

COUNTY KILDARE HEDGEROW SURVEY REPORT

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Contrasting hedge types near Clane

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1.0 SUMMARY

County Kildare's hedgerow network is a huge asset to the county, being valuable in terms of agriculture, landscape, wild flora and fauna, water quality, carbon sequestration and employment. Before this survey was carried out relatively little detailed information was known about the resource.

In the summer of 2006 field recording of hedgerows was carried out using a standard methodology in 18 sample 1 km squares distributed evenly around the county, covering approximately 1% of its total area. The focus of the survey was to record information on the extent, species composition, structure, condition and management of hedgerows.

Results from the County Kildare survey were compared with those from similar hedgerow surveys conducted in County Longford in 2006, County Laois, County Offaly and East Galway in 2005, and Counties Roscommon and Westmeath during 2004.

Based on the results from the sample, the total length of hedgerow in County Kildare was estimated at 10305km, and the average figure for hedgerow density as 5.92 kilometres per square kilometre (km/km²).

There is a wide contrast in the structure and composition of hedgerows around the County, from the precisely managed hedges on stud farms and tightly managed tillage hedges to the less formal hedges on the less intensively managed lands further to the west.

A very wide range of shrub and tree species were found in County Kildare's hedges. A total of 45 shrub and tree species, including 20 native species, were recorded in the sampled hedges. Whitethorn is the most frequently occurring shrub species found in 93% of hedges, with Ash the most common tree species, occurring in 58% of hedges in tree form. Most hedges have young trees.

Approximately 19% of hedges recorded were classed as 'species rich', with the majority of these found in the north of the county.

County Kildare's hedgerows show a higher degree of fragmentation than those of other counties, largely due to the high degree of development in rural areas. This information, coupled with the fact that two thirds of hedges adjoin intensively managed farmland, means that there are implications for the overall biodiversity potential of the resource.

Most hedges are of a standard construction with a single line of shrubs planted on the side of a hedge bank often with an associated drain. Stone walls are not a common feature of Kildare hedges. Over 80% of hedges are part of boundaries that have been in existence since at least the time of the first Ordnance Survey in 1837-8. This does not guarantee that the hedges themselves are of the same age. Some degree of field rationalisation has occurred since the second edition of the Ordnance Survey in 1912-13, but it is not possible to quantify hedgerow loss as there is no compatible benchmark to base the current results. 15% of hedges would now be classed as redundant boundaries in terms of the field division on farms.

County Kildare's hedges compare favourably with those in other counties in terms of the structural characteristics of height, basal density, and extent of gaps. These qualities influence the agricultural and wildlife value of hedgerows. 65% of hedges showed evidence of some degree of management in the recent past.

23% of hedges met a series of 'favourable condition' criteria linked to structure and species composition. When species rich hedges alone were considered 41% met the criteria. Most of the assessed characteristics can be influenced by appropriate management.

Over half of the hedges had wire fixed to hedgerow stems and trees which is a negative feature that has implications for safety and hedgerow health.

Overall County Kildare has a varied, distinct, and interesting hedgerow resource, but appropriate efforts must be made by various bodies (and individuals) if the resource is to be improved and sustained into the future.

Recommendations have been made based on the Hedgerow Survey results, considered in the light of current best conservation practice. The relevance of the recommendations to each of the stakeholder groups, such as Kildare County Council, farmers and landowners, the various state bodies, research institutions and Teagasc, have been tabulated for easy reference.

Key Recommendations for Kildare County Council

Prioritisation of actions is important. The key recommendations (see section 9.0) most relevant to Kildare County Council have been listed below for easy reference.

| No. | Recommendation |
|------------|-----------------------|
|------------|-----------------------|

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|------|---|
| 1.11 | As part of the County Kildare Biodiversity Action Plan, Kildare County Council should draw up a 'Hedgerow Conservation Policy' document. |
| 1.12 | In the planning process, greater consideration should be paid to individual hedgerows in light of their particular qualities and characteristics. The concept of "Heritage Hedgerow" should be introduced for hedgerows which have notable historical, structural, or species composition characteristics. |
| 1.13 | Guidelines should be produced for planners and road engineers dealing with hedgerows in planning applications. |
| 1.16 | A study should be initiated to investigate the impact of development control in relation to hedgerows and to determine degrees of compliance with hedgerow related planning conditions by landowners. |
| 1.21 | All of the relevant stakeholders (including Kildare County Council) should commit to eliminating the cutting of hedges during the period indicated in the Wildlife Amendment Act (2001) (1 st March to 31 st August) except where absolutely necessary for safety reasons. They should also commit to implement forward planning in order to minimise the necessity for cutting for safety reasons. |
| 1.25 | After consultation with relevant stakeholders, all Local Authorities jointly should set consistent standards for the interpretation and implementation of the section of the Air Pollution Act (and any other legislation) relevant to disposal of hedgerow waste. This interpretation should be communicated to farmers, landowners and contractors. Kildare County Council should take the lead in this process. |
| 2.01 | As a base line, in order to achieve management objectives, stakeholders (including Kildare County Council) should commit to ensuring hedgerow management works carried out under their responsibility should conform to recognised, basic minimum standards. |

- 3.01 A study should be conducted of nursery suppliers and garden centres to determine the availability of native planting stock (including provenance) for the range of hedgerow tree and shrub species recorded in the County Kildare Hedgerow Survey. This information should be disseminated to interested parties.
- 4.01 Ensure all relevant staff (and any contractors used) have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation.
- 4.02 Provide appropriate training for staff in aspects of hedgerow conservation relevant to their position.
- 4.03 A number of showcase sites of best practice covering different aspects of conservation and management should be developed around County Kildare.
- 4.05 A pictorial information leaflet should be produced to show all of the species native to County Kildare Hedgerows. This should be distributed to Teagasc offices, hedge-cutting contractors, marts, creameries, garden centres, etc.

2.0 INTRODUCTION

Hedgerows are a valuable multi- functional resource in our countryside, benefiting agriculture, wildlife, the environment, tourism and the general community. However there is only limited and localised data on the current extent, nature, variation and condition of Irish hedgerows.

For the purposes of this survey hedgerows are defined as

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

This sample study examines the extent, species composition, structure, condition and management of hedgerows in County Kildare.

