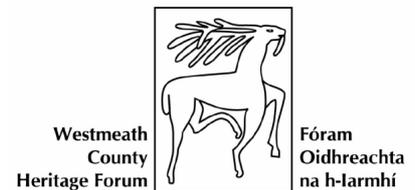


County Westmeath Hedgerow Survey Report

Staidéar Fálta Sceach Chontae na hIarmhí

Westmeath Co. Council
Planning Department

Neil Foulkes and Anja Murray



SUPPORTED BY THE HERITAGE COUNCIL



LE CUIDIÚ AN CHOMHAILTELE OIDHREACTHA

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Hedgerow landscape near Crookedwood

This Survey was carried out for Westmeath County Council as part of the Co. Westmeath Heritage Plan, 2003-2007.

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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 Westmeath and Roscommon was commissioned. The two studies ran simultaneously, and almost as the same study. The focus was 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 Westmeath and Roscommon Heritage Plans both identify actions to address issues of hedgerow conservation:

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.

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.

2. 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.

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

The focus of the survey was on the extent, composition, structure, condition, and management of hedgerows in the two counties. A total of 20 sample squares were recorded in Westmeath, 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 County Westmeath is 10,481km

The corresponding figures for remnant hedgerows would give an estimated length of remnant hedgerow of 1,126km.

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. The species rich hedge group was more common in Westmeath than in Roscommon, while the Gorse and Willow hedge types occurred very infrequently.

The most common hedgerow tree in County Westmeath is by far the Ash. Beech and Sycamore, both non – native trees, are the second most frequently occurring tree species.

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 24% being either remnant or derelict. Just over half of hedges in Co. Westmeath were found to be long term unmanaged. The majority of the county's hedges have a significant proportion of gaps along their length, with more than half of hedges containing more than 10% 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 fifth of the county's hedges are less than 1.5 metres tall. This form of severe management negatively impacts the long term health of hedges and has little benefit for wildlife.

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 Westmeath; infrastructural recommendations; education and awareness recommendations; and recommendations for future research. The relevance of the recommendations to each of the stakeholder groups, such as Westmeath County Council, farmers and landowners, various state bodies, research institutions, and Teagasc, have been tabulated for easy reference.

3.0 BACKGROUND

3.1 The History of hedgerows in County Westmeath

Under the Gaelic system of joint land ownership (pre 1000 A.D.) 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 hawthorn. Permanent banks with or without hedges on them may also have existed.

It was 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 much resented by small stockowners.

By later medieval times Townlands had become the fundamental unit of land tenure. They were bounded by banks 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).

In "A Geographical Description of County Westmeath (1682) Sir Henry Piers wrote "*The county is of pleasant and fruitful soil*", abounding in every desirable commodity, except woods and timber. He bemoans the "deficiency" of hedges in the county "*a defect that we cannot hope to find in our days thoroughly removed, nor is it likely it ever will, unless our proprietors become the inhabitants also*", for estates "*are set at the highest rents to the poor farmer, and from him little of improvement is to be expected, who, if he be able to pay his rent and live, thinks himself happy and rich*". He also mentions how "*the Irish farmer*" is not inclined to "*be at any present expense, in expectation of a future greater benefit*".

This reluctance to implement improvements is no doubt related to the insecurity of land tenure.

According to Jeremiah Sheehan in *South Westmeath Farm and Folk* (1978)

"The fencing of the common land to produce the present day pattern of field and fence can be dated to the 1730-1760 period, from the following 2 observations: Dr. Molyneaux, writing in 1709 mentions that "the country around Moate had hardly any enclosures". In 1813 JC Curwen, on a journey from Athlone to Ballymore states, "the soil is light and the fences good. Whilst we were stopping to refresh our horses, Mr Garrett arrived. He said he remembered almost the whole country without hedges, very thinly populated."

So it seems that the pattern of hedge-bound fields that is so characteristic of the Co. Westmeath landscape originated mainly during the mid 1700's. It is likely that land was further enclosed during the agricultural improvements of the early 1800's. Other hedges

encountered in the survey originate from the subdivision of the Land Commission in the early 20th Century.

Laurence Geoghan in the 1942 Topographical Survey of Westmeath makes numerous references to well-wooded country. This would be predominantly hedgerow related as woodland records indicate low woodland cover at this period.

Traditional hedgerow management

In his original volume Practical Treatise on Trees, Samuel Hayes expounds the virtues of stone faced ditches topped with hawthorn and crab-tree as means of securing young plantations against livestock and also to provide essential shelter to the developing trees. Holly is also referred to as a suitable species, with sally cuttings preferred in ground “*inclinable to moisture*”.

On the subject of managing hedges, Hayes states that hedges “*will be improved by clipping the breast and tapering up the hedge, but suffering the top to grow for a considerable time without shortening*”. Ignoring the latter point is considered to weaken the growth of the hedge.

The Department of Agriculture and Technical Instruction for Ireland in their leaflet No.73, The Planting and Management of Hedges (1911) states that

“The importance of good hedges on agricultural land of any kind is so obvious to owners and occupiers that it is unnecessary to give reasons for advocating that proper attention be paid to them.”

In more recent times, the 1960 County Westmeath Committee of Agriculture included a section on Farm Hedges in their Annual Report. This report indicated that the care and management of farm hedges had fallen behind many other of the improvements of the period. Valuable technical information is included in the report including Planting A Hedge, Reasons For Laying Hedges and Laying and Thinning a Hedge. This latter section includes a description of laying hedges that is very distinctively of the Irish tradition.

Terminology:

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



Evidence of hedgelaying near Delvin

3.2 The value of hedgerows for County Westmeath

Based on the results of the Badger and Habitats Survey of Ireland (Smal, 1995) the current hedgerow /tree row 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 Westmeath'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, they 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 Westmeath. 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.



Badger set in hedgebank

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.



Hedgerows link to native woodland

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 otherwise would.

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Carbon Sequestration

In the process of photosynthesis hedgerow trees and shrubs absorb carbon dioxide from the air and emit oxygen. Carbon Dioxide is a major greenhouse gas. Estimating an average hedgerow width of two metres, hedgerows cover an approximate area of 764 square km and therefore 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.



Hedge cutting contractor managing trackside hedges for Iarnród Éireann

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.

It is beyond the scope of this report to document previous research results into best practice conservation of hedgerows. The authors would refer the interested reader to a paper by D. McCollin in *'Hedgerows of the World'* (IALE (UK) 2001), which documents current research on a category basis.

4.0 SURVEY RATIONALE AND OBJECTIVES

4.1 The need for a Hedgerow Survey in County Westmeath

Prior to this survey, the estimated length of the hedgerow network in Co. Westmeath was 10,594 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 these 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 Westmeath and 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 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

Community Groups

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

4.2 The Aims and Objectives of the Westmeath Hedgerow Survey

- To ascertain the extent and condition of hedgerows in County Westmeath 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
- Sustainable Rural Housing: Consultation Draft of Guidelines for Planning Authorities (2004)
- Electricity Supply Act 1927
- Communications Regulations Act 2002
- The Forestry Act 1946

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."

(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 Environmental 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 that "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 all county planners and engineers and to all members of the Westmeath Heritage Forum with information about the hedgerow survey and a consultation feedback form. The Heritage Forum is composed of a range of heritage stakeholder interests, including education, agriculture, business, tourism. The first batch was sent out, both electronically and by post, prior to the commencement of fieldwork, in July 2004. A total of 9 completed consultation feedback forms were returned to us, all from Heritage Forum consultees. An updated version of the same information was sent again in October with notification of the open public consultation sessions.

The first of these was held in the Mullingar Arts Centre on 15th October 2004, and the second in Athlone library on the 21st October 2004. These sessions were advertised in advance in the local press and on local radio. An interview publicising the hedgerow survey and the consultation session was given for local radio on the morning of the first session. A total of 7 individuals from County Westmeath came along, each bringing a range of local issues, and in some cases aspects of local history, to our attention.

Consultation Feedback forms

When asked how relevant will the survey be to you / your work / organisation, two thirds of respondents consider that the survey will yield useful information to their organisation, while the remaining third consider the results to be of limited interest. None considered the survey to be of no relevance.

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

- Raising awareness among school teachers and children
- Formulation of environmental policy
- Aid the protection of hedgerows in terms of planning regulations and development
- Of interest to rural based businesses
- Education in terms of REPS
- Aid farm based hedgerow maintenance
- Protection of an important environmental resource, and prevention of further destruction of the resource
- Improve understanding of historic and cultural aspects of hedges

Suggested outcomes from the survey include:

- the planting of natural hedgerows around school areas
- the organisation of hedge management demonstrations to help people in how hedges should be managed
- to protect worthwhile hedgerows while assessing planning applications
- improved hedgerow management advice for the county
- recommendations for planting of new hedges

Public consultation Sessions

Most people who came along to the sessions were particularly concerned about the removal of hedges for housing development and road straightening. That too much hedge, more than necessary, is usually removed, was also a concern. Some were also concerned about replacement hedges, where instated, being planted with inappropriate species.

Several who came to meet with us were interested in the cultural and historical aspects of hedges, for example the apples, wild and domestic, in hedges, and their traditional functions (blossom in spring for honey bees, fruit later for pig fodder, very important as pigs were essential to the economy of small holdings). We were also informed that willows were often planted into hedges near dwellings as source of scallops for thatching.

Many who came along on the day stated that they would like to see the protection of heritage features like old hedged walkways, double ditches, and other notable or historic hedges. It was suggested that it would be good to see grants available for this.

A few of the consultees were seeking management advice. Another stated the need for more encouragement for good management for farmers and landowners. It should be a priority, in terms of hedge conservation, to support those landowners who are planting and actively managing their hedges, and are struggling through lack of practical management demonstrations.

Difficulty sourcing native quicks (young hawthorn plants) locally and species such as Spindle and Guelder rose for planting in to hedges was also identified as a problem.

Several were concerned also about lack of management for hedges around the county, and another identified over-trimming and bad management as a concern.

One consultee was mainly concerned with the felling of roadside trees, that trees are often felled when only de-limbing is required, as it is cheaper and easier to fell the whole tree than take away limbs. Trees are also not cared for, Ivy is not managed, which is particularly important for roadside trees because it can de-stabilise, weaken, or choke trees and make them a danger and a liability.

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 country 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. A total of 20 squares (17 full and 3 part) were selected in this way. The grid references for each square in Westmeath are listed in Table 8.1.1

Within each sample square 10 hedges were selected randomly using a number of transparent overlays. 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 definition of Networks for Nature Draft Hedgerow Survey Methodology (Murray, 2003).

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 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, though where no junction was evident. This is normally a result of boundary removal, where the two lengths 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 (Royal Dublin Society), 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 2). 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 into 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'.

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 (strip a and strip b) 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.
- Inability to differentiate between a hedgerow and a remnant 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 minimise 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 colonised 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.



Example of a Remnant 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 Westmeath Hedgerow Survey.

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 a decision was made at the outset of the fieldwork not to seek permission from all landowners. Where access to land was through a farmyard or close to a dwelling, or in any other situation deemed relevant by the surveyors, 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 hedges 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 Westmeath

Grid Reference	Square Reference	Nearest Town/ Village	Area km ²	Hedgerow Length (km)	Remnant Length (km)	Density (excluding Remnant) (km/km ²)
N 400 800	W01	Finnea	0.723	5.425	1.2	7.50
N 300 700	W02	Street	0.06	0.08	0	1.33
N 400 700	W03	Coole	1	2.56	0.735	2.56
N 500 700	W04	Fore	1	5.65	0.725	5.65
N 300 600	W05	Ballinacarrigy	1	10.085	1.52	10.09
N 400 600	W06	Ballynafid	1	5.155	0.215	5.16
N 500 600	W07	Crookedwood	1	9.685	1.165	9.69
N 200 500	W08	Ballymore	1	5.94	0.55	5.94
N 300 500	W09	Rathconrath	1	2.075	0.575	2.08
N 400 500	W10	Mullingar	1	6.15	0.285	6.15
N 500 500	W11	The Downs	1	6.92	0	6.92
N 100 500	W12	The Pigeons	1	5.985	0.24	5.99
N 100 400	W13	Athlone	1	5.825	0.775	5.83
N 200 400	W14	Moate	1	2.465	0.29	2.47
N 300 400	W15	Horseleap	1	5.195	0.145	5.20
N 400 400	W16	Tyrellspass	1	9.79	0.08	9.79
N 500 400	W17	Rochfortbridge	1	0	0	0.00
N 300 300	W18	Kilbeggan	0.024	0.285	0	11.88
N 600 600	W19	Delvin	1	5.83	1.37	5.83
N 600 500	W20	Killucan	1	6.39	1.03	6.39
Total			17.807	101.49	10.9	Average 5.82

Table 8.1.1 Measurement of Extent of Hedgerow and Remnant Hedgerow in Sample Squares in County Westmeath

Table 8.1.1 shows the extent of hedgerows and remnant hedgerows in the individual sample squares of County Westmeath. The total area surveyed was 17.807km² which is 0.968% 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 Westmeath has a Hedgerow Length of 10,481km

The corresponding figures for remnant hedgerows would give an estimated length of remnant hedgerow of 1,126km

The figure of 1,126km for remnant hedgerow is 9.7% of the total of hedgerow and remnant hedgerow length. This compares favourably with the results of the more detailed survey of hedges within each sample, which found that 9.9% 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.

The amount of hedgerows in the sample squares varies from 0 in W.17 (bog near to Rochfortbridge) to 11.88km/km² in square W. 18 (Kilbeggan). The latter was based on a very small sample area (only a small fraction of the sample square was in County Westmeath) and thus it may be more accurate to take the maximum figure as square W.5 (Ballinacarrigy) which had a hedgerow density of 10.09 km/km².

The average figure for hedgerow density is 5.82 km/km² (standard deviation of 3.09).

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 .

Figure 8.1.2 shows the distribution of hedgerow density throughout the sample. It can be seen that most squares have a hedgerow density around the 6km/km² figure, indicating a degree of consistency in the hedgerow landscape.

