methodology (Murray / Networks for Nature, 2003) made during this survey should be assessed and a finalized methodology for hedgerow surveys in Ireland should be agreed.

Stakeholder Group	Recommendation reference number		
	2.1	2.2	2.3
Agri/Environmental Consultants			
Community Groups			
Department of Agriculture	*		
Developers			
Environmental NGO's			
Farmers/Landowners			
Forest Service/Foresters			
Heritage Council	*	*	*
Local Authority	*	**	
Management Professionals			
National Parks & Wildlife Service	*		*
Research Institutions	*		*
Semi-State Bodies			
Teagasc	*		*
Tourist Sector			

Table 10.2 Relevance of policy and legislation recommendations to particular stakeholders

10.3 Recommendations in relation to Hedgerow Management in County Roscommon

Hedgerow Quality

Results from the survey indicate that a large proportion of the county's hedges are vulnerable to further decline due to a lack of management. There is significant room for improvement in the structural quality of hedgerows, which can be achieved by appropriate maintenance.

Standards of management activities

- 3.1 As a base line, in order to achieve management objectives, hedgerow management works carried out as part of the REP Scheme should conform to recognised, basic minimum standards.
 - Routine trimming should be carried out by operators qualified to Teagasc Unit MT 1302 – Mechanical Hedge Trimming
 - Hedge laying should be to National Proficiency Test Council (NPTC) (UK) Standard (AO2098) or equivalent.
 - Coppicing of hedgerows should be carried out to standards currently being developed by the Coppice Association of Ireland in conjunction with Standards bodies in the UK.
 - Planting of new hedgerows should be to NPTC standard or equivalent.
- 3.2 In order to achieve these standards, more opportunities for training need to be made available to farmers and landowners who wish to undertake hedgerow management activities, especially in connection with the REPS.
- 3.3 Planners and Inspectors operating the REP Scheme need to become familiar with these standards.
- 3.4 If the benefits of hedgerows are to be maximised then the relatively high percentage of hedgerows with structural deficiencies needs to be addressed.
- 3.5 If hedgerow extent and quality are not to decline further, then the levels of hedgerow rejuvenation will need to increase significantly from those detected in the survey.
- 3.6 REPS 3 needs to prioritise the filling of gaps in existing hedgerows over the planting of new hedgerows if the diminishing quality of hedges is to be addressed.
- 3.7 Farmers and landowners in Co. Roscommon should be encouraged to not reduce hedge height below 1.5m during routine maintenance.
- 3.8 Breasting hedges but allowing the top to grow freeform should be encouraged as a management technique that satisfies both ecological and agricultural functions. It is also well suited for the management of many roadside hedges.
- 3.9 Farmers and landowners should be strongly discouraged from attaching fencing to hedgerow stems and trees.
- 3.10 The restoration of degraded hedge banks and walls should be encouraged. This should be fully costed and included in the options for hedgerow management under future REPS Schemes.
- 3.11 The appropriate maintenance of drains associated with hedgerows should be regarded as an essential part of hedgerow management.

Guidelines

- 3.12 Where the control of ivy is deemed to be a necessary part of a hedgerow management programme (as in REPS), guidelines should be given to landowners and contractors as to the timing of operations so as to minimise the environmental disruption. This will need to be based on research evidence.
- 3.13 The appropriate aftercare of newly planted hedgerows needs to be stressed by advisory bodies. Fencing from livestock must be an adequate distance away from the hedge to prevent browsing and also to allow maintenance. Recommended figures for this distance should be stated in the REPS specifications and considered best practice for non REPS situations.
- 3.14 Figures on the age composition of hedgerow trees in Co. Roscommon would indicate that the number of hedgerows containing trees is likely to fall in the future unless there is increased tree planting or retention of saplings.

Fuel Wood Production

- 3.15 Technical advice should be provided to farmers and landowners wishing to manage hedgerows with the objective of producing wood fuel on a cyclical basis. This would be consistent with Ireland's commitments under the Kyoto Protocol.