This information can then be used to further the objectives of the County Kildare Heritage Plan 2005 which contains a number of actions, directly or indirectly, interrelated to hedgerow conservation.

Objective 1: To Facilitate the Collection and Dissemination of Heritage Information

- 1.19 Conduct a survey of hedgerows in the County to include extent, composition, condition, management and historical aspects.

Objective 2: To Raise Public Awareness, Understanding and Appreciation of County Kildare’s Heritage

- 2.28 Promote the awareness and conservation of Heritage on farms.

Objective 3: To Promote Best practice in Heritage Conservation and Management

- 3.1.1 Develop an education programme for local authority staff and councillors on all aspects of Kildare’s built, natural and archaeological Heritage.
- 3.10 Produce policy papers and “best practice guidelines” on the following topics:
The siting and landscaping of new developments.
Biodiversity and road design (considering the NRA guidelines).
Biodiversity considerations in site development and site management.
- 3.11 Produce guidelines for the incorporation of biodiversity considerations into local authority activities.
- 3.14 Provide training, advice and best practice guidelines for Tidy Towns Associations and community groups in relation to wildlife and built heritage.
- 3.15 Promote the correct management of hedgerows and roadside verges. Provide training for landowner, contractors and local authority staff.

Objective 4: To Inform policy and Provide Advice to Kildare Local Authorities

- 4.7 Conduct heritage appraisals of all County, Town and Local Area Plans to ensure that all aspect of Heritage, as defined by the Heritage Act 1995, are considered.
Include information generated by local surveys and inventories in town and local plans.

4.10 Prepare a bio-diversity plan for the county (in accordance with the National Biodiversity Plan).

3.0 BACKGROUND

3.1 THE HISTORY OF HEDGEROWS IN COUNTY KILDARE

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

It was the Normans who introduced the concept of land ownership. As they spread throughout Ireland during the thirteenth century, they introduced the Feudal System, whereby 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 (mid 14th to end of 15th centuries) townlands had become the fundamental unit of land tenure. They were bounded by banks or 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.

An Act of Parliament held at Drogheda in 1488 defined the area know as the Pale. It divided the counties of Dublin, Meath, Kildare and Uriel (Louth) from the rest of the country. In 1494 a further Act was passed for the construction and maintenance of a great double ditch or rampart, around the whole district. This boundary became known as the Pale Ditch and some portions of it still exist around Clongowes Wood College and dividing the parishes of Clane and Kilcock (Denis Murphy, Devitt)



Part of the old Pale Ditch between Clane and Kilcock

The estate system emerged in the seventeenth century, resulting in major agrarian landscape change and the associated establishment of fields in the more prosperous agricultural regions of Ireland including Kildare (Aalen et al. 1997).

In 1721 the Irish Parliament passed an Act *“to oblige proprietors and tenants of neighbouring lands to make fences between their several lands and holdings ... at equal expense in making between such several lands and holdings good and sufficient ditches of six foot wide and five foot deep at least, where the same is practicable, well and sufficiently quicked in good husbandlike manner with white thorn, crab and other quicksets, where the same will grow, and, in ground where such quicksets will not grow, with furze”*.

The term ‘quick’ or ‘quickset’ refers to young hedging plants, usually whitethorn (hawthorn).

The main period of land enclosure in Ireland was during the period 1740-1830. Agricultural improvement through land rotation programmes necessitated protection of crops by restricting the movement of livestock to particular fields. It was during this period that the familiar patchwork landscape of hedged fields largely came into being.

Interestingly, hedgerows also played a part in warfare. Corrigan (website) relates that, in the 1798 rebellion, during an engagement near to Ovidstown;

“William Aylmer and John Doorly quickly arranged their army of around 4,000 men, at the foot of Wiley’s Hill. Some of the rebels lined the hedges on both sides of the road and fired on Irwin’s advance guard.”

“Aylmer ordered his pikemen to attack the cannon positions, but they sought refuge behind a quick-set hedge. The cannon was turned upon them and the grape-shot, according to Doorly, cut the quick-set hedge “as if lopped off by a clipping shears.”

Current townland boundaries were regularised by the first Ordnance Survey carried out in Kildare in 1837-8; although there is evidence to suggest that some current townland boundaries may exist as a result of relatively recent revisions and realignments and that some older boundaries that may have once formed part of townland boundaries in the past are no longer so (Murray 2001).

In 1801 Rawson produced his Statistical Survey of County Kildare. Numerous references are made to the condition and management of ‘inclosures’.

Samuel Lewis in his Topographical Dictionary (1837), noted

“The districts around the towns of Kildare, Naas, Kill, and Clane are also fertile, well fenced, and tolerably well cultivated”.

With reference to Rawson’s earlier study, he notes *“The fences generally are tolerably good, but they everywhere occupy too much ground; the usual kind is a bank of earth thrown up from a wide ditch, and covering five or six feet of surface, so that the bank and ditch seldom occupy less than nine feet in width: in the breast of this bank, about halfway up, a single row of quicksets is placed, sometimes accompanied by seedlings of forest timber.”*

The size and shape of some enclosures is also commented on,

“In the smaller farms a very disadvantageous custom is prevalent of dividing the land into long narrow enclosures, which occasions an unnecessary and therefore injurious extent of fence in proportion to the land included.”

The Grand Juries, forerunners to the County Councils, were responsible for many road building programmes in the late eighteenth and early nineteenth centuries. A measure of funding was often provided for the provision of roadside hedges. Other hedgerows in the county may owe their origin to other transport routes. The development of the Grand Canal between 1753 and 1830, and the building of Railways (1847-1860s), would also have involved the planting of many miles of hedgerow.

Anecdotal evidence from landowners spoken to during the survey suggests that during the Second World War (*'the emergency'*) men would travel the countryside cutting (coppicing) hedges and hedgerow trees. They were paid for their labours by taking the cut timber from the hedge to sell for firewood.

Intensification of farming and the development of larger machinery resulted in hedgerow removal on many farms particularly during the 1960s and '70s. The absence of any comparable survey data means that it is not possible to quantify the extent of the loss, but a comparison of the current status with field boundary patterns from the second edition Ordnance Survey maps from the early part of the twentieth century would suggest that hedgerow loss is a fraction of what occurred in Britain during a similar period.