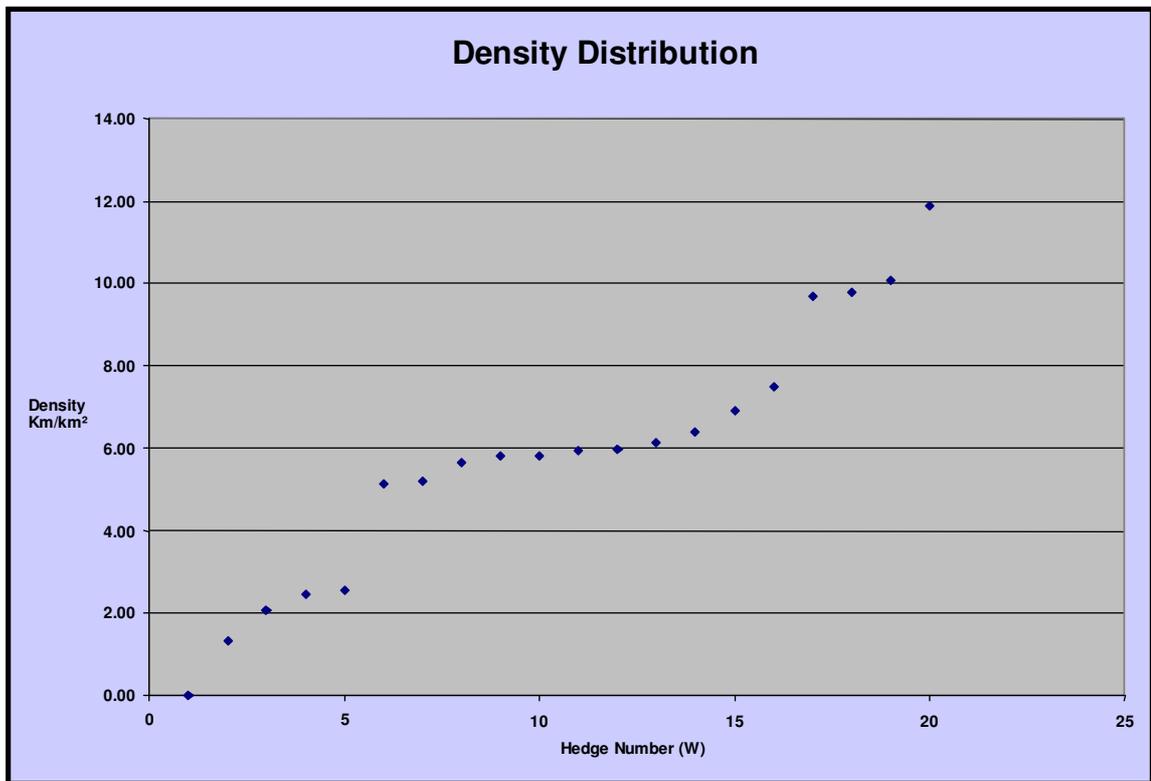


Figure 8.1.2 Distribution of hedgerow density per km² in sample squares

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

It should be noted that measurements of hedgerow length do not incorporate gaps along the length of a hedgerow.

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 of hedgerows between the two surveys are not sufficiently consistent for a direct comparison of the two data sets.

The estimation of hedgerow length in County Westmeath based on the definitions and results of the Badger and Habitats Survey of Ireland is 10,594 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 indicate a reduction of 113km of hedgerows throughout the County in the period between the surveys.

However, the discrepancy between the figures produced in the comparative survey in County Roscommon (where hedgerow length has almost doubled in the intervening time, an unlikely scenario) 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 Counties Westmeath and Roscommon

From the output of the TWINSpan 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 hawthorn, 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 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 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.

Table 8.2.1

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

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.

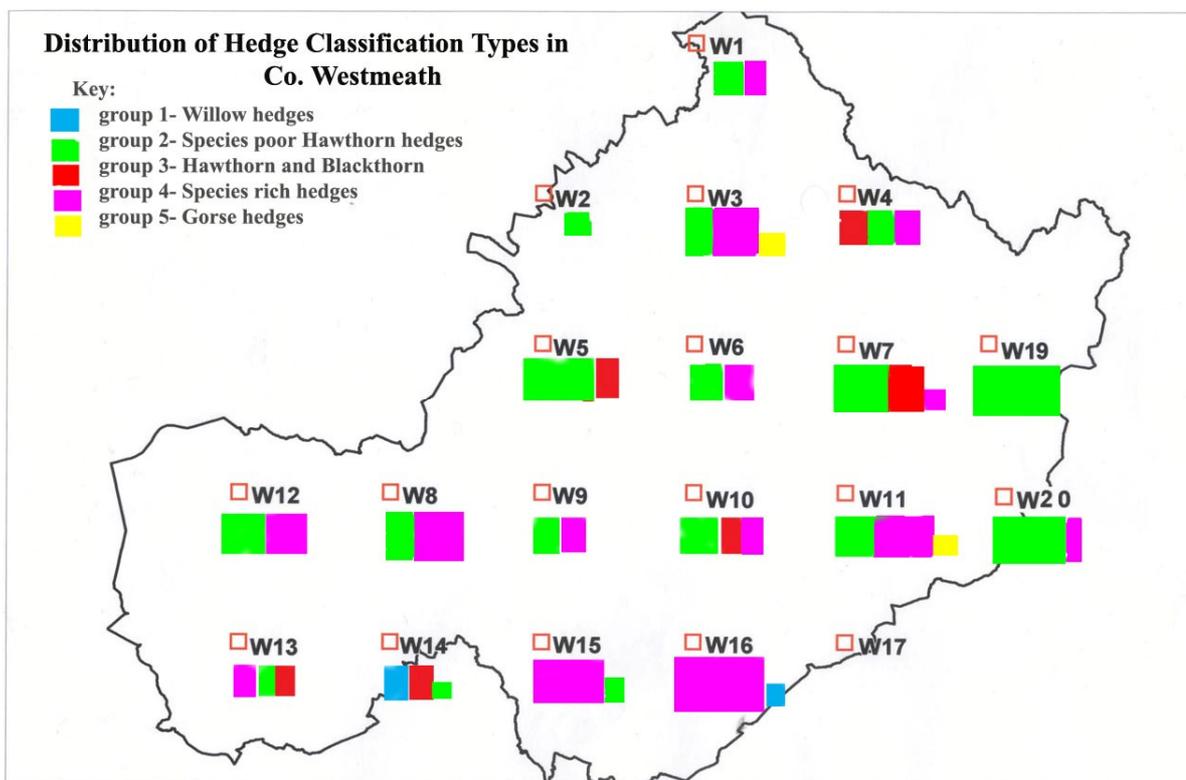


Figure 8.2.2 Distribution of Hedge Classification Types in Co. Westmeath

Structural characteristics of each group:

As the groups are based solely on their species composition, the differences 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) hawthorn. As the hawthorn 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 Westmeath hedges

Shrub species occurring in the hedge layer

The hedges of Westmeath are comprised mostly of Hawthorn, with Elder, Blackthorn, Holly, and Privet occurring commonly. Spindle, Damson (plum), willows, Hazel and Gorse occur frequently. 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 Westmeath and Roscommon Hedges

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

Hawthorn is both the most frequently occurring hedge shrub and has the highest percentage cover in Westmeath hedges. While elder is found in more than half of hedges surveyed, it has a relatively low level of abundance. Blackthorn, while occurring less frequently than elder, tends to be more abundant in those hedges in which it occurs. Holly and privet are found in reasonable quantity in a third of Westmeath hedges. This is a very good level of holly, suggesting its capacity to seed readily in to hedges.

Privet, damson, willow, and hazel also occur at good levels, while crab apple and guelder rose occur very infrequently.

Trees

The most common hedgerow tree in County Westmeath is by far the Ash. Beech and Sycamore, both non – native trees, come in as the second most frequently occurring tree species.

Trees	Westmeath	Roscommon
Ash (<i>Fraxinus excelsior</i>)	61.6	50.3
Sycamore (<i>Acer pseudoplatanus</i>)	13.9	9.6
Beech (<i>Fagus sylvatica</i>)	13.9	7.2
Oak	7.9	2.4
Willow	7.3	10.8
Birch	4.6	2.4
Holly	4.0	1.8
Damson	2.0	0.6
Alder	1.3	2.4
Horse chestnut	1.3	0.6
Wild cherry	1.3	2.4
Crab apple	0.7	0.6
Rowan	0.7	0.6

Table 8.3.2 The Frequency of tree species occurrence in sampled Westmeath Hedges

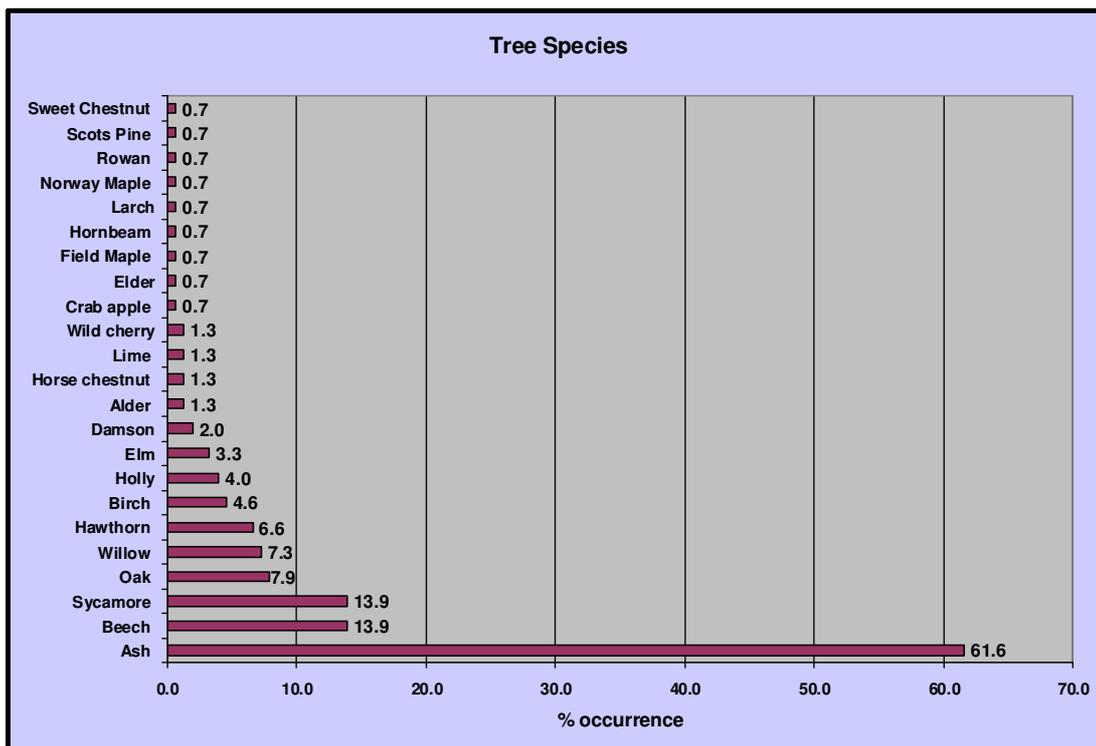


Figure 8.3.2 The Frequency of tree species occurrence in sampled Westmeath Hedges

Tree Species Richness

There is little diversity in the species of hedgerow trees in the county. 53 % of the hedges where trees were recorded had only one tree species. 31% of the hedges where trees were recorded contained two tree species, 8% had 3 species, and a further 8% 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.

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

Roscommon 32 from 166 (19.3%) have 4 or more native species in at least 1 strip
Westmeath 28 from 136 (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.

It should also be noted that 21% of hedges samples in Westmeath 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 21% does not represent the proportion of species rich hedges in the county.

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 Westmeath is 2.8 species.

Townland Boundary Hedges

10% of all the randomly chosen hedges surveyed in Co. Westmeath were townland boundary hedges (15 hedges in total). Their mean species richness was higher than the average, with a mean of 2.8 species per 30 metre strip.