Stakeholder Group	Recommendation reference number														
	3.1	3.2	3.3	3.4	3.5	3.6	3.7	3.8	3.9	3.10	3.11	3.12	3.13	3.14	3.15
Agri/Environmental Consultants			*	*	*			*		*	*	*	*	*	*
Community Groups								*						*	
Department of Agriculture	*	*	*	*	*	*		*		*	*	*	*	*	
Developers															
Environmental NGO's															
Farmers/Landowners	*			*	*		*	*	*	*	*			*	
Forest Service/Foresters										*	*		*		*
Heritage Council												*			
Local Authority								*			*	*	*	*	
Management Professionals	*				*		*	*							
National Parks & Wildlife Service															
Research Institutions												*			
Semi-State Bodies								*							
Teagasc	*	*	*	*	*	*		*		*	*	*	*	*	*
Tourist Sector															

Table 10.3 Relevance of hedgerow management recommendations to particular stakeholders

10.4 Infrastructural Recommendations

Registration/ certification of local provenance planting stock

The ability to source planting material of a known genetic provenance is important. The origin of plants or seeds determines their adaptability, quality and wildlife value. More information is needed on the status and production capacity of the hedgerow nursery sector in Ireland.

- 4.1 A study should be conducted of nursery suppliers and garden centres to determine the availability of native planting stock (including provenance) for a range of hedge species. This information should be disseminated to interested parties.
- 4.6 A programme should be developed for the identification, registration, and certification of local provenance sites for woody hedgerow shrubs.

Supply and Demand of Nursery Stock

Contact with nursery grower and other professionals has indicated a likely shortfall of native provenance hawthorn for the 2004/5 season.

Native species such as Spindle, Holly, Hazel, Crab Apple, and Guelder Rose are not commonly available in nurseries. This situation should be addressed in the light of the lack of diversity found in hedges surveyed.

- 4.3 The production capacity of nurseries producing Irish hedgerow stock from Irish seed sources should be determined. Plans need to be made to ensure that the planting requirements predicted as a result of the introduction of REPS 3 can be met from indigenous stock. This will require a degree of forward planning.
- 4.4 Nurseries should be encouraged to improve the range and supply of the less common hedgerow shrubs.

Support of nurseries

Individuals wishing to establish, develop or expand tree nurseries with a view to supplying hedgerow plants of a local provenance should be actively encouraged through the Development Agencies. The Department of Agriculture and Food could look at providing funding through its direct provision of support services. The Forest Service, which is now under the wing of the Department, could facilitate this.

- 4.5 Financial and technical support should be given to individuals and groups wishing to develop nurseries to supply woody hedgerow shrubs from local seed sources.

Machinery

- 4.6 The practicality of adapting conventional hedge cutting machinery for use on tracked machines should be explored as a means of enabling hedgerows on poorly drained land to be managed during the appropriate season.
- 4.7 If the burning of woody brash or brush from hedge cutting is prohibited under the Air Pollution Act, methods for alternative disposal need to be developed, including cost effective methods for chipping or shredding.

Stakeholder Group	Recommendation reference number						
	4.1	4.2	4.3	4.4	4.5	4.6	4.7
Agri/Environmental Consultants							
Community Groups							
Department of Agriculture	*		*		*		
Developers							
Environmental NGO's							
Farmers/Landowners							
Forest Service/Foresters	*	*	*		*		
Heritage Council					*		
Local Authority	*				*		*
Management Professionals			*	*		*	*
National Parks & Wildlife Service					*		
Research Institutions			*				
Semi-State Bodies							
Teagasc	*	*	*		*	*	*
Tourist Sector							

Table 10.4 Relevance of infrastructural recommendations to particular stakeholders

10.5 Education and Awareness Recommendations

A chain is only as strong as its weakest link. All individuals in the process from decision making to implementation need to be sufficiently well informed so as to be able to direct, implement and evaluate best practice actions.

- 5.1 Ensure all relevant staff (and any contractors used) have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation.
- 5.2 Provide appropriate training for staff in aspects of hedgerow conservation relevant to their position.
- 5.3 The message promoted by Teagasc, and the Department of Agriculture through the REP Scheme, to cut hedges to an A-shape profile does not appear to be getting through at ground level. The reasons why the recommendation is not being heeded should be investigated.
- 5.4 Further training is required for REPS Planners regarding the values and appropriate management of hedges.
- 5.5 Education in terms of best practice management is best implemented with the development of showcase sites of best management practices. A number of such sites covering different aspects of management should be developed around County Roscommon.
- 5.6 The practice of piling hedgerow cuttings (or in the case of hedgerow removal whole hedgerows) and leaving to dry out for a number of weeks or months before burning should be strongly discouraged on environmental grounds.
- 5.7 General awareness of the values of hedgerows should be encouraged among rural communities through circulation of educational materials (such as the summary report produced in conjunction with this survey), an increase in targeted education for schools, and with the continuation of initiatives such as the "Golden Mile Competition."