In the early 1990s increased emphasis on environmental conservation in connection with agriculture (largely driven by the EU) resulted in the Department of Agriculture and Food introducing the Rural Environmental Protection Scheme (REPS).

The objectives of the REPS are:

- To establish farming practices and production methods that reflect the increasing concern for conservation, landscape protection and wider environmental problems.
- To protect wildlife habitats and endangered species of flora and fauna.
- To produce quality food in an extensive and environmentally friendly manner.

Hedgerow conservation is an intrinsic component of the scheme. The design and operation of this scheme will set the tone for hedgerow conservation in Ireland for the foreseeable future.

3.2 THE VALUE OF HEDGEROWS FOR COUNTY KILDARE

Based on the results of the Badger and Habitats Survey of Ireland (Smal, 1995) the hedgerow/tree row network in Ireland was estimated to be approximately 382,000 km. The estimated figure for County Kildare was 9,809km (2.6% of the national total). This is a huge asset to the county and the country.

Landscape

Perhaps more than any other landscape element, the patchwork of fields and hedgerows, along with stonewalls, endow the countryside with a distinctive and attractive appearance. The flowering and fruiting of hedgerow shrubs give a colour and fragrance to the summer countryside that is unique. In particular, regional and local variations in hedgerows give character to a townland or county and lead to a sense of place. They frame the passage through much of the countryside by lining the roads and in certain areas give the impression of a wooded landscape.

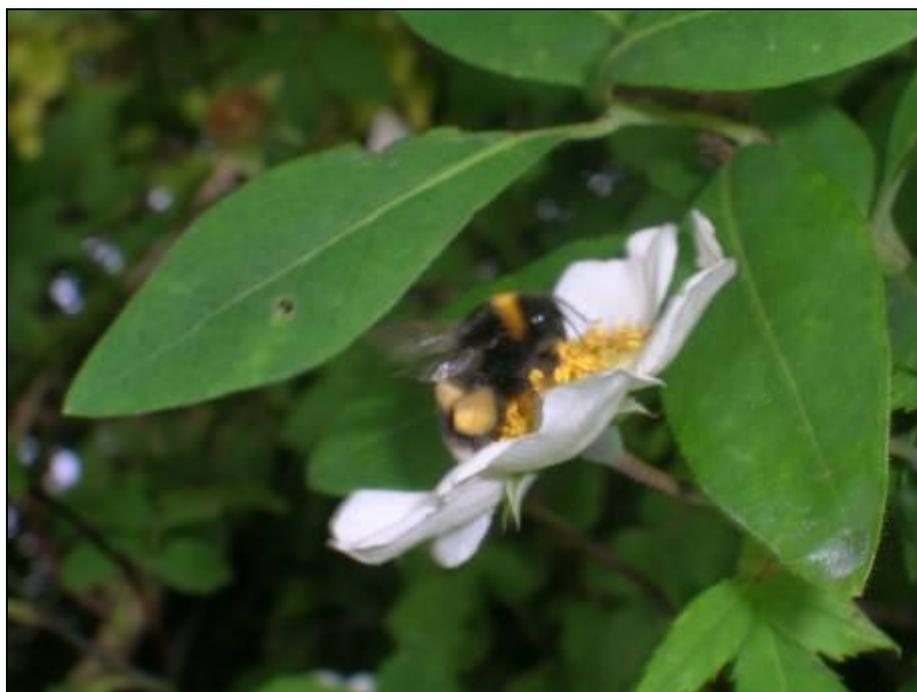
Agriculture

Although the hedgerow network is largely a result of 18th and 19th century farming methods, hedges still have many benefits for the modern farmer. Apart from their basic function as cheap (Meyen, 1997) 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 and they can prevent animals from neighbouring farms coming in

direct nose to nose contact. Good hedgerows reduce wind speeds and thus protect against soil erosion.

Flora and Fauna

Hedgerows are an essential wildlife habitat in the modern countryside, especially in the light of the low percentage native woodland cover in County Kildare (and Ireland as a whole). Hedgerows may be 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.



Bee on wild rose flower (note pollen sacs) - Moone

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 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 are common. The quality of any particular hedge, in terms of its height, width, density, and general structure and condition (especially the amount and size of gaps), determines the extent to which it will act as a corridor for species movement and dispersal. However, even a relatively poor hedge may be important in an otherwise very intensive agricultural landscape.

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.

Carbon Sequestration

Estimating an average hedgerow width of two metres, hedgerows cover an approximate area of 764 square km of the country and play a role in meeting Ireland's obligations under the Kyoto Protocol (see section 4.3).

Employment

A number of people derive at least part of their income directly or indirectly from the management of hedges. No estimate has been made of the economic impact of the management of the hedgerow resource in Ireland.

A Material Resource

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

4.0 SURVEY RATIONALE AND OBJECTIVES

4.1 THE NEED FOR A HEDGEROW SURVEY IN COUNTY KILDARE

As will be seen from section 4.3, hedgerow conservation in Ireland is embraced through legislation, policy and incentive. Any attempts to promote hedgerow conservation need to be based on an accurate and meaningful assessment of the current resource. There have been a number of studies on aspects of Kildare's Hedgerows (e.g. Murray 2001), but until now there has been no systematic record made of the extent, species composition, structure, condition and management of the hedgerows of County Kildare.

The *Badger and Habitats Survey of Ireland* (Smal, 1985) produced statistics for hedgerow length based on the same sample as this survey (see section 5.2 for sampling details). However, the definition of what constitutes a hedge is different in both surveys. The estimated length of the hedgerow network in County Kildare based on Smal's survey was 9809km. Assuming an average hedgerow width of 2m; this would represent an area of over 19 km², which is approximately 1.2% of the area of the county. This is clearly a substantial cultural, agricultural, and environmental resource which deserves to be better understood.

There probably has never been a more appropriate time for a survey of this nature given the growing emphasis on ensuring environmental welfare, especially as part of agricultural programmes, in addition to increasing development pressure from housing, transport infrastructure and industrial development.