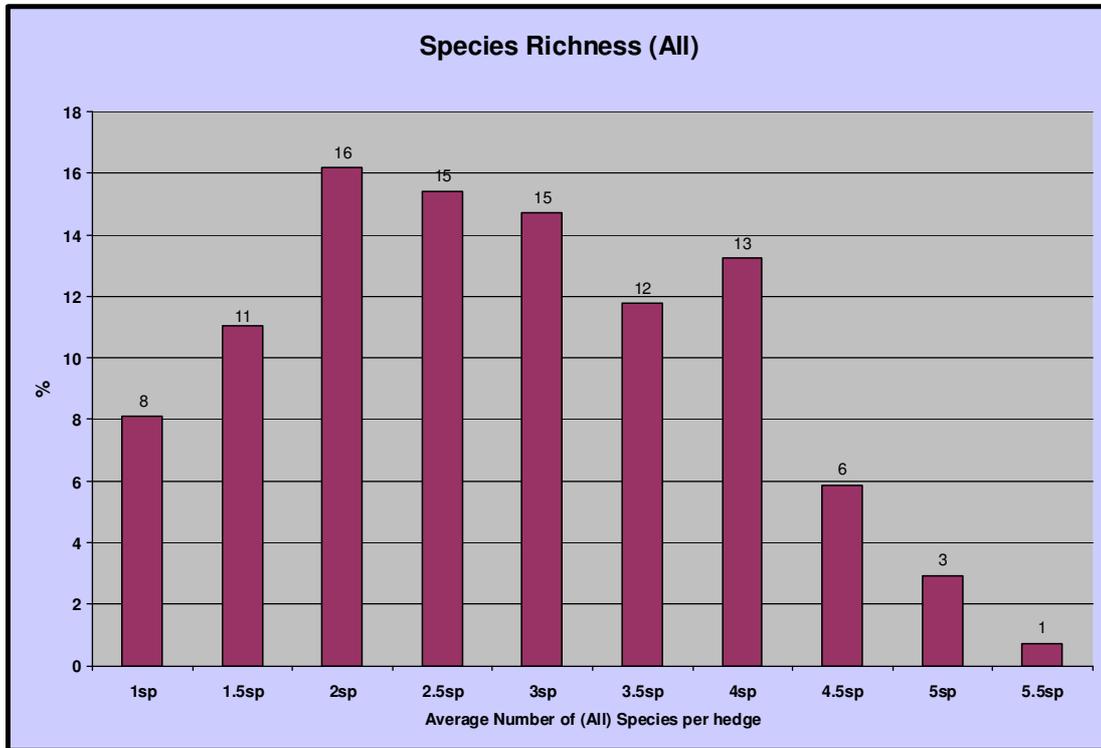


Figure 8.3.3 Percentage breakdown of (average) species numbers in hedges

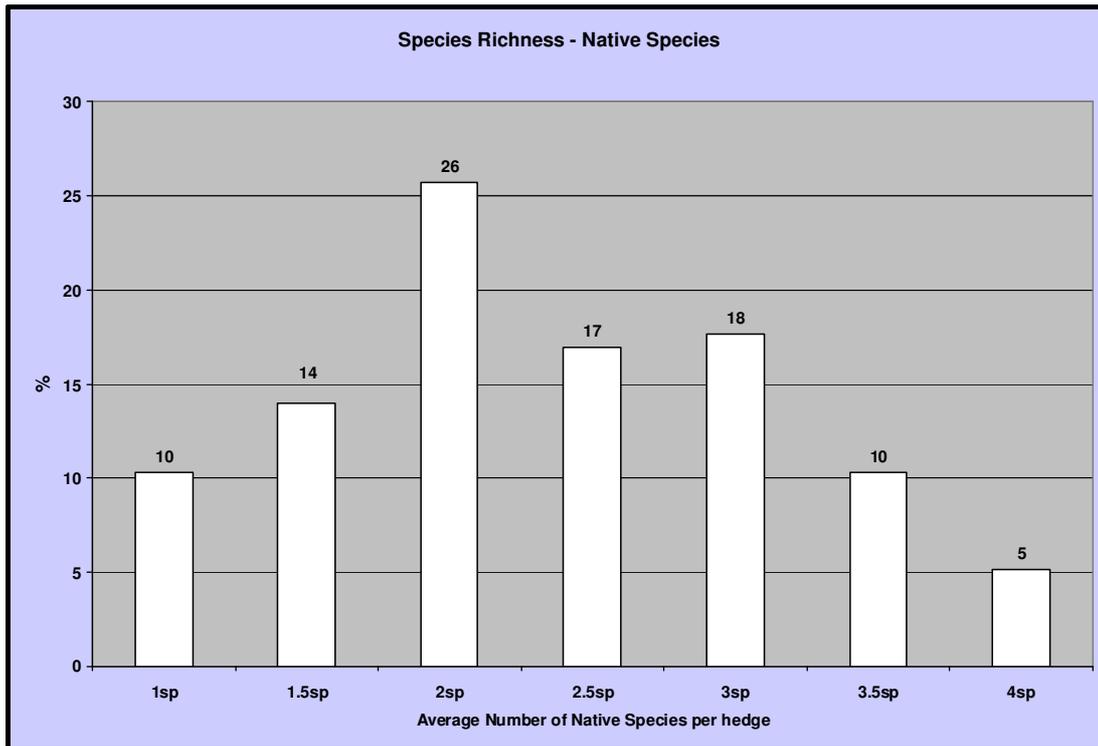


Figure 8.3.4 Percentage breakdown of (average) native species numbers in hedges

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 in County Westmeath is 3.24, compared to a non-roadside average (mean) of 2.64 species.

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 4.33 compared with 3.77 in non-roadside hedges. In post 1837 hedges the respective figures were 3.75 and 2.75. 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.

Table 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).

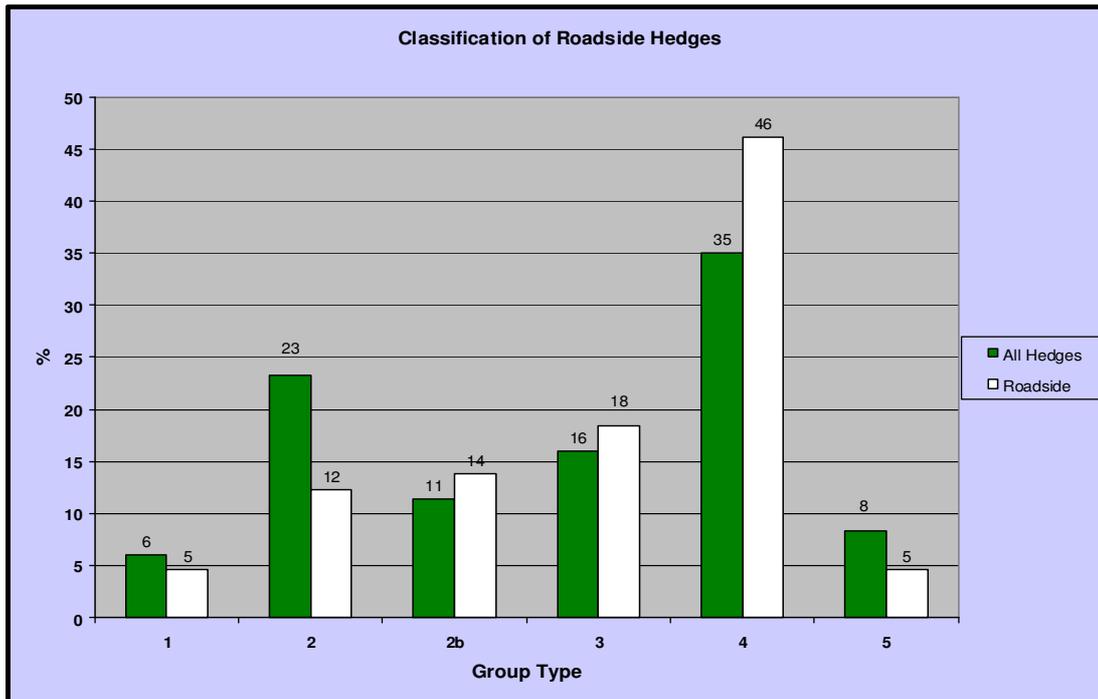


Figure 8.3.5 The occurrence of each hedge group type in Roadside hedges compared to all hedges

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 townland boundaries than non townland boundary hedges. This could explain the greater species richness of roadside hedges.

8.4 Character and condition of hedges in County Westmeath

The character and condition of hedges was 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.

Ecologically, there is no prescription possible for the ideal hedge. Features that are beneficial for one species may be detrimental for another. Variety in composition, structure and management are the key to biological diversity. That said, it has been shown that, in general, a number of factors are beneficial for broad hedgerow ecology:

- Increasing height and width
- Greater diversity of species composition, especially native species
- Linear continuity; absence of gaps, and links with other hedges and natural or semi-natural habitats.
- Associated features such as banks, drains and verges.

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 Westmeath are of the single line type. This would be indicative of a planted origin. 6% of hedgerows have a stone wall as part of the structure.

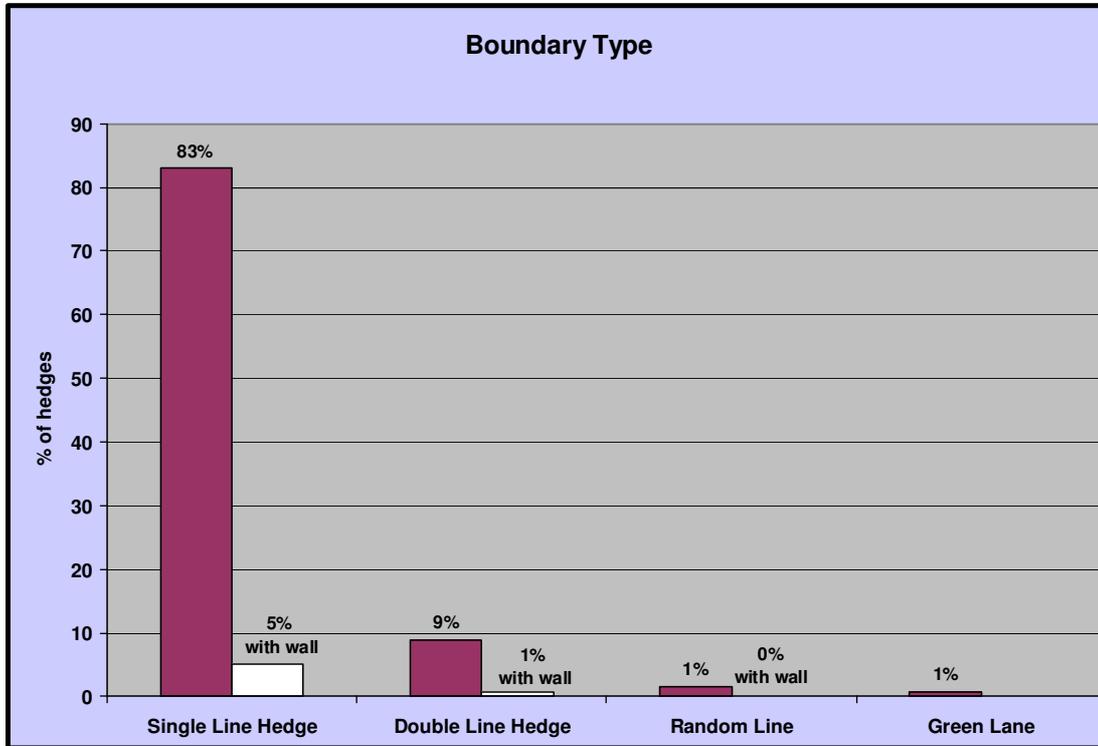


Figure 8.4.1 Boundary Type of hedgerows in County Westmeath



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.

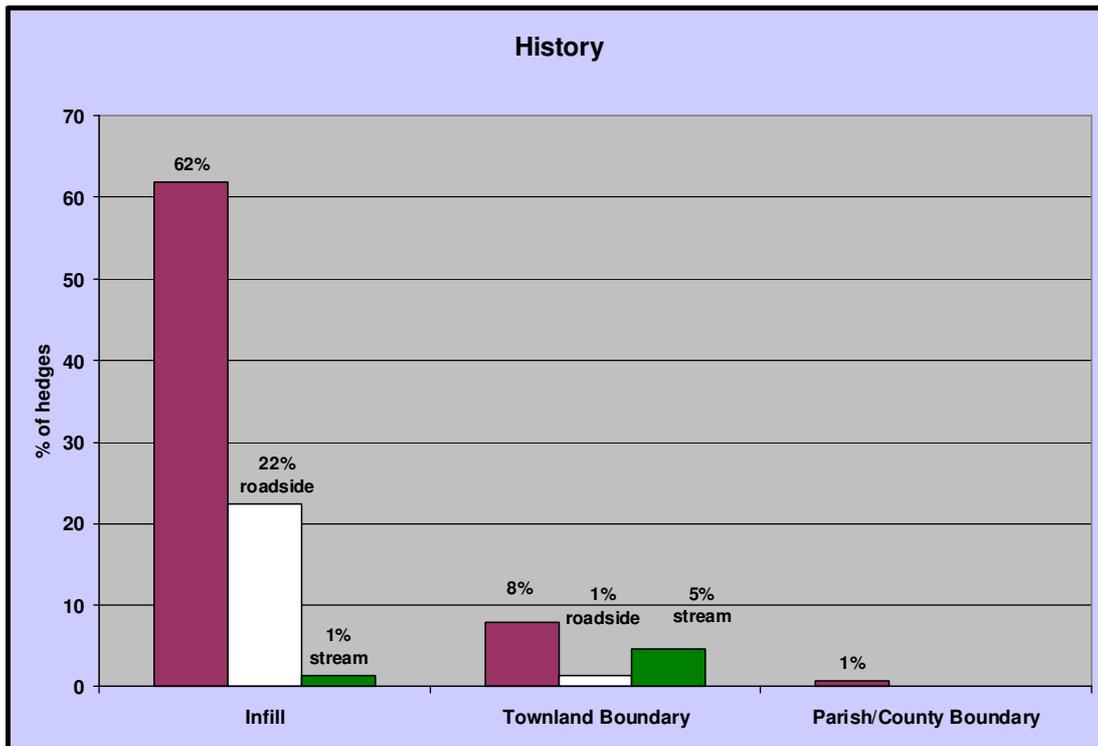


Figure 8.4.2 The proportion of Townland boundary and non townland boundary (infill) hedges that are situated by roads and streams

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. 14% of hedges surveyed in County Westmeath had end links with habitats (other than hedgerows).