Stakeholder Group	Recommendation reference number						
	5.1	5.2	5.3	5.4	5.5	5.6	5.7
Agri/Environmental Consultants	*	*		*	*	*	
Community Groups	*				*		*
Department of Agriculture	*	*	*	*	*	*	
Developers	*	*			*	*	
Environmental NGO's	*	*			*		*
Farmers/Landowners	*	*		*	*	*	
Forest Service/Foresters	*	*			*		
Heritage Council	*	*					*
Local Authority	*	*			*		*
Management Professionals	*	*	*			*	
National Parks & Wildlife Service	*	*			*		
Research Institutions							
Semi-State Bodies	*	*		*	*		
Teagasc	*	*	*	*	*	*	*
Tourist Sector						*	

Table 10.5 Relevance of education and awareness recommendations to stakeholders

10.6 Recommendations for Future Research

National Context

- 6.1 It is recommended that comparable hedgerow surveys be carried out across the country in order to place the findings of this survey in their appropriate national context.

The results from the survey open up a number of avenues for potential future research projects. These include:

Substantiation of the 30m rule

- 6.2 Based on work by Hooper in the UK, the figure of 30m is used as a standard measure for recording a representative sample of hedgerow information. The relevance of this figure for Irish conditions needs to be validated.

Incorporation of results in to a Geographic Information System

- 6.3 Including the hedgerow survey data in to a GIS would enable further investigation of hedgerows in relation to water, development, landscape and other elements.

Deduction of Discrepancies between Extent Recordings

- 6.4 By comparing the records from the Hedgerow Survey with those from the Badger and Habitats Survey of Ireland an explanation of the discrepancy between the two sets of results may be determined. This would enable approximations of change in hedgerow extent between the dates of the two surveys to be established.

Ecology

Comparative Ecological Value of Hedgerows and Lines of Trees

- 6.5 The high percentage of long term unmanaged hedgerows and the presence of hedgerow trees in over 70% of Roscommon hedges indicates that if current low intervention management regimes persist more hedgerows will become lines of trees in the future. The desirability of this should be discussed and its implications for biodiversity should be investigated. Research could compare ecological values of hedgerows and bare tree lines.

Investigating Data Sets from Other Surveys (Countryside Bird Survey, Badger and Habitats Survey of Ireland)

- 6.6 Detailed recording of habitats and how these habitats change over time should allow for a greater understanding of the factors that govern the fluctuations in wildlife populations .

Two of the main objectives of the Countryside Bird Survey, conducted annually since 1998 by volunteers for Birdwatch Ireland, are

- To promote greater understanding of the factors responsible for any declines which are occurring, in order to identify appropriate conservation measures
- To provide information on annual and longer term changes in population levels for a wide range of Ireland's breeding birds, across a variety of habitats

According to the results of the Badgers and Habitats Survey, most badger setts were located in hedgerow and treelines. Data from the Hedgerow Survey could be related to previous surveys using the same sample area to enable more specific analysis.

Genetic Provenance of Old Thorn

- 6.7 Some anecdotal evidence suggests that much of Ireland's hedgerow network was originally established using hawthorn quicks imported from Holland. Research could be conducted to establish the genetic origin of the hawthorn, comparing material from townland boundaries and infill hedges of more recent origin.
- 6.8 The fruiting mechanisms of Hawthorn could be further investigated to determine the period of time after rejuvenation that the new growth produces flowers and fruit.

Management and Ecology

Roadside Trees

- 6.9 It is a recommendation of this report that a thorough programme for the assessment of the condition and potential hazard of roadside hedgerow trees be undertaken.

If the relevant stakeholders (local authority, farmers and landowners, arboriculturalists) were to come together and devise a project that allows for an assessment of the condition and potential hazard of trees, removal of potentially dangerous specimens, and mitigation through alternative planting (in safer areas?), this issue could be tackled in a constructive, proactive and much more cost effective way than if it is tackled piecemeal. Such a programme would not only protect the interests of the landowner and road users but would also recognize the enormous aesthetic and nature conservation value of roadside trees. Appropriate management implemented in advance of crisis situations would result in a greater retention of roadside trees. Some level of European funding may be available for such a programme.