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

- It gives a snapshot of the quantity and character of the hedgerows in the county. This information serves as a benchmark for future surveys.
- Repeat surveys will provide a useful tool in monitoring environmental change.
- It is possible to identify current and potential future threats facing the resource by assessing the results in light of current conservation best practice.
- The survey identifies plant life local to the county.
- Comparisons can be drawn between hedgerows under different management regimes.
- Detailed information collated as part of the *County Kildare Hedgerow Survey* can complement data collated from other habitat related studies, e.g. *The Badger and Habitats Survey of Ireland* (Smal 1985); *The Countryside Bird Survey* (Birdwatch Ireland, ongoing study).

- The *County Kildare Hedgerow Survey* can be placed in its national context when viewed alongside other surveys based on the same methodology.
- Provides valuable baseline data which will be essential in planning and implementing a future Biodiversity Action Plan for County Kildare.

The survey results and conclusions will also provide a useful tool for decision makers, advisory bodies and educational institutions including;

- Local Authority planners
- National Roads Authority
- Road Engineers
- Landscape Planners
- Environmental Consultants, particularly in drawing up Environmental Impact Statements
- Department of Agriculture and Food
- Teagasc
- Farmers, land owners and estate managers
- Foresters
- Schools, Colleges, and Universities
- State Bodies – National Parks and Wildlife Service, CIE, Waterways Ireland

4.2 THE AIMS AND OBJECTIVES OF THE COUNTY KILDARE HEDGEROW SURVEY

1. To estimate the extent of hedgerows in County Kildare based on extrapolating data from a known sample area.
2. To establish the species composition of the county's hedges.
3. To examine the general environmental and historical context of hedgerows in County Kildare.
4. To record the general construction types of hedgerows in the county.
5. To record the structure and condition of hedgerows in the county based on a sample study.
6. To assess the data collected and produce recommendations that will promote the future conservation of the resource.

4.3 LEGISLATION AND POLICY

Various Legislative Acts, Directives, and Guidelines (International, European, and National) reflect the importance of the hedgerow resource and its management. These are listed below with a summary given for those having the most direct relevance.

International

- The Kyoto Protocol (1997)
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.

European Union

- (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.
- (EC) Council Regulations
 - 2078/1992 (Agri-Environmental Schemes)
The Rural Environmental Protection Scheme (REPS) operates under this European Regulation. Specifications set down the conditions by which participant farmers in the Scheme must manage their hedgerows.
 - 1257/1999 (Good Farming Practice)
 - (EU) 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.

National

- The Wildlife Act, (1976), as amended by the 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.
- The Roads Act, (1993)
Owners or occupiers of land are obliged to take all reasonable steps to ensure that any roadside hedge is
“*not a hazard or potential hazard to persons using a public road and that it does not obstruct or interfere with the safe use of a public road or the maintenance of a public road*”.
Also, under this Act, a road authority must prepare an Environmental Impact Statement (EIS) for motorways and dual carriageways over 8kms in rural areas.
- Planning and Development Act, (2000)
There is scope within this legislation for Local Authorities to give some measure of protection to hedgerows in specific circumstances. They can designate Special Amenity Area Orders (SAAO's) within which certain activities can be controlled. Once SAAO's are confirmed, Conservation Orders can be put in place. SAAO's are very seldom invoked, with

only three designations (all in the Dublin region) as of April 2005 (Crangle, 2005). No Conservation Orders have been designated (Birdwatch Ireland, 2005).

Local Authorities can also make Tree Preservation Orders (TPO's), but currently there are no TPO's designated in respect of hedgerows (Hickie, 2004).

- 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 which states:

"Field boundaries, mainly hedgerows, are a particularly prominent feature of the Irish countryside and provide important habitats for a variety of species. Hedgerows have suffered significant losses. Current legal controls for their protection are limited. For the future, the overall goal should be to have no net loss of the hedgerow resource."

Action 10 states, under *"Integrating Biodiversity into Sectors"*,

"Each Local Authority to prepare a Local Biodiversity Plan in consultation with relevant stakeholders."

- National Heritage Plan (2002)

The National Heritage Plan recognises hedgerows as prominent and important features in terms of their ecological, archaeological and landscape values. Action 32 (Heritage in the Countryside) ensures the

"protection and enhancement of hedgerows as a natural and archaeological heritage resource through the use of regulatory, educational and financial measures, as appropriate."

- Electricity Supply Act, (1927)

Article 98 of the above Acts permits any *"authorised operator"* to *"lop or cut any tree, shrub or hedge which obstructs or interferes"* with electric wires.

- Communications Regulations Act, (2002)

Article 58 of the above Acts permit any *"authorised operator"* to *"lop or cut any tree, shrub or hedge which obstructs or interferes"* with the physical infrastructure of the network.

- The Forestry Act, (1946)

- Sustainable Rural Housing Guidelines (2005)

5.0 METHODOLOGY AND FIELD SURVEY

The initial methodology developed for county wide hedgerow surveys in Ireland was produced by Murray (2003). This methodology was refined in 2004 by Foulkes and Murray in the course of hedgerow surveys carried out in Counties Westmeath and Roscommon (Foulkes and Murray, 2005b, 2005c). The initial methodology and any adaptations made during the field surveys were thoroughly reviewed and a new paper, *"A Methodology for the recording of hedgerow extent, species composition, structure, and condition in Ireland"* (Foulkes and Murray, 2005) was produced in the spring of 2005. The *County Kildare Hedgerow Survey* was carried out to the methodology described in this paper.

5.1 DEFINING HEDGES

For the purpose of this survey hedges are defined as

"Linear strips of woody plants with a shrubby growth form that cover more than 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 previous definitions made by Cooper & McCann (1997), Fossitt (2000), and Murray (2003).

The terms ‘*hedge*’ and ‘*hedgerow*’ are used inter-changeably throughout this report.

In accordance with the Methodology, garden hedges and those bordering curtilage (BL3 as fully defined by Fossitt, 2000) have not been recorded unless they also border agricultural land.

5.2 SELECTING THE SAMPLE

The south-western (or “bottom left hand”) 1 km square of each of the Ordnance Survey ten kilometre National Grid squares of the country was chosen for the Hedgerow Survey, in accordance with the sampling procedure used for the *Badger and Habitats Survey of Ireland* (Smal, 1995) and subsequently the *Countryside Bird Survey* (Birdwatch Ireland, ongoing study). This placement gives the potential for some joint assessment of these data sets in the future.