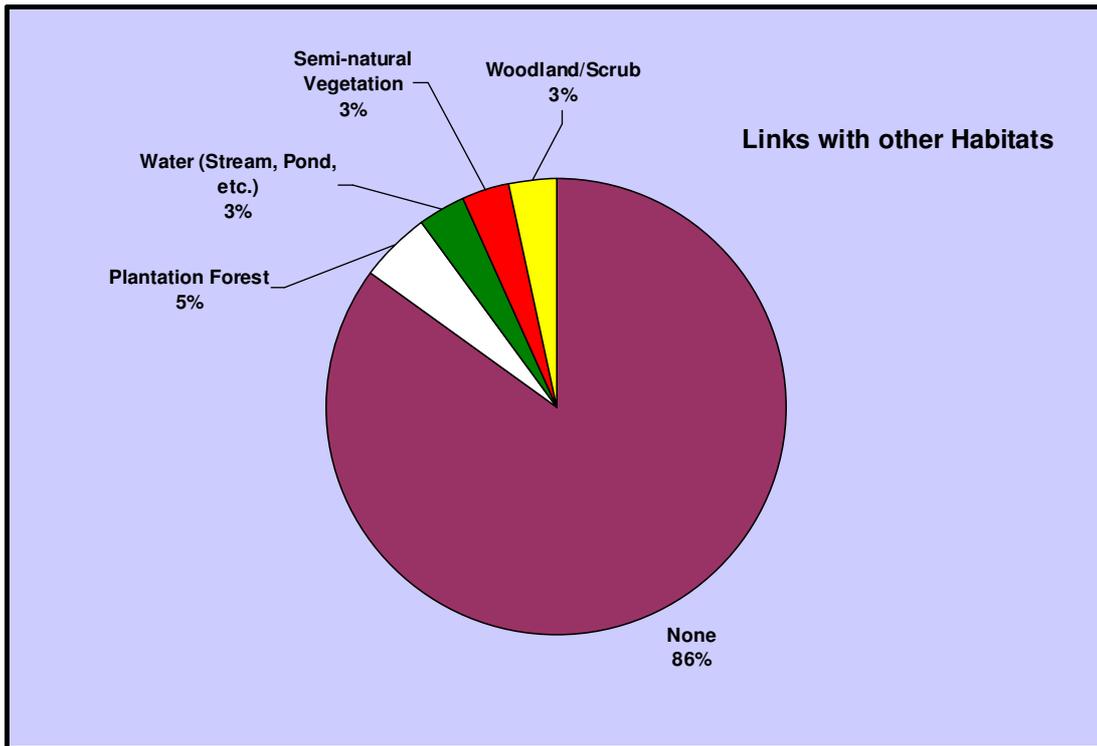


Figure 8.4.3 Hedgerow Links with other habitats

Hedge Profile

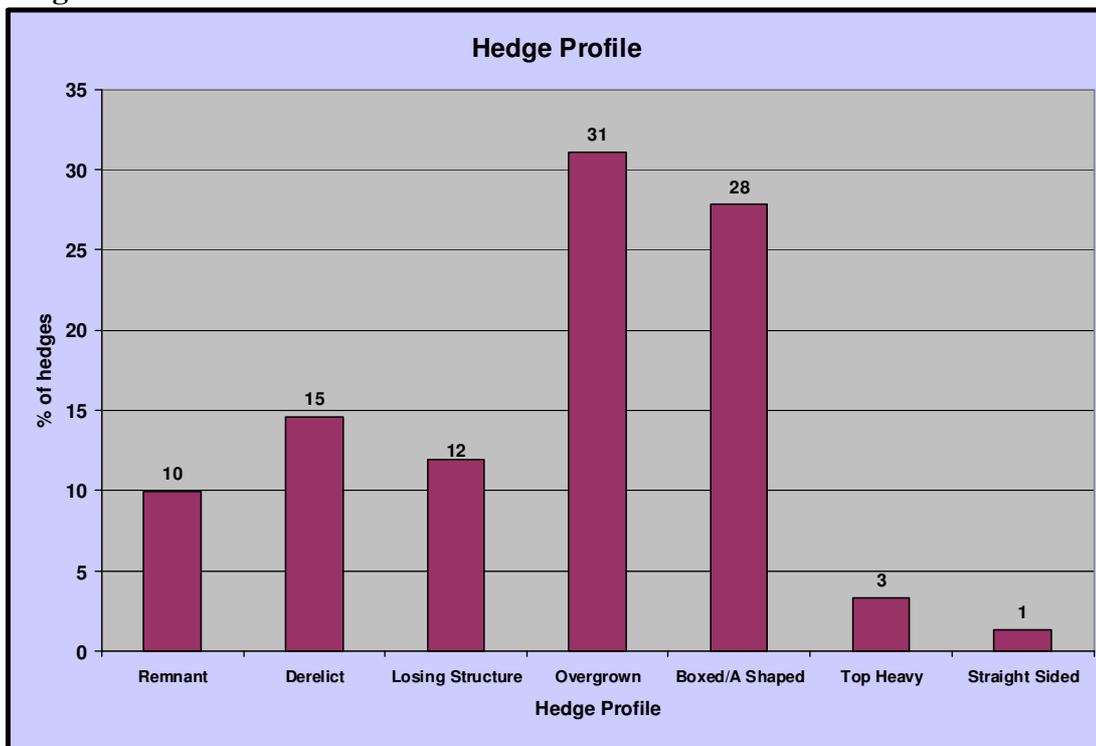


Figure 8.4.4 Proportion of hedges with different profile categories

A large proportion of hedges in the county are structurally extremely poor, with a total of 24% 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. It is also considered that they are of less value for nature conservation than hedges with dense basal growth. These are very high figures for remnant and derelict hedges, indicating a serious threat to the future existence of a quarter of the counties resource.

A further 12% 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 are likely to move into the derelict category.

More than a quarter (26%) 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

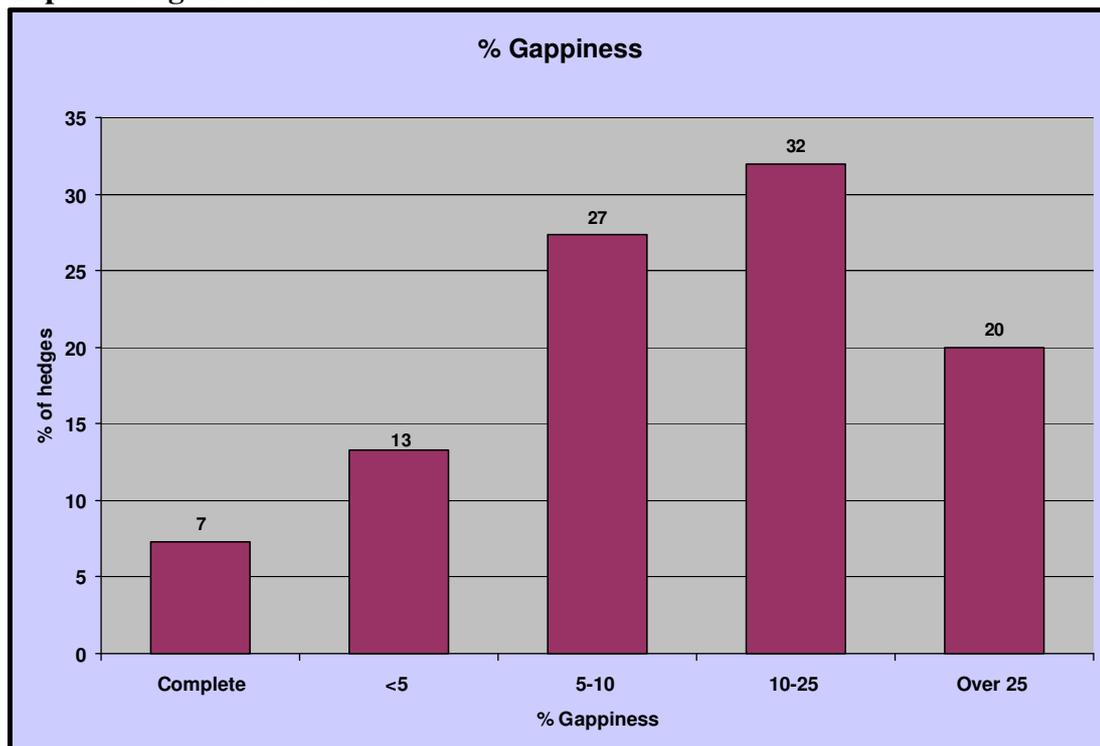


Figure 8.4.5 Proportion of hedges in different categories of percentage cover of gaps in hedge length

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. Stock containing capacity and value to wildlife are both influenced significantly by gaps at this level, rather than at the canopy level. Some hedges have very distinct gaps, in other hedges the gappiness is more a result of the overall sparse number of hedgerow stems. Only a small number of hedges (7% in total) were without gaps in their structure. These figures do not include derelict hedges.

Hedge Height

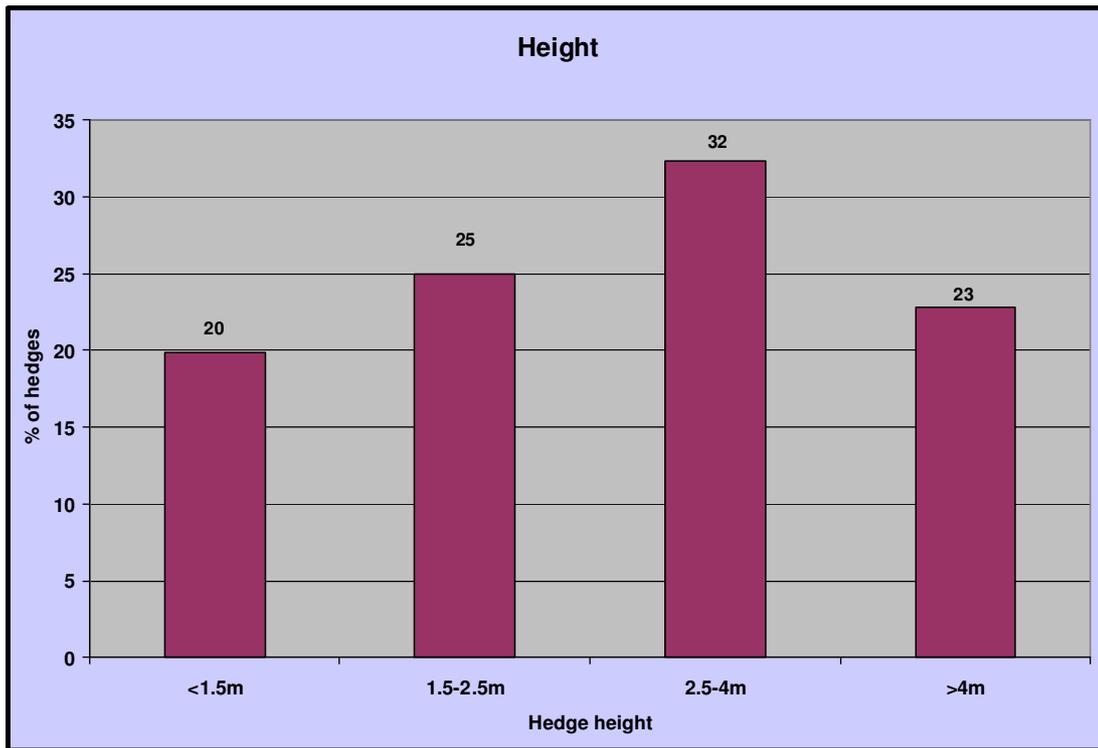


Figure 8.4.6 Proportion of hedges in different hedge height classes

Increasing hedgerow height correlates positively with increasing diversity of bird species in a hedge. One fifth of Westmeath hedgerows were in the minimum category of less than 1.5m in height.

Hedge Width

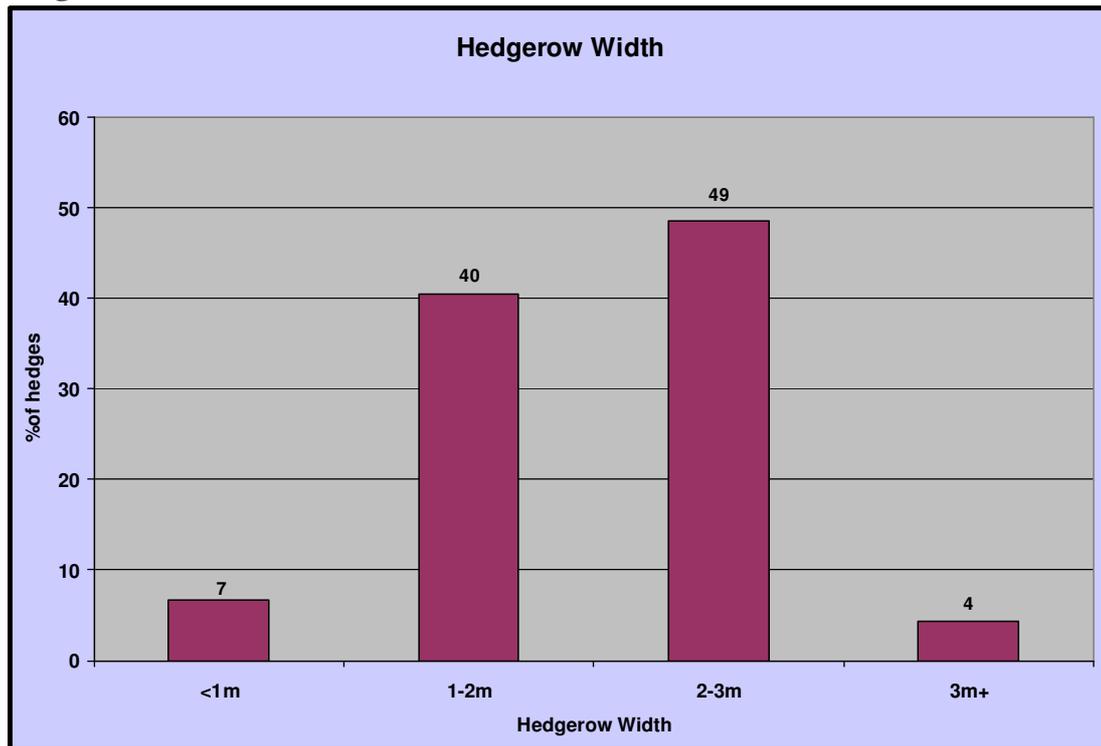


Figure 8.4.7 Proportion of hedges in different hedge width classes

It is generally considered that, from an ecological perspective, the wider the hedge the better for wildlife. 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, 93% of hedges in Westmeath are over 1m in width.

Density of hedge basal growth

Recording how dense 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 towards becoming a tree line and losing its principle agricultural function. Several studies have shown that density of growth in the hedge base influences the hedges significance for supporting wildlife.