Ivy

- 6.10 Research needs to be initiated to examine the causes of the development of ivy in hedgerow trees and shrubs and the impact that different levels of ivy growth have on the host plant.
- 6.11 If control of ivy is deemed necessary, research needs to be carried out to determine the optimum time for cutting to minimise the disturbance to dependent wildlife.

Effects of non traditional management techniques

- 6.12 A thorough research programme should be carried out to assess the full implications of managing hedges with excavator machines and until such time the precautionary principle should be applied.

Stakeholder Group	Recommendation reference number											
	6.1	6.2	6.3	6.4	6.5	6.6	6.7	6.8	6.9	6.10	6.11	6.12
Agri/Environmental Consultants												
Community Groups												
Department of Agriculture	*		*	*	*	*						*
Developers												
Environmental NGO's	*				*	*						
Farmers/Landowners					*				*			
Forest Service/Foresters			*		*				*			
Heritage Council	*		*	*	*		*					
Local Authority	*		*		*				*			
Management Professionals									*			*
National Parks & Wildlife Service	*		*	*	*	*						
Research Institutions	*	*	*	*	*	*	*	*	*	*	*	*
Semi-State Bodies												
Teagasc	*		*		*				*			*
Tourist Sector					*							

Table 10.6 Relevance of future research recommendations to particular stakeholders

11. CONCLUSIONS

The survey has been successful in determining the extent, composition, structure, condition, and variation in Roscommon's hedgerows. The information gathered is valuable to a wide range of interests and stakeholders in County Roscommon and the rest of Ireland.

The hedges of the two counties, Westmeath and Roscommon, have been sufficiently distinctive as to warrant individual county surveys (these being the first two counties to take on such a survey). The physical structure of hedges, the different floristic hedge types, the specific variations in condition and management practices, and thus the recommendations for each county are specific to these distinctive findings.

Various characteristics of Roscommon's hedges have been documented and quantified in the survey, in a way which fosters a greater appreciation of the unique nature of these hedges and enables strategic approach to the conservation of the resource.

The recommendations presented will now have to be taken on by the relevant stakeholders in order for results to be seen in to the future. This is the beginning of an important move toward securing the benefits of the resource for the county in both the long and short term, and the successful management of one of Roscommon's finest assets.

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Appendix A: Consultation Feedback Form

Westmeath and Roscommon Hedgerow Surveys

CONSULTATION FEEDBACK FORM:

For office use only:
Form return no.

Name: _____

Organisation: _____

Address and Contact Details: _____

1. How relevant will the Hedgerow Survey be to you / your work / organisation?

- a) No relevance ☐
- b) Results may be of limited interest ☐
- c) Results expected to yield valuable information ☐

2. In what way do you think the findings of the survey or the recommendations that result be useful to you / your organisation / your profession?

3. Can you identify any areas where you think the survey is lacking?

4. Are there any stated objectives or targets that you would consider it appropriate to see included for this project?

5. In what way do you think the findings of the survey or the recommendations that result be useful to you / your organisation / your profession?

6. Are you aware of any specific use you may have for the results of the survey?

7. Do you have any other comments?

8. Will you be willing and available to meet us for further consultation in your area at a time that suits you?

(if yes we will contact you to arrange a time and place, please include a phone number: _____)

Appendix B: Field Recording Sheets

The following pages contain copies of the field recording sheets at the final stage of their evolution over the course of the survey.

Sheet 1 covers the location and setting of the sample hedges. It also includes space for target notes to be made.

Sheet 2 covers the detailed recording of the situation, structural attributes, associated features and management characteristics of the sample hedges.

Sheet 3 covers the recording of floristic data for the two 30m strips which are randomly selected along the hedgerow sample lengths. These sheets also allow for the recording of ivy, and tree species in the sample lengths.

These sheets differ slightly from those included in the Draft Methodology document which was the initial basis of this survey. This was to reflect refinements that were made to the methodology during the course of the fieldwork. The principal changes to the field sheets involved the modification of the Profile category to distinguish between Remnant and Relict Hedges and add a “straight sided” profile. A new category “Boundary Type” was added and a number of small changes were made to other categories to either increase or decrease the degree of distinction between various attributes. Changes were made to a number of the definitions to enable a more thorough, accurate and replicable assessment to be made of hedgerow characteristics and features.

A document detailing the evolved methodology will be available on the Roscommon County Council web site, www.roscommoncoco.ie at a later date.