Samples areas are 1 km square, with the exception of four part squares which fall on the county boundary (in which case only the area in County Kildare was surveyed). A total of 18 samples (14 full squares and four part squares) were selected in this way. The sample area is approximately 1% of the total area of the County. The Ordnance Survey National Grid references and townland details for each survey square in County Kildare are listed in Appendix 12.1.

Within each sample square a maximum of 10 hedges were selected for detailed study using randomly generated points on a transparent overlay. The points on the overlay were selected at random using a random number generator and an appropriately scaled, numbered grid marked by subdividing the square, and then matching the randomly chosen numbers with points on this grid. The overlay was then placed on top of the relevant aerial photograph of each square, and the hedge nearest to each point on the overlay was chosen for detailed investigation. If there was no hedge within a fixed radius (equating to approximately 175m) of the randomly selected point, the number of sampled hedges was reduced by one. 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 photograph was discovered on the ground 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, provided that it fell within the specified radius of the random point.

Each hedge chosen for detailed investigation by the random selection process was clearly marked and labelled with a number on a copy of the relevant vector map (see Appendix 12.3), with beginning and end points also marked. A length of hedge was generally 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 of a hedge changed suddenly and conspicuously along its length, or where a clear and obvious difference in the origin of the hedge was apparent, but where no junction was evident. This was normally a result of boundary removal, where the two portions of a linear hedge once bounded separate fields.

5.3 MAPS AND AERIAL PHOTOGRAPHS

The Ordnance Survey Discovery Series maps (scale 1: 50,000) were used to physically locate the sample squares. Vector maps (regularly updated), aerial photographs (photographed in 2000), and second edition six inch Ordnance Survey maps from the early 1900s, all at a scale of 1:5000 with the 1km square outline overlaid were supplied by the GIS technician in the Planning Department of Kildare County Council. The vector maps were used to identify features in the field and to record hedgerow extent. Aerial photographs enabled the square to be assessed in terms of its general character and the presence of hedges. This made the identification of the randomly selected hedge samples more efficient and aided orientation and navigation within and around the square. The second edition six inch Ordnance Survey maps were used primarily for the identification of

townland boundaries. The first edition six inch Ordnance Survey maps were sourced through the Local Studies section of Library Head Quarters in Kildare County Council.

5.4 PERIOD OF FIELDWORK

Fieldwork commenced on 24th May 2006 and was concluded by 5th July 2006.

5.5 ACCESS AND PERMISSION

The Irish Farmers Association (IFA), Teagasc and the Irish Thoroughbred Breeders Association (ITBA) were informed of the survey by the Kildare Heritage Office and the support of their members/ clients was requested. A meeting was held with the IFA where it was agreed that there would be no entry onto private land without the consent of the landowner. The IFA provided contact information for a number of landowners in the area of the sample squares and this proved a very useful starting point for determining land ownership. A reconnaissance of each sample square was made in order to finalise the ownership of the various parcels of land and seek permission from landowners. This was done either early in the morning or the evening before the intended field survey. The Kildare Heritage Office provided photographic identity cards for the fieldworkers and a covering letter explaining the purpose of the survey and requesting the co-operation of landowners. Where requested, permission was granted with one exception. In a number of cases landowners provided useful background information on their areas. The co-operation and assistance of landowners is much appreciated.

Full public liability insurance cover was in effect for the field work

5.6 STRUCTURAL RECORDINGS OF HEDGES

For each hedge selected (a maximum of 10 hedges per sample square, as described above), two end points were marked on the map. End points were generally identified as field corners or by junctions with other hedges or boundary features (i.e. one side of a field) or gaps greater than 20m. Each selected hedge was subjected to a detailed investigation along its whole length.

A '*Field Survey Sheet*', developed in previous hedgerow surveys, was used to record the characteristics of each hedge and its associated features (see Appendix 12.5)

Recordings were made in 25 categories, grouped under the following headings: context, construction, structure/condition, and management. Each category field has a corresponding code that is entered into the appropriate box on the data recording grid.

Context

Each hedge is placed in its '*context*': noting the type of farm on which it is located, and the wider physical environment, in terms of adjacent land use and links with other habitats. The data recorded is consistent with The Heritage Councils habitat classification '*A Guide to Habitats in Ireland*' (Fossitt, 2000). Any potential indicators of hedgerow antiquity are also noted.

Construction

The basic '*construction*' of the hedge relates to the linearity of the woody shrubs (single or double line) and the presence or absence of features such as drains, banks, walls or shelves (a '*shelf*' is where there is a difference between the land height on either side of the hedge).

Structure/Condition

The '*structure*' relates to the physical dimensions of the hedge (height, width, cross section, percentage of gaps, etc.), including any degradation to the basic construction. Condition is gauged by an assessment of the vigour of the hedgerow shrubs, degree of fruiting and a record of the quantity and age profile of hedgerow trees.

Management

'Management' covers the type and method of hedgerow management, past and present. The nature of any fencing is also recorded.

5.7 FLORISTIC RECORDINGS OF HEDGES

For each hedge examined, two 30m strips were paced out and marked from two randomly chosen points along the sample's length. Based on hedgerow survey work in Britain (Bickmore, 2002), a 30m strip is generally accepted as an adequately representative sample size for recording woody species in a hedge. By recording woody species along a standardised length, statistical comparison of hedges of different lengths is made possible. Irish hedges tend to show high degrees of variation in species composition from one end of a hedge to the other. For this reason, two 30m strips were recorded for each sample hedge in this survey. The increased sampling intensity for each hedge gives a more accurate picture of the overall species composition of each hedge.

A 'Floristic Recording Sheet' was used to record these data. On this, each woody shrub species present within the length of each strip was allocated an appropriate Domin Scale value. The Domin Scale is used to record the percentage cover of each woody shrub species detected (see Appendix 12.6).

The presence of other species within the hedge but which did not fall within either sample strip was recorded separately.