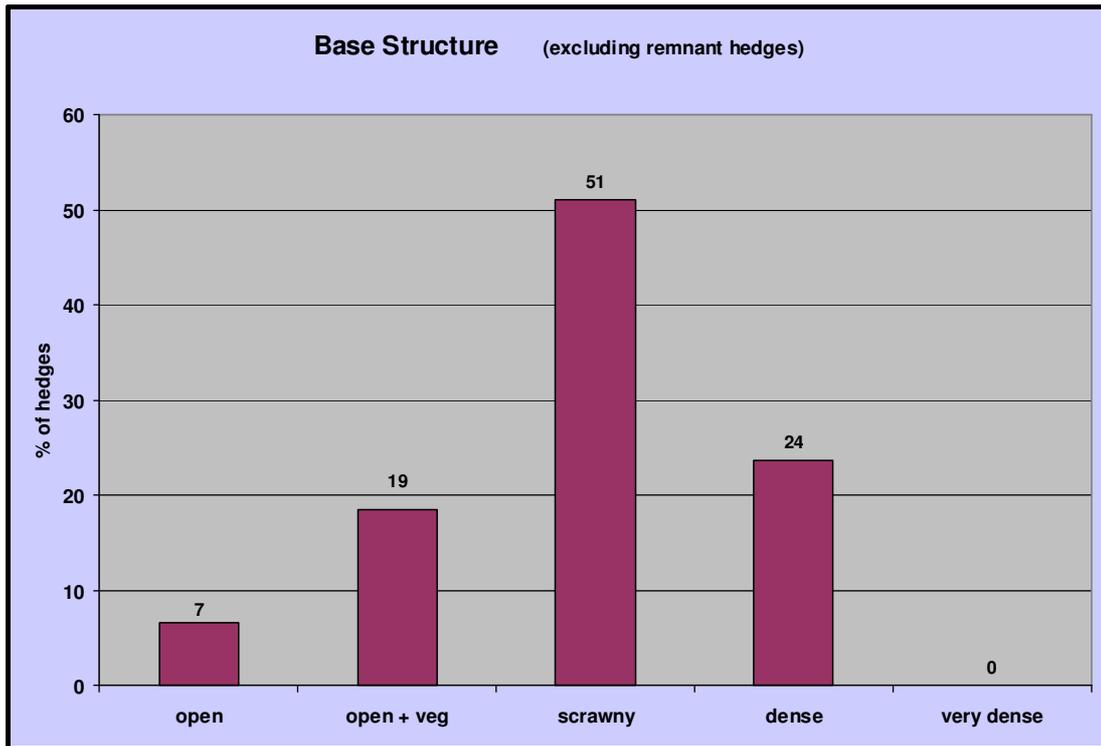


Figure 8.4.8 Proportion of hedges in different categories of basal density

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

Tree Abundance

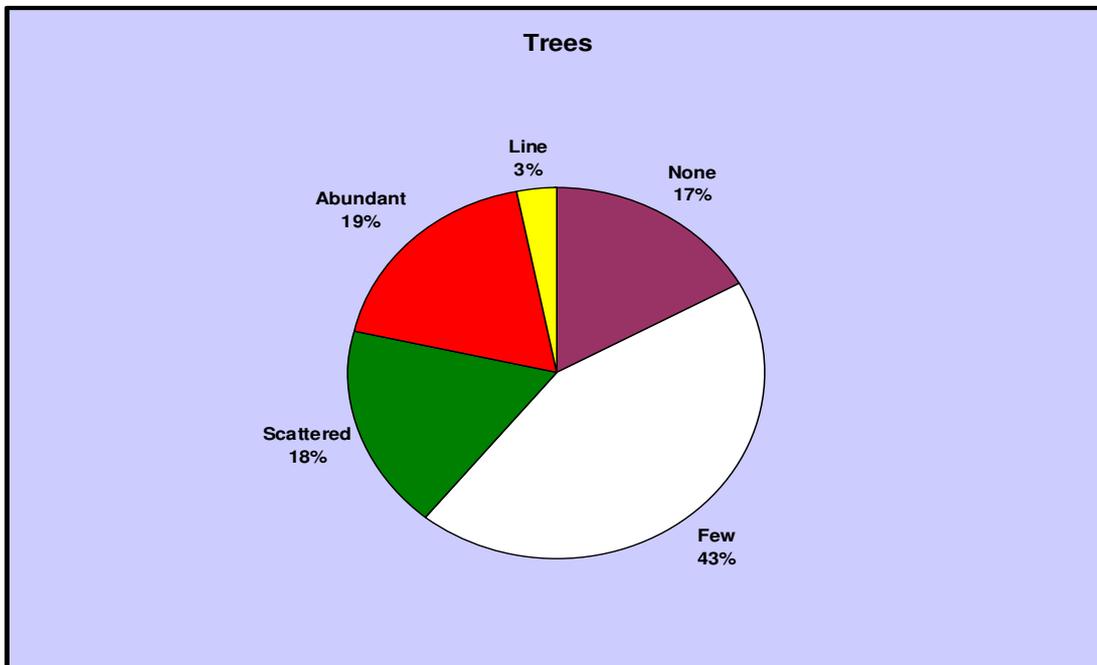


Figure 8.4.9 Proportion of hedges with different abundance levels of hedgerow trees

60% of Westmeath hedges have either just a few trees or no trees at all. This is probably a reflection of management levels and methods. Unless special care is taken, hedges that are managed regularly by tractor mounted machines are likely to have any saplings that are developing cut during maintenance.

Tree age composition

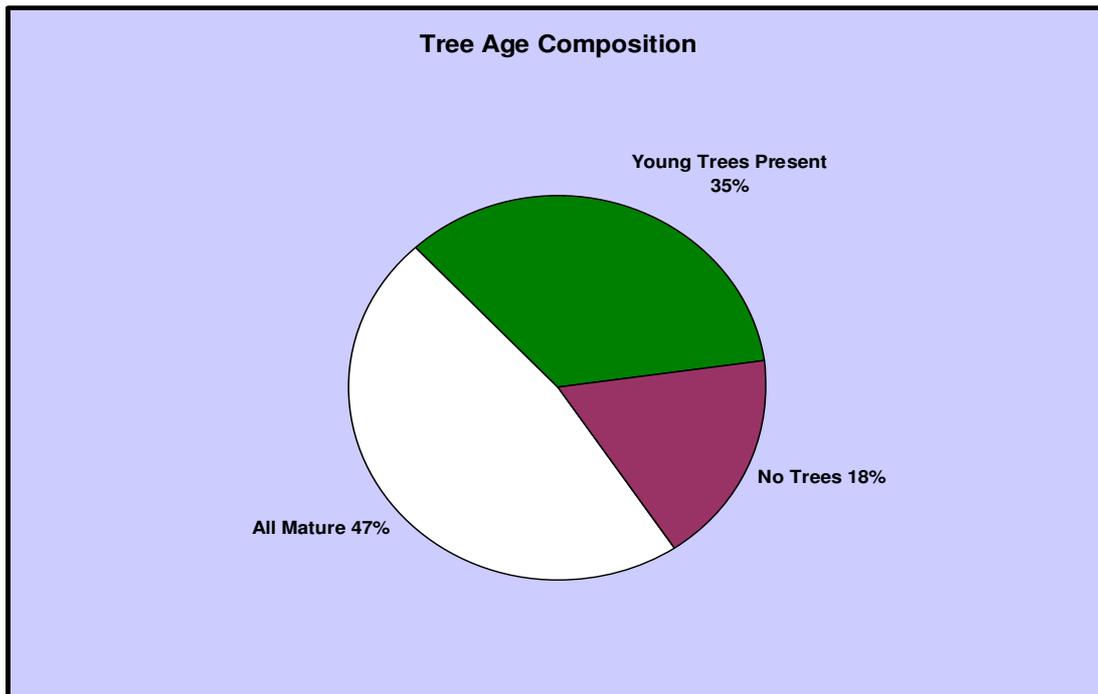


Figure 8.4.10 Tree age composition of sampled Westmeath hedges

Almost half of the hedges sampled have only mature trees in them. It is generally considered that to achieve sustainable levels of hedgerow trees, a balance between young, medium and older trees needs to be maintained. A further 18% of hedges have no trees at all. These figures would suggest that there is likely to be a decline in the numbers of hedgerows containing trees in the future.

Associated Features

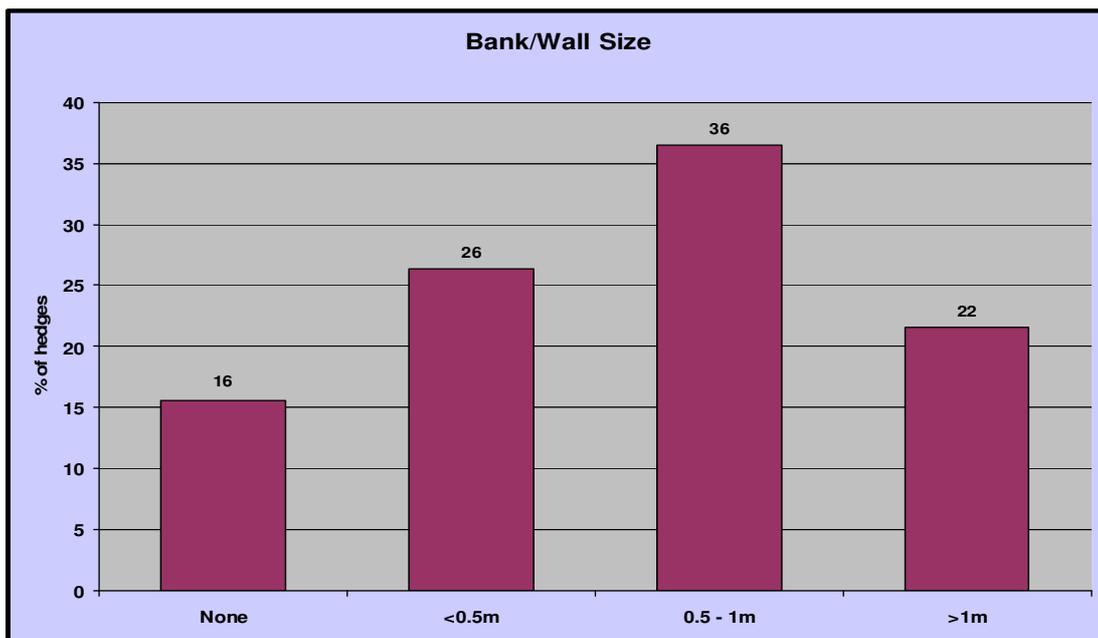


Figure 8.4.11 Proportion of hedges in the different size categories

84% of hedges are associated with a bank or wall. 58% 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 almost a fifth severely eroded.



Hedgerow with stone wall

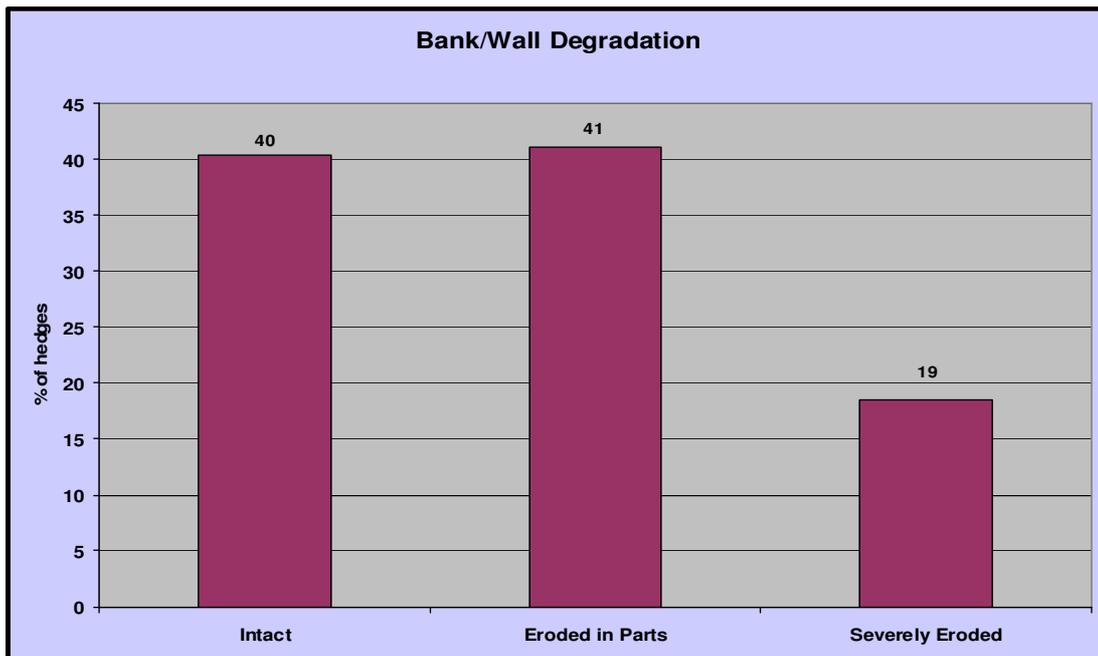


Figure 8.4.12 Proportion of hedges having degraded banks or walls



Eroded stone faced earth bank, vulnerable to further degradation

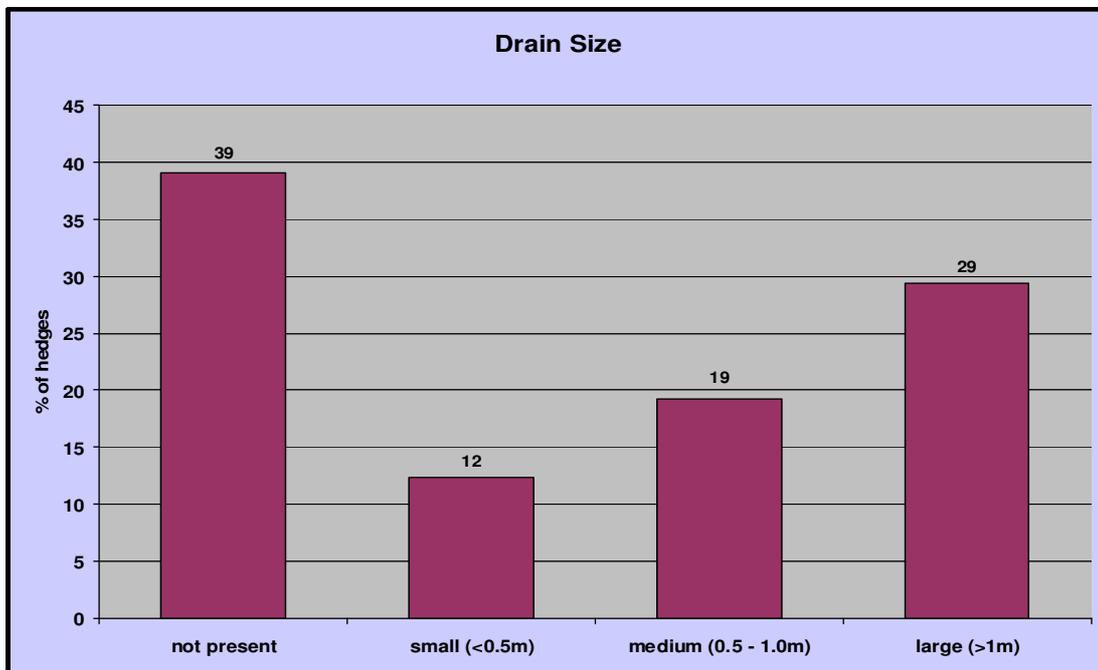


Figure 8.4.13 Proportion of hedges in different drain size categories

61% of hedges are associated with a drain with almost a third of hedges having a drain of over 1m in size.