Sheet 1

2004 WESTMEATH & ROSCOMMON HEDGEROW SURVEYS					
Square Ref: Grid Ref:		Survey duration:		Date: Surveyors:	
A. FARM TYPE		Hedge No	A	B	C
a. tillage		01			
b. dairy		02			
c. cattle		03			
d. sheep		04			
e. mixed stock		05			
f. mixed stock + crops		06			
g. organic		07			
h. stud		08			
i. other		09			
		10			
B. LANDSCAPE					
1. Rolling fertile farmland					
2. Drumlin					
3. Mountain farmland complex					
4. Wetland/blanket					
C. ALTITUDE					
a. 0-50m					
b. 50-100m					
c. 100-200m					
d. >200m					

Target Notes

CODES FOR RECORDING EXTENT		
F: fence D: drain B: earth bank H. hedge	Fs: fence with shrubs Ds: drain with shrubs Bs: bank with shrubs	W: stone wall Ws: stone wall with shrubs TL: bare tree line

2004 WESTMEATH & ROSCOMMON HEDGEROW SURVEYS

Square Ref: Grid Ref:	Survey duration:	Date: Surveyors:
--------------------------	------------------	---------------------

Situation	Structural		Assoc. Features	Management	Trees & Fruit
A HISTORY	E BOUNDARY TYPE	H WIDTH	L LITTER	Q MANAGEMENT	U TREES
10 infill	10 single line hedge	1 <1m	1 not evident	A cut box profile	A none
11 infill + roadside	20 double line hedge	2 1-2 m	2 litter	B cut 'A' shape	B few
12 infill + stream	11 single line hedge with wall	3 2-3m	3 lawn cuttings	C cut on one side	C scattered
20 t'land boundary	21 double line hedge with wall	4 3m+	4 rubbish	D cut on both sides	D abundant
21 t'land + road	01 (*stone wall with hedge shrubs)	I GAPPINESS	M DRAIN SIZE	E topped only	E line
22 t'land + stream				F hi-mac'd	
30 parish boundary	02 (*bare earthbank)	A complete	A not present	G fully laid	V TREE AGE
	03 (*vegetated bank)	B <5% gaps	B small (<0.5m)	H laid in part	COMPOSITION
B ADJACENT LAND USE	04 green lane	C 5-10% gaps	C med (0.5 – 1m)	I coppiced	1 all mature
1 arable	05 (*woodland strip)	D 10-25%	D large (>1m)	J short term unmanaged	2 young trees
2 improved grassland	06(*Shelterbelt)	E 25-50%		K long term unmanaged	present
3 semi-nat grassland	07 (*woodland /forest edge)	F >50%	N BANK / WALL SIZE		3 no trees
4 neglect/fallow	08 (*drain)		1 <0.5M	R MANAGEMENT	
5 semi-nat. veg	09(*fence line + shrubs)	J BASE	2 0.5-1M	METHOD	W FRUITING
6 plantation forest	(where */) do not continue recordings	1 open	3 >1M	1 flail	A none
7 woodland/scrub		2 open + veg	4 not applicable	2 circular saw	B sparse flowers
8 curtilage		3 scrawny + veg		3 bar cutter	and fruit
9 amenity	F PROFILE	4 dense	O BANK/WALL	4 hand tools	C average
(double nos to cover both sides)	1 remnant	5 very dense	DEGRADATION	5 hi-mac	D heavy
	2 relict		A severely eroded	6 other	
	3 losing structure	K FENCING	B eroded in parts	7 unsure	X OVEALL VIGOUR
C LINKS WITH OTHER HABITATS	4 boxed / A shape	01 none	C bank intact	8 not applicable	1 poor
A none	5 overgrown + outgrowth at base	02 fixed to stems	D not applicable		2 average
B plantation forest	7 top heavy / undercut	03 electric		S EVIDENCE OF LAYING	3 good
C water (stream pond, etc)	8 straight sided	04 post & wire	P VERGE	A no evidence	
D semi-nat veg		05 sheep wire	(roadside hedges and tillage only)	B past evidence	
E woodland / scrub	G Height	06 horse fence		C recent evidence	
	A <1.5m	(double nos if needed, principal category first)	1 <1m		
D OUTLINE	B 1.5-2.5m		2 1-2m	T FUNCTION	
1 linear / regular	C 2.5-4m		3 2-4m	1 hedge redundant	
2 non-linear/irreg	D >4m		4 4m+	2 active boundary	
			5 none		