The presence of Ivy (*Hedera helix*) at canopy level was recorded according to the Domin scale. The extent of cover (or absence) of the following species was also noted in accordance with the DAFOR scale (see Appendix 12.7).

| Common Name | Latin Name |
|--------------|--|
| Brambles | <i>Rubus fruticosus</i> agg. |
| Wild Rose | <i>Rosa</i> spp |
| Honeysuckle | <i>Lonicera periclymenum</i> |
| Clematis | <i>Clematis vitalba</i> |
| Bindweed | <i>Calystegia sepium</i> , <i>Convolvulus arvensis</i> |
| Blackcurrant | <i>Ribes nigrum</i> |
| Gooseberry | <i>Ribes uva-crispa</i> |
| Bilberry | <i>Vaccinium myrtillus</i> |
| Raspberry | <i>Rubus idaeus</i> |

Tree species present along the whole length of the hedge were noted and the dominant tree species, where applicable, was noted.

5.8 RECORDING THE EXTENT OF HEDGEROWS IN SAMPLE SQUARES

For the purposes of this survey the extent of hedgerows within a sample square were recorded by visual inspection of all linear features apparent on the relevant aerial photograph or vector map. The presence of hedgerows was marked with a solid red line on a black and white photocopy of the vector map. Remnant hedgerows were recorded with a broken red line. Remnant hedges are those where the shrubs have reverted to their (often aged) tree form with extensive gaps. Any other linear feature that was apparent on the aerial photograph/vector 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 within hedges a green line was used to mark the gap section. This was practiced to minimize the over estimation of hedgerow length due to the inclusion of significant gaps.

5.9 TARGET NOTES

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

5.10 PHOTOGRAPHY

A Nikon Coolpix 3700 digital camera was used to photograph all sample hedges plus other notable hedges, specific characteristics, wildlife, etc.

5.11 DATA RECORDING

All of the data recorded during the field survey was transferred into a Microsoft Excel spreadsheet for subsequent analysis, with the exception of the Target Notes which were recorded in a Microsoft Word file and, where applicable, cross-referenced to the data file.

Digital photographs were downloaded, referenced, and stored in electronic folders relating to each sample square.

6.0 DATA ANALYSIS

Data recorded during the field survey was transferred from the field recording sheets in to a Microsoft Excel spreadsheet for further analysis.

All the data were subjected to standard statistical analyses (frequencies of species occurrence, mean species richness, frequency of structural characteristics, etc.) and graphed using a Microsoft Excel spreadsheet. These results are presented in sections 7.2 to 7.9.

7.0 RESULTS OF THE COUNTY KILDARE HEDGEROW SURVEY

The results from the sample survey are presented in this section with comments on the significance of the data discussed further in section 8.0. Recommendations for future conservation of the County's hedgerow resource in the light of these results are presented in section 9.0.

7.1 THE EXTENT OF HEDGEROWS IN COUNTY KILDARE

Table 7.1.1 shows the extent of hedgerows and remnant hedgerows in the individual sample squares of County Kildare. The total area surveyed was 16.77km² which is approximately 1% of the total area of the county.

Table 7.1.1 Measurement of Hedgerow Extent in Sample Squares in County Kildare

| OS Grid Reference | Square Reference | Nearest Town/Village | Area km ² | Hedgerow Length (km) | Remnant Length (km) | Density (excluding remnant) (km/km ²) |
|-------------------|------------------|----------------------|----------------------|----------------------|---------------------|---|
| N 70 40 | KE01 | Cadamstown | 1.00 | 5.173 | 0.081 | 5.17 |
| N 80 40 | KE02 | Enfield | 0.99 | 7.233 | 0.886 | 7.31 |
| N 70 30 | KE03 | Derrinturn | 1.00 | 7.724 | 0.474 | 7.72 |
| N 80 30 | KE04 | Staplestown | 1.00 | 8.359 | 0.218 | 8.36 |
| N 90 30 | KE05 | Clane | 1.00 | 11.549 | 0.186 | 11.55 |
| N 70 20 | KE06 | Rathangan | 1.00 | 3.086 | 0.445 | 3.09 |
| N 80 20 | KE07 | Kilmeage | 1.00 | 11.055 | 0.393 | 11.06 |
| N 90 20 | KE08 | Naas | 1.00 | 1.510 | 0.361 | 1.51 |
| N 00 20 | KE09 | Kilteel | 0.91 | 0.825 | 0.000 | 0.91 |
| N 60 10 | KE10 | Monasterevin | 0.49 | 2.345 | 0.000 | 4.79 |
| N 70 10 | KE11 | Kildare | 1.00 | 10.242 | 0.000 | 10.24 |
| N 80 10 | KE12 | Curragh | 1.00 | 3.530 | 0.045 | 3.53 |
| N 90 10 | KE13 | Ballymore Eustace | 1.00 | 3.965 | 0.285 | 3.53 |
| N 70 00 | KE14 | Kilmead | 1.00 | 0.000 | 0.000 | 0.00 |
| N 80 00 | KE15 | Narraghmore | 1.00 | 5.416 | 0.345 | 5.42 |
| S 70 90 | KE16 | Athy | 1.00 | 8.240 | 0.000 | 8.24 |
| S 80 90 | KE17 | Moone | 1.00 | 10.549 | 0.185 | 10.55 |
| S 80 80 | KE18 | Knocknacree X | 0.38 | 1.220 | 0.000 | 3.21 |

It can be estimated that County Kildare has a hedgerow length of 10305km assuming that the squares surveyed are a representative sample of the county as a whole.

The estimated length of remnant hedgerows is just 394km. This equates to 3.7% of the total of hedgerow and remnant hedgerow length. This compares with the results of the more detailed survey of hedges within each sample which found that almost 5% of sample hedgerows recorded were remnant. Figures for remnant hedges are much lower than those from counties of Roscommon and Westmeath where figures of 10% and 12% were recorded respectively.

The length of hedgerows in the sample squares varies from 0 in a bogland square near to Kilmead (KE14) up to 11.55km/km² in square KE05 (Clane). The highest 'length of hedgerow' figure recorded in an individual 1km² in any of the specific Irish county based hedgerow surveys to date is 18.25km/km² in a square near to Ballinalee, County Longford.

The average figure for hedgerow density in County Kildare is 5.92km per km². The results from the other county hedgerow surveys are shown for comparison, along with the standard deviations in Table 7.1.2.