Fruiting

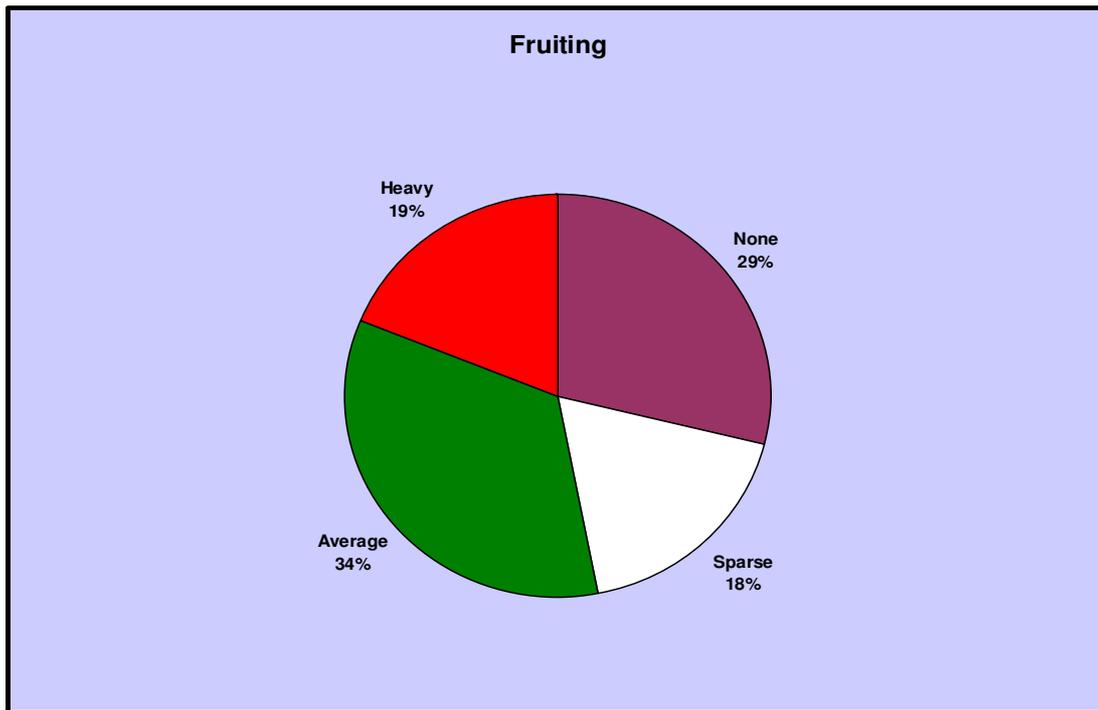


Figure 8.4.14 Proportion of hedges in the different fruiting categories

Levels of fruiting were gauged by assessing the fruiting of hawthorn which is by far the most frequently occurring and abundant hedgerow species. Almost one third of Westmeath hedges show no signs of fruiting (2004 is generally considered to have been a good year for fruit production in most species). This is a very large proportion of hedges with no fruit at all, which can be explained largely in terms of management practices and methods. Figure 8.4.15, below, 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.



Heavy fruiting of hawthorn in unmanaged hedge

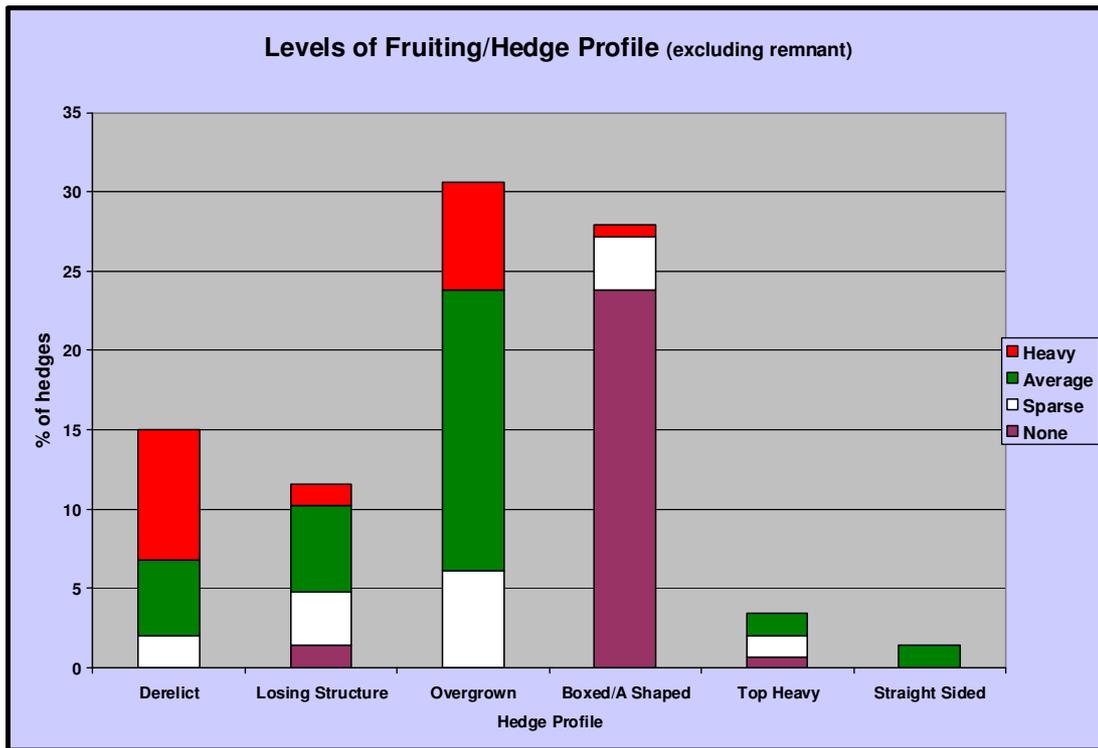


Figure 8.4.15 Levels of fruiting related to hedge profile

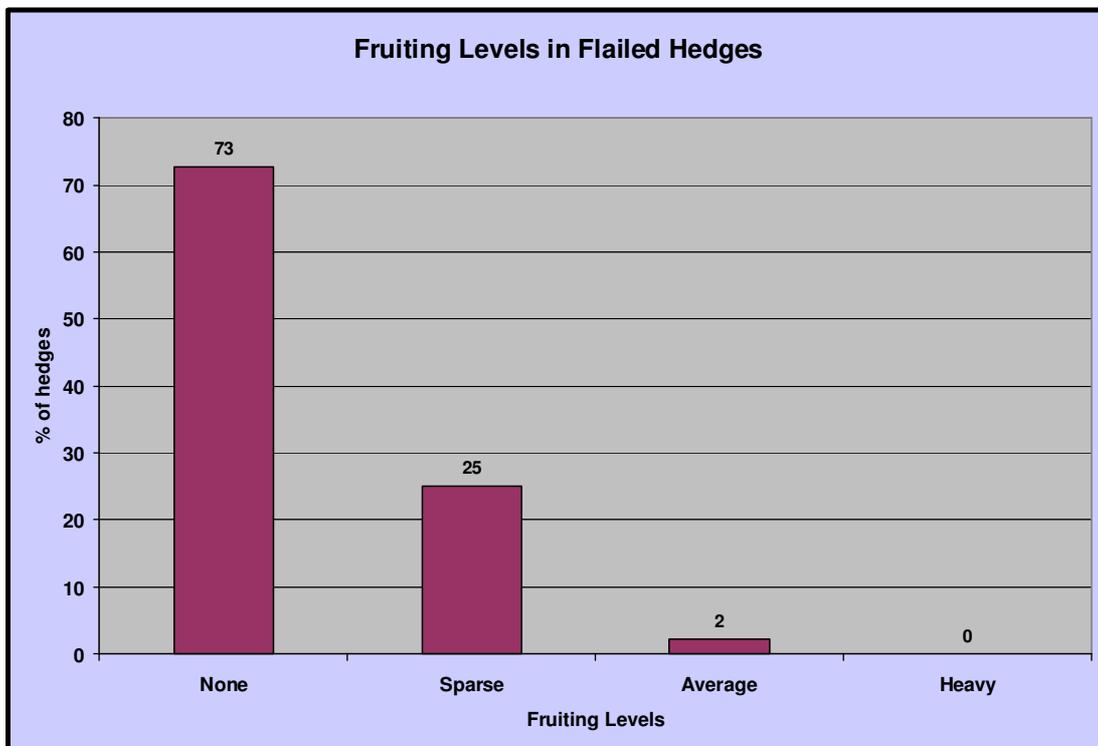


Figure 8.4.16 Levels of fruiting in flaied hedges

Ivy

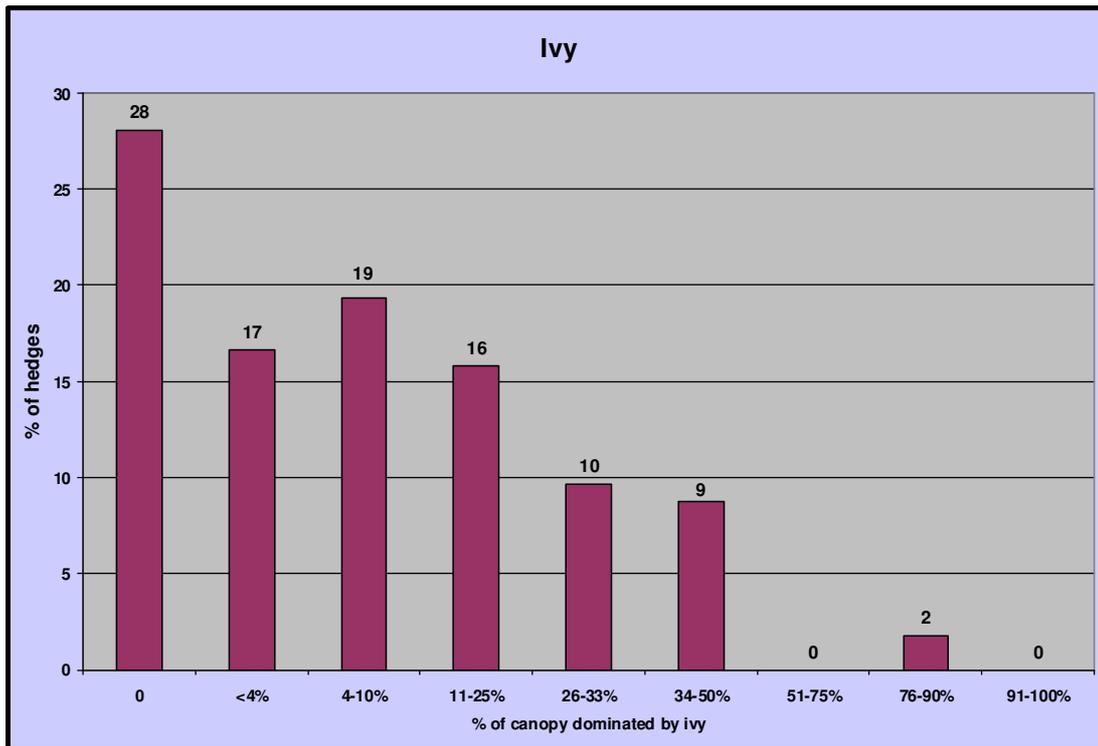


Figure 8.4.17 Percentage breakdown of domination of ivy at canopy level

Statistics for the levels of ivy in the canopy of hedges show that over a fifth of hedges have more than a quarter of their length dominated by ivy.

8.5 Management of hedges in County Westmeath

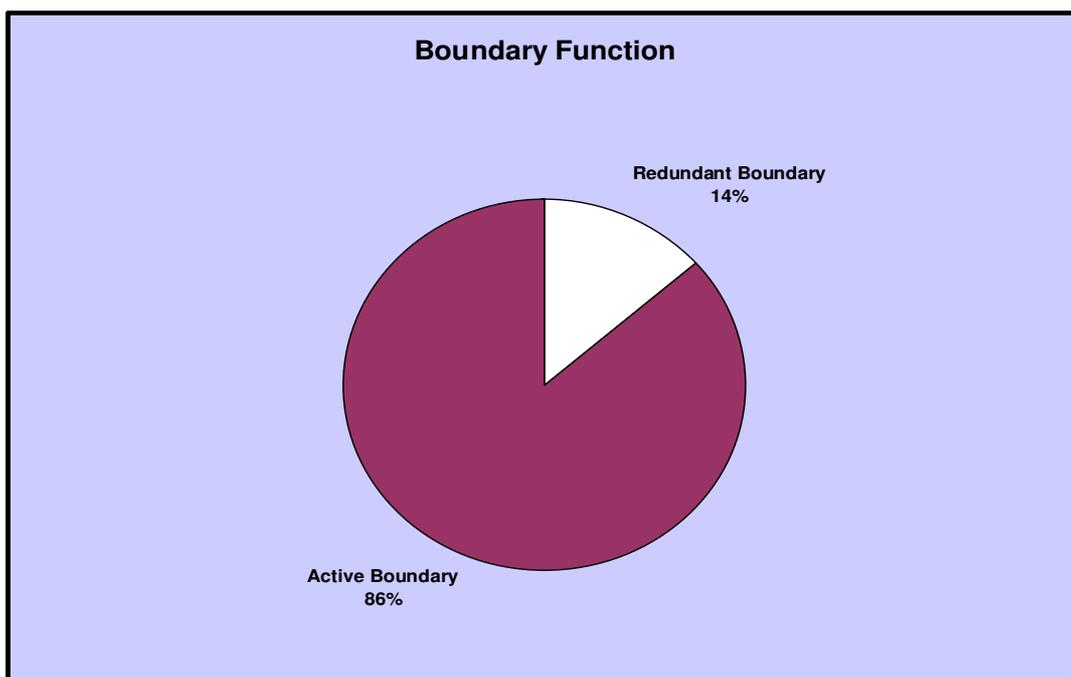


Figure 8.5.1 The proportion of boundary lines with hedges that are active or redundant as boundaries.

“Active” and “Redundant” boundaries refer specifically to the functionality of the hedge as a stock barrier.