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
01																								
02																								
03																								
04																								
05																								
06																								
07																								
08																								
09																								
10																								
11																								
12																								

2004 WESTMEATH & ROSCOMMON HEDGEROW SURVEYS

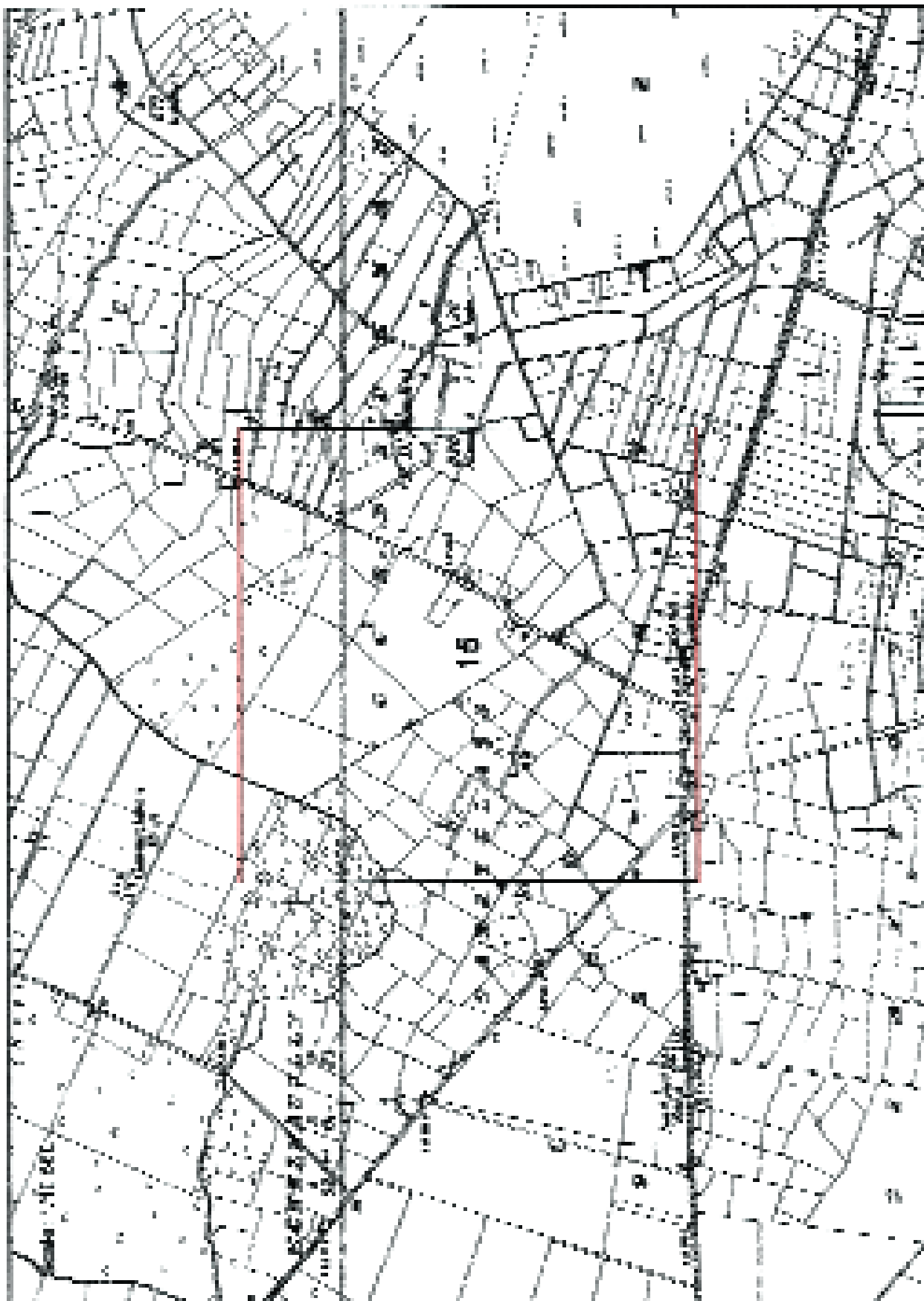
Square Ref:

Date:

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Appendix C Sample Ordnance Survey Map

Sample Square No.15 is outlined



Ordnance Survey Ireland Permit No. 8085
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Appendix D Sample Aerial Photograph

Sample Square No.15 is shown



NOTES

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