Table 7.1.2 Comparison of average hedgerow density

| Year of Survey | County | Average Density (km/km ²) | Standard Deviation | % of remnant hedges |
|----------------|-----------|---------------------------------------|--------------------|---------------------|
| 2006 | Kildare | 5.92 | 3.61 | 3.7 |
| 2006 | Longford | 8.23 | 6.14 | 3.5 |
| 2005 | Laois | 7.28 | 3.15 | 1.7 |
| 2005 | Offaly | 5.81 | 4.32 | 2.1 |
| 2004 | Roscommon | 5.43 | 4.75 | 12.2 |
| 2004 | Westmeath | 5.82 | 3.28 | 9.7 |

Standard deviation of hedgerow density statistics gives an insight into the overall nature of the hedgerow landscape within a county. A high standard deviation figure is recorded, such as in County Longford, where there is a wide variation in hedgerow density across the county, from areas of bog and forestry, with little or no hedges to the areas with a much heavier concentration of hedges. In contrast, County Laois has a high hedgerow density, but relatively low standard deviation, which indicates a more consistent hedgerow landscape. County Kildare has a similar hedgerow density to Counties Offaly and Westmeath, but the standard deviation figures indicate that the hedgerow landscape is more consistent in County Westmeath and less so in County Offaly.

Figure 7.1.1 illustrates the distribution of hedgerow density throughout the sample. It can be seen that there is quite an even distribution of density figures through from highest to lowest which indicates the variability of the hedgerow landscape in the county.

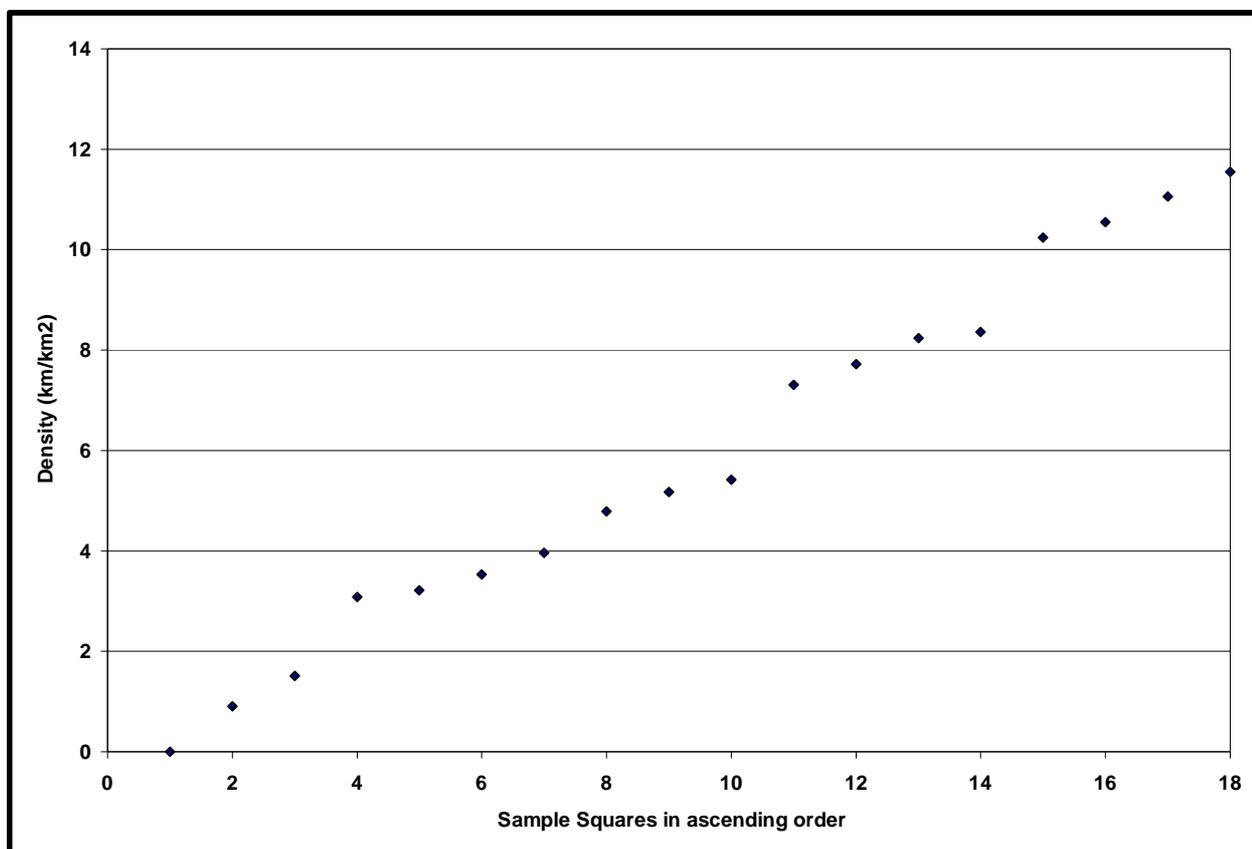


Figure 7.1.1 Distribution of hedgerow density per km² in sample squares

Potential Error in Extent Values

Recording non hedgerows as hedgerows

Close inspection of every hedge within each 1km square for the purpose of recording extent was outside the scope of the survey within the working timeframe. Even on close inspection it was difficult, in certain cases, to determine whether a particular linear feature was or was not a hedgerow based on the survey definition. When it came to recording extent this distinction was often determined from a distance. It is possible that some features that were recorded for extent purposes as hedgerows may have been considered not to be hedgerows on closer examination. This potential error would be almost non-existent in most landscapes but in areas on the fringes of bog-land the difference between a hedgerow and a colonized drain, or similar feature is more blurred.

Recording of remnant hedgerows as hedgerows

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

Non detection of new hedges

Young hedges that would not be included on early Ordnance Survey Maps and that would have been too small to register as distinct linear features on aerial photographs or vector maps 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 significantly contribute to the overall hedgerow extent.

7.2 SPECIES COMPOSITION OF HEDGEROWS IN COUNTY KILDARE

The 'species composition' of hedgerows is individually examined in respect of i) the shrub layer and ii) the tree layer. The average length of recorded hedgerows was 178m.