14% 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

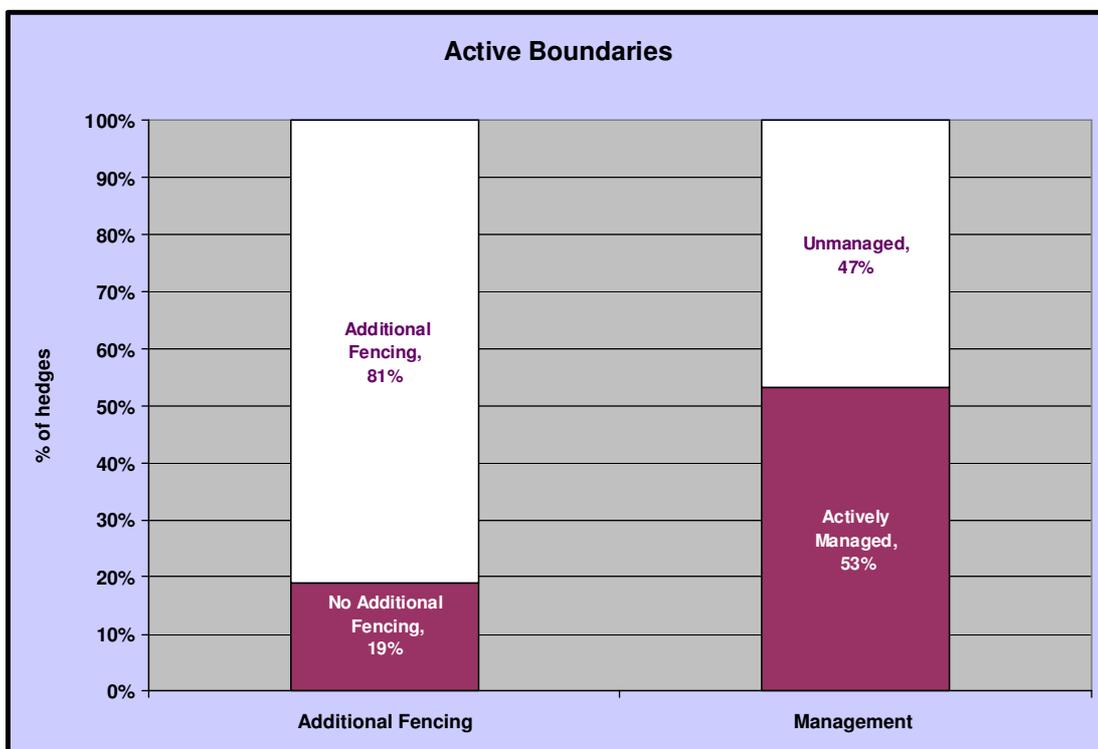


Figure 8.5.2 Fencing and Management of Hedgerows along Active Boundaries

The vast majority of hedgerows along active agricultural boundaries are reinforced with some additional fencing. Only 53% of these hedges are being actively managed. Interestingly, 20% of redundant boundaries are still being actively managed. This raises an interesting question as to what are the management objectives of farmers and landowners?

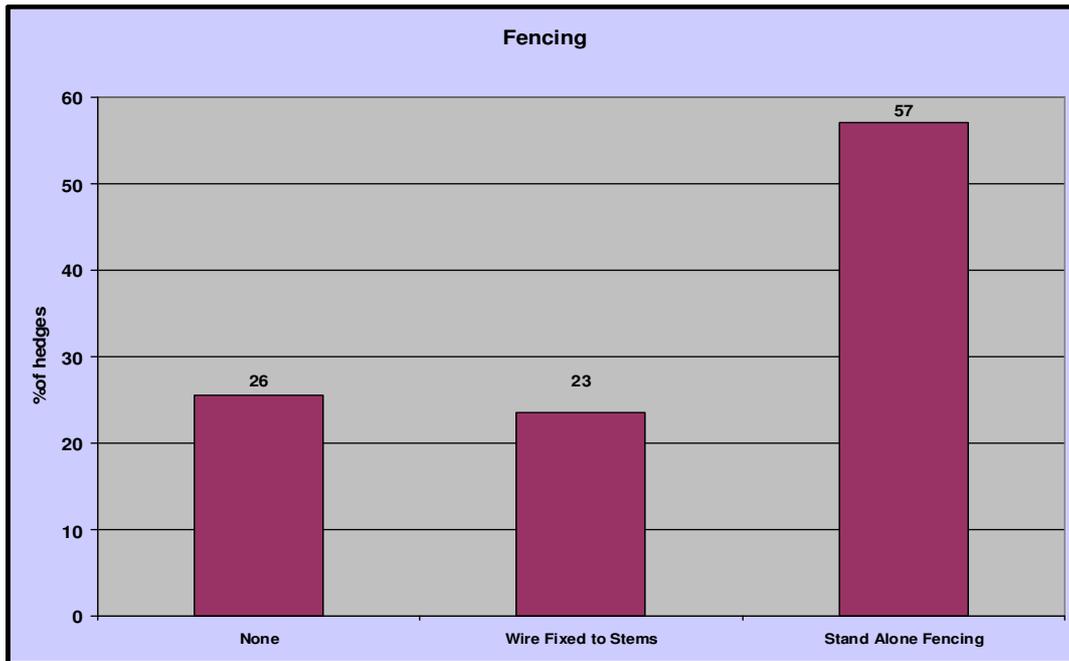


Figure 8.5.3 Additional Fencing of Hedgerows

Nearly a quarter 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).

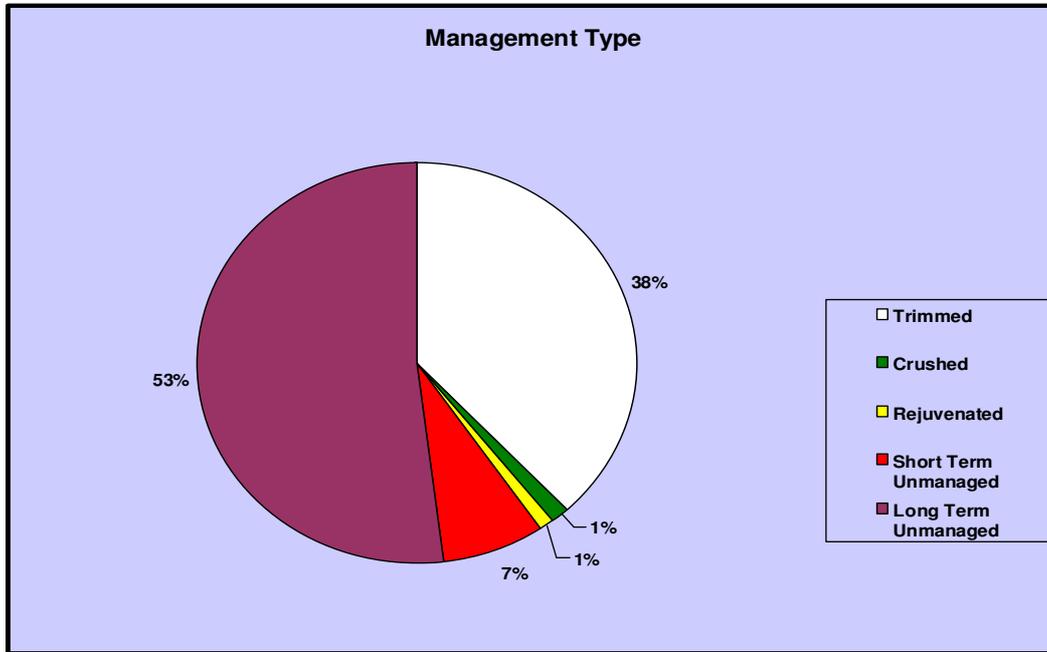


Figure 8.5.4 Breakdown of Hedgerows by Management Type

Just over half of hedges (53%) surveyed in county Westmeath were classified as long term unmanaged, with just 2% 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.

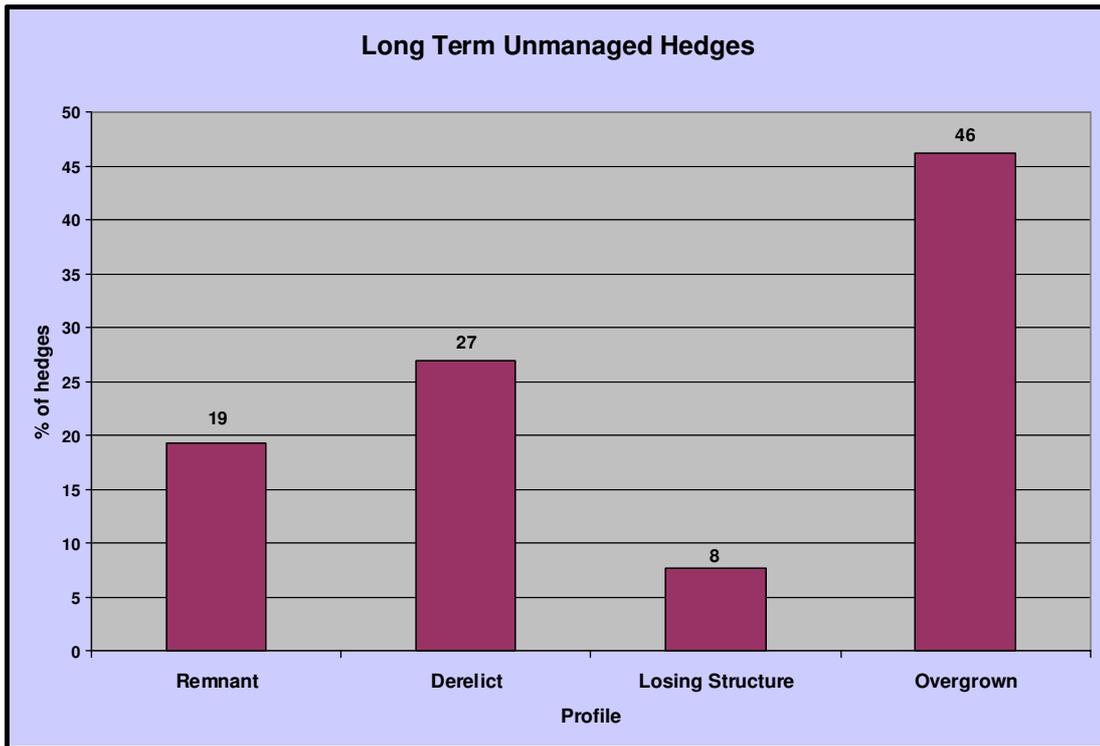


Figure 8.5.5 Proportion of long term unmanaged hedges in the different profile categories

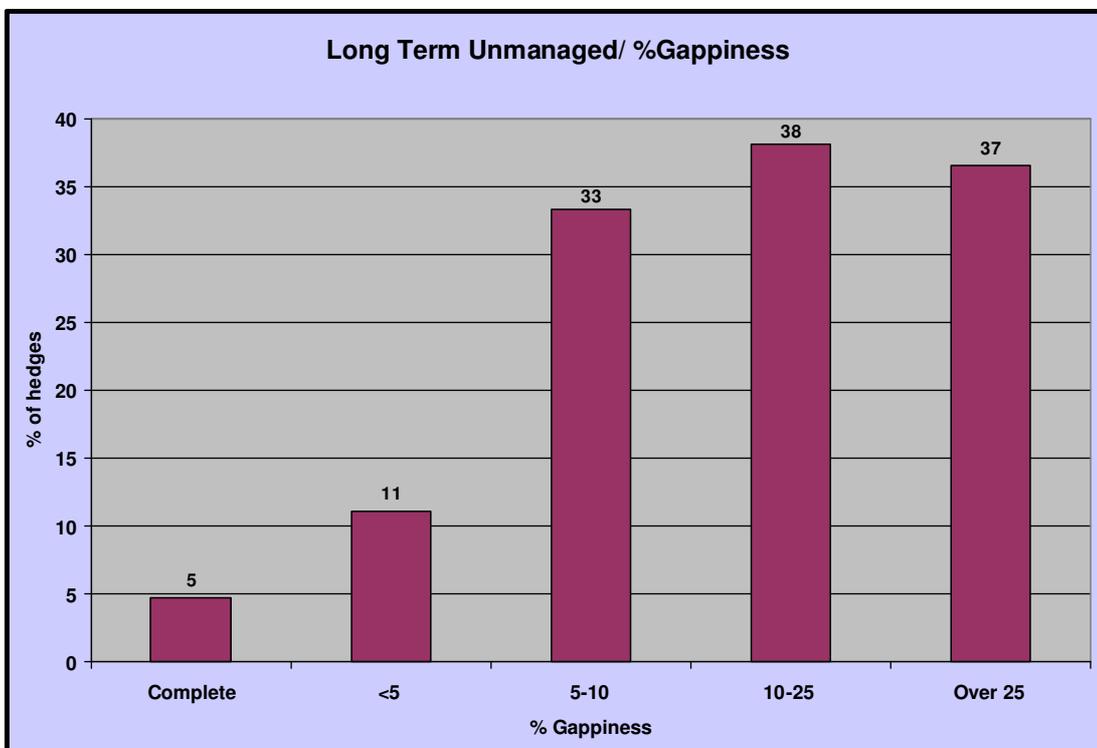


Figure 8.5.6 Proportion of long term unmanaged hedges in the different levels of gappiness categories

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

A quarter of hedges were classed as either remnant or derelict (46% of all long term unmanaged), and with a further 12% 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.

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 by a considerable margin responsible for almost three quarters of managed hedges. A breakdown of the trimming profiles for routinely managed hedges showed that only 1 hedge from the 42 sampled was trimmed to the profile recommended by the REPS and Teagasc.

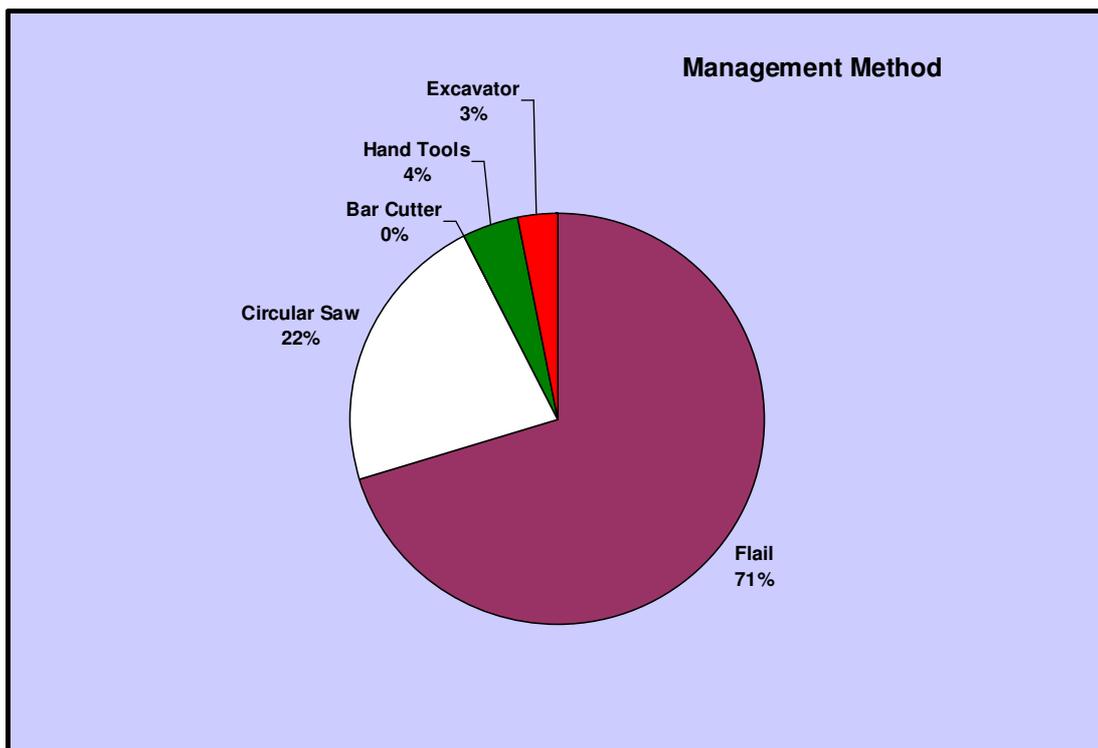


Figure 8.5.7 Proportion of managed hedges in the different management method categories

Hedge Rejuvenation

1.3% of hedges (2.8% of managed hedges) in Co. Westmeath showed evidence of having been layed, 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. 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. The fact that 24% of the hedges recorded showed evidence of laying in the past (compared with only 12% in Roscommon) indicates that the technique was widespread and traditional. 70% of the squares sampled contained at least one recorded example of a previously laid hedge.

Rejuvenation of hedges by laying should also reduce levels of gappiness.

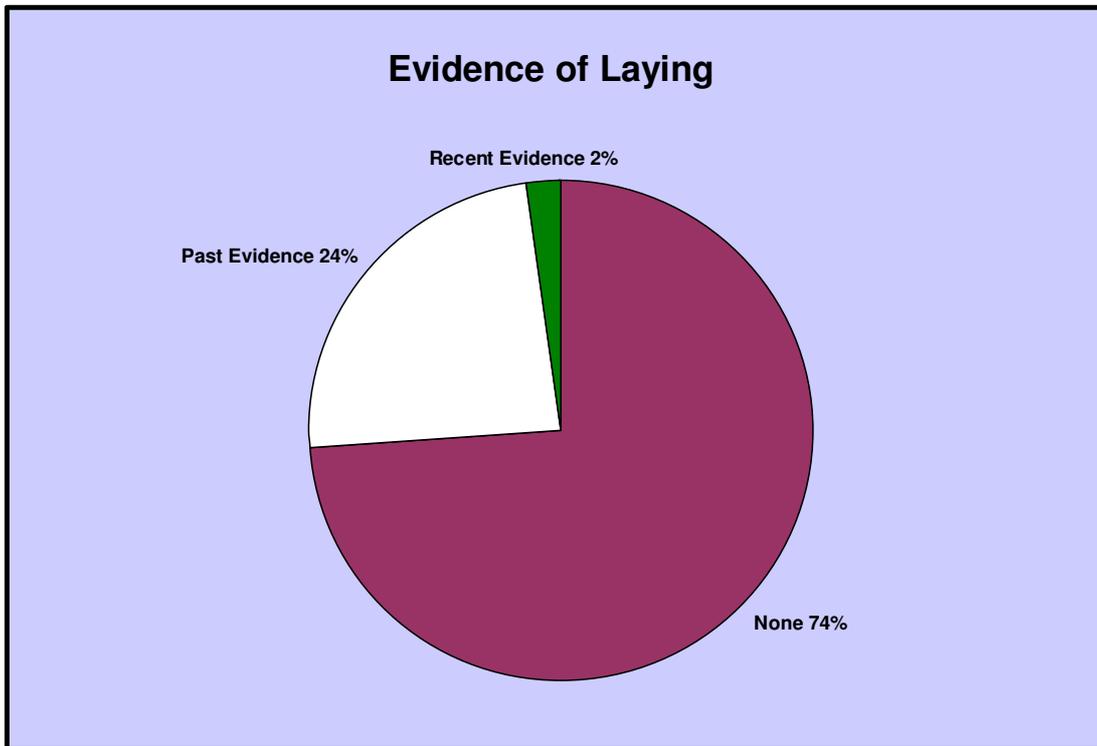


Figure 8.5.8 Proportion of hedges showing evidence of having been laid

8.6 The Quality of Hedgerows in County Westmeath

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 152 recorded hedges in Co. Westmeath, only 7 are classed as species rich and of these only 1 (14.3% of species rich hedges) passed the above criteria (0.07% of the total hedges sampled).

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.

One of the more notable characteristics of Westmeath’s hedges is the high number of short boxed hedges.



Species rich hedge in good structural condition

9.0 Discussion

Westmeath has an abundant network of hedgerows that are well distributed around the county. The estimated total length of hedges in County Westmeath is 10,481km, 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 a 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 in a study of hedges in Co. Kildare (Murray, 2001), and in Northern Ireland (Hegarty and Cooper, 1994).

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 fact that such a small proportion of hedges in the county can be classed as species rich under the present criteria indicates that the protection of species rich hedges should be a priority in order to maintain at least this proportion of species rich hedges. 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).

There is 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 Westmeath a total of 25% 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, though from farming, landscape, and wildlife perspectives the proportion of very low hedges in Westmeath could be reduced. 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 correlates with lower species richness (Murray, 2001), as do smaller and lower hedges.

These factors are important in determining the agricultural value of a hedge. Continuous hedges with a good basal structure do not 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, Corbit 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 42 routinely trimmed hedges recorded was trimmed to the recommended shape. The figure in Roscommon was 1 from 23 so this appears to be a widespread state of affairs. 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)

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 53% of hedges that are long term unmanaged only 8% have a dense base structure compared with an overall total of over 24% hedges with a dense base.

The top heavy/ undercut hedge profile appears to 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 (hawthorn) provenance is closely managed 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.

Crushing Hedges

The use of excavator machines to push over and crush down mature hedgerows is often referred to as “Hi-Mac”ing after the name of one of the main machinery manufacturers. 3% of managed hedges in Westmeath showed evidence of this type of management. The comparative figure in Roscommon is 24% and a comprehensive discussion on the use of this kind of machinery for hedge management is included in the Roscommon Report.

Changes to the Rural Environmental 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 24% of the hedges in County Westmeath 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 over 60% 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 to provide fuelwood. It would also have been utilized for tool handles.

Other Species

No other species is present in more than 14% 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 this 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.

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.

Ivy

Ivy was recorded as present in 72% of the hedgerows in Co. Westmeath. It is a plant that provokes polarised views from different quarters. Its value for wildlife as a food source, and as nesting or roosting site is unquestionable. However, it is the destructive potential of ivy that provokes controversy. It is generally acknowledged that ivy is not directly parasitic on its host, but the fact that ivy is frequently associated with trees that are in poor condition gives rise to two schools of thought.

One school suggests that ivy can dominate its host and cause it to lose vigour and even eventually kill it.

The other school suggests that ivy only dominates trees and shrubs that are already in poor condition and that ivy itself is not destructive.

The truth probably lies somewhere between the two, but considering that 21% of non-remnant hedges recorded had ivy dominant at a canopy level for over 25% of their length indicates that, whichever view is subscribed to, there is a problem. Either ivy is reducing the vigour of a significant proportion of over 20% of hedgerows in the county, or over 20% of the hedges in the county have trees that are in poor condition covering a significant proportion of their length.

Hedgerow Quality

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

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.



Fine example of a mature and diverse hedgerow

In assessing hedgerow quality it must be borne in mind that many hedgerows that 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.



Derelict hedge with potential for improvement

Air Pollution Act

Certain hedgerow management activities give rise to quantities of woody/bushy material (often referred to as bush or brash) which needs to be disposed of. Traditionally this would have been done by burning. Often piles of bush 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.

Anecdotal evidence suggests that a number of local authorities, including Co. Westmeath/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;

- Building into a pile and leaving to biodegrade
- Chipping or shredding
- Removal to land fill

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? If funds from outside the farming/agriculture sector are required who is prepared to pay and how much? As a country, can we afford to subsidise the management of all of our hedges to best practice standards. If not, do we spread resources (inadequately) in an extensive manner, or do we target resources towards 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 Westmeath County Council, and others to the different 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 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 utilise 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 value of a hedgerow or a network of hedgerows in any given environment is relative to its wider environmental context. A species rich hedgerow in good structural condition in an area well populated with similar hedges in an area dominated by semi-natural vegetation may be of lower relative importance in its setting than a less diverse hedge in poorer condition 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. Westmeath has declined from 10,500 in 1855 to 3437 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 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 hedgerow/s 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. Westmeath 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 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 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 (1st March – 31st August). Details to include are the date of cutting; machine operator; location; landowner; details of any Section 70 Notification; 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 subsidised 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 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 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.

Recommendation reference number

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 the 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 hedgerow resource, 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 finalised methodology for hedgerow surveys in Ireland should be agreed.

	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 Westmeath

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 Westmeath 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 REPS 3.
- 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 Westmeath 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 cyclical basis. This would be consistent with Ireland's commitments under the Kyoto Protocol.

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.

- 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.

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.

- 4.4** 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 Westmeath.
- 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 scheme.

	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 80% of Westmeath 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.

The Badgers and Habitats Survey

According to the results of the Survey, most badger sets 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.

Prunus domestica hybridization

The wild plum, *prunus domestica*, occurs in approximately 12% of the hedges surveyed and its distribution was widespread with examples in 12 of the 19 squares containing hedgerows. According to Webb, the wild plum is an introduced species. It has probably been present in Ireland since medieval times often being associated with monastic settlement. The wild plum is closely related to the native *prunus* species, *prunus spinosa*, blackthorn. Evidence from previous research suggests that where an introduced species is co generic with an existing native species the distinction between native and non-native in respect of capacity to support wildlife is less than when the introduced species is completely unrelated. There were a number of examples detected during the fieldwork that indicates that the wild plum may be hybridizing with blackthorn.

- 6.8** Research could be conducted to establish whether the wild plum (*prunus domestica*) is hybridizing with blackthorn (*prunus spinosa*).
- 6.9** 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

- 6.10** 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

- 6.11** 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.
- 6.12** 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

- 6.13** 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.

	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	6.13
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 Westmeath's hedgerows. The information gathered is extremely useful and valuable to a range of interests and stakeholders in the county.

The hedges of the two counties, Westmeath and Roscommon, have been sufficiently distinctive as to warrant the 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 Westmeath'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 Westmeath's finest assets.

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For office use only: Form return no.

Westmeath and Roscommon Hedgerow Surveys

CONSULTATION FEEDBACK FORM:

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?

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 County Westmeath web site at a later date.

2004 WESTMEATH & ROSCOMMON HEDGEROW SURVEYS		
Square Ref:	Survey duration:	Date:
Grid Ref:		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. 50-100					
c. 100-200m					
d. >200m					

Target Notes

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

2004 WESTMEATH & ROSCOMMON HEDGEROW SURVEYS						
Square ref:		Survey duration:		Date:		
Grid ref:				Surveyors:		
Situation	Structural	Assoc. Features	Management	Trees & Fruit		
A History 10 infill 11 infill + roadside 12 infill + stream 20 t'land boundary 21 t'land + road 22 t'land + stream 30 parish boundary B. ADJACENT LAND USE 1 arable 2 improved grassland 3 semi-nat grassland 4 neglect/fallow 5 semi-nat. veg 6 plantation forest 7 woodland/scrub 8 curtilage 9 amenity <i>(double nos to cover both sides)</i> C LINKS WITH OTHER HABITATS A none B plantation forest C water (stream pond, etc) D semi-nat veg E woodland / scrub D OUTLINE 1 linear / regular 2 non-linear/irreg	E BOUNDARY TYPE 10 single line hedge 20 double line hedge 11 single line hedge with wall 21 double line hedge with wall 01 (*stone wall with hedge shrubs) 02 (*bare earthbank) 03 (*vegetated bank) 04 green lane 05 (*woodland strip) 06(*Shelterbelt) 07 (*woodland /forest edge) 08 (*drain) 09(*fence line + shrubs) <i>(where * /) do not continue recordings</i> F PROFILE 1 remnant 2 relict 3 losing structure 4 boxed / A shape 5 overgrown + outgrowth at base 7 top heavy / undercut 8 straight sided	G Height A <1.5m B 1.5-2.5m C 2.5-4m D >4m H Width 1 <1m 2 1-2 m 3 2-3m 4 3m+ I GAPPINESS A complete B <5% gaps C 5-10% gaps D 10-25% E 25-50% F >50% J BASE 1 open 2 open + veg 3 scrawny + veg 4 dense 5 very dense K FENCING 01 none 02 fixed to stems 03 electric 04 post & wire 05 sheep wire 06 horse fence <i>(double nos if needed, principal category first)</i>	L LITTER 1 not evident 2 litter 3 lawn cuttings 4 rubbish M DRAIN SIZE A not present B small (<0.5m) C med (0.5 – 1m) D large (>1m) N BANK / WALL SIZE 1 <0.5M 2 0.5-1M 3 >1M 4 not applicable O BANK/WALL DEGRADATION A severely eroded B eroded in parts C bank intact D not applicable P VERGE <i>(roadside hedges and tillage only)</i> 1 <1m 2 1-2m 3 2-4m 4 4m+ 5 none	Q MANAGEMENT A cut box profile B cut 'A' shape C cut on one side D cut on both sides E topped only F hi-mac'd G fully laid H laid in part I coppiced J short term unmanaged K long term unmanaged R MANAGEMENT METHOD 1 flail 2 circular saw 3 bar cutter 4 hand tools 5 hi-mac 6 other 7 unsure 8 not applicable S EVIDENCE OF LAYING A no evidence B past evidence C recent evidence T FUNCTION 1 hedge redundant 2 active boundary	U TREES A none B few C scattered D abundant E line V TREE AGE COMPOSITION 1 all mature 2 young trees present 3 no trees W FRUITING A none B sparse flowers and fruit C average D heavy X OVEALL VIGOUR 1 poor 2 average 3 good	

	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:

HEDGE no.			
STRIP 1		STRIP 2	
Species Code	Domin Value	Species Code	Domin Value
Strip Total		Hedge Total	

HEDGE no.			
STRIP 1		STRIP 2	
Species Code	Domin Value	Species Code	Domin Value
Strip Total		Hedge Total	

HEDGE no.			
STRIP 1		STRIP 2	
Species Code	Domin Value	Species Code	Domin Value
Strip Total		Hedge Total	

HEDGE no.			
STRIP 1		STRIP 2	
Species Code	Domin Value	Species Code	Domin Value
Strip Total		Hedge Total	

Appendix C Sample Ordnance Survey Map

Appendix D

Sample Aerial Photograph