Although making a meaningful record and examination of ground flora was outside the scope of this survey, a note was made of the presence of less common species in the base of sampled hedges. These species are listed in Table 7.8.1.

SHRUB LAYER

Shrub species occurring in the hedge layer

37 species were recorded in the shrub layer of the sampled hedges. 18 of these are species native to Ireland, excluding wild privet (*ligustrum vulgaris*). Although native to southern Britain, the Wild Privet is not considered to be a native species in Ireland. Webb (1977) states that it is found 'frequently in hedges as an introduction'.

In common with all previous studies Hawthorn (Whitethorn) is the most commonly occurring hedgerow shrub found in 93% of sampled hedges. It also has the highest percentage cover in hedges. Four other species, Ash, Elder, Blackthorn and Wild Privet occur in over 40% of hedges although Blackthorn is much less frequent in County Kildare hedges (48%) than in counties Laois, Offaly and Longford where it was found in almost three quarters of the sample. All other species were recorded at levels of 15% or less. One of the most notable features of the survey is the lack of holly in County Kildare. It was recorded in only 8% of samples. It was found in a fifth of the hedges in County Roscommon (next lowest) and over half of the hedges in County Laois (highest). Spindle was less frequently recorded in County Kildare than in the neighbouring counties – just 5% of the sample compared with an average of 13% across all surveys. Conversely, Elm is much more common in County Kildare (15%) than other counties so far surveyed, with the exception of County Laois (18%). Of the non-native species, Laburnum was found in 2% of the sample but these were all in the same square near to Derrinturn (KE03). It was observed in hedges in other squares but not in any of the samples. Levels of Hazel (13%) were similar to the north midland counties, but below what were recorded in County Laois and County Offaly (average of 29%). Similar comments would apply to Willow, Crab Apple and Guelder Rose. Yew was noted in three sample squares, but didn't show up in the shrub layer of any of the samples and one specimen of Bird Cherry was noted in a hedge in the Cadamstown square (KE01), but again, not in a sample hedge.



Laburnum flowers in Derrinturn hedge (KE03)

The frequency and abundance of each species is presented below, in Table 7.2.1 with the frequency of the major species represented graphically in Figure 7.2.1.

The ‘frequency of occurrence’ is the frequency with which each species is found in one or other of the two sampled 30m strips of each hedge.

The “mean Domin abundance level” is a representation of the degree of cover of each species within the 30m sample strips. To arrive at the figure the average is taken of the relevant mid-point Domin percentage figure from each hedge in which the species occurs.

Table 7.2.1 Frequency of woody species occurrence and mean abundance in sampled County Kildare hedges

| Latin Name (*denotes non-native species) | Common Name | Frequency of occurrence (%) | Mean Domin abundance level |
|---|-----------------|-----------------------------|----------------------------|
| <i>Crataegus monogyna</i> | Hawthorn | 93% | 7 (34–50% cover) |
| <i>Fraxinus excelsior</i> | Ash | 57% | 4 (4-10% cover) |
| <i>Sambucus nigra</i> | Elder | 51% | 4 (4-10% cover) |
| <i>Prunus spinosa</i> | Blackthorn | 48% | 5 (11-25% cover) |
| * <i>Ligustrum vulgare</i> | Privet | 43% | 4 (4-10% cover) |
| <i>Salix spp</i> | Willow | 15% | 4 (4-10% cover) |
| <i>Ulmus spp</i> | Elm | 15% | 4 (4-10% cover) |
| <i>Corylus avellana</i> | Hazel | 13% | 4 (4-10% cover) |
| * <i>Acer pseudoplatanus</i> | Sycamore | 12% | 4 (4- 10% cover) |
| <i>Ulex europaeus</i> | Gorse | 10% | 6 (26-33% cover) |
| <i>Ilex aquifolium</i> | Holly | 8% | 4 (4-10% cover) |
| * <i>Fagus sylvatica</i> | Beech | 7% | 5 (11-25% cover) |
| <i>Prunus domestica</i> | Wild Plum | 6% | 4 (4- 10% cover) |
| <i>Malus sylvestris</i> | Crab Apple | 6% | 4 (4- 10% cover) |
| <i>Euonymus europaeus</i> | Spindle | 5% | 4 (4-10% cover) |
| <i>Quercus spp</i> | Oak | 5% | 3 (< 4% cover) |
| <i>Viburnum opulus</i> | Guelder Rose | 4% | 3 (< 4% cover) |
| <i>Sorbus aria</i> | Whitebeam | 2% | 3 (< 4% cover) |
| * <i>Symphoricarpos albus</i> | Snowberry | 2% | 4 (4-10% cover) |
| <i>Prunus Avium</i> | Wild Cherry | 2% | 4 (4-10% cover) |
| <i>Betula spp.</i> | Birch | 2% | 3 (< 4% cover) |
| * <i>Picea spp</i> | Spruce | 2% | 5 (11-25% cover) |
| * <i>Laburnum anagyroides</i> | Laburnum | 2% | 7 (34–50% cover) |
| <i>Sorbus Aucuparia</i> | Rowan | 1% | 3 (< 4% cover) |
| * <i>Lonicera nitida</i> | Dwarf Box | 1% | 5 (11-25% cover) |
| <i>Populus tremula</i> | Aspen | 1% | 4 (4-10% cover) |
| * <i>Populus nigra</i> | Black Poplar | 1% | 3 (< 4% cover) |
| * <i>x Cupressocyparis leylandii</i> | Leylandii | 1% | 7 (34–50% cover) |
| * <i>Chamaecyparis lawsoniana</i> | Lawson Cypress | 1% | 5 (11-25% cover) |
| * <i>Ligustrum ovalifolium</i> | Japanese Privet | 1% | 4 (4-10% cover) |
| * <i>Philadelphus coronarius</i> | Mock Orange | 1% | 4 (4-10% cover) |
| * <i>Syringa vulgaris</i> | Lilac | 1% | 4 (4-10% cover) |

The following species were noted in the sample hedges but not within the two 30m strips

| | |
|---------------------------|-------------------|
| * <i>Cornus sanguinea</i> | Dogwood |
| * <i>Larix spp</i> | Larch |
| * <i>Tilia spp</i> | Lime |
| * <i>Ribes sanguineum</i> | Flowering Currant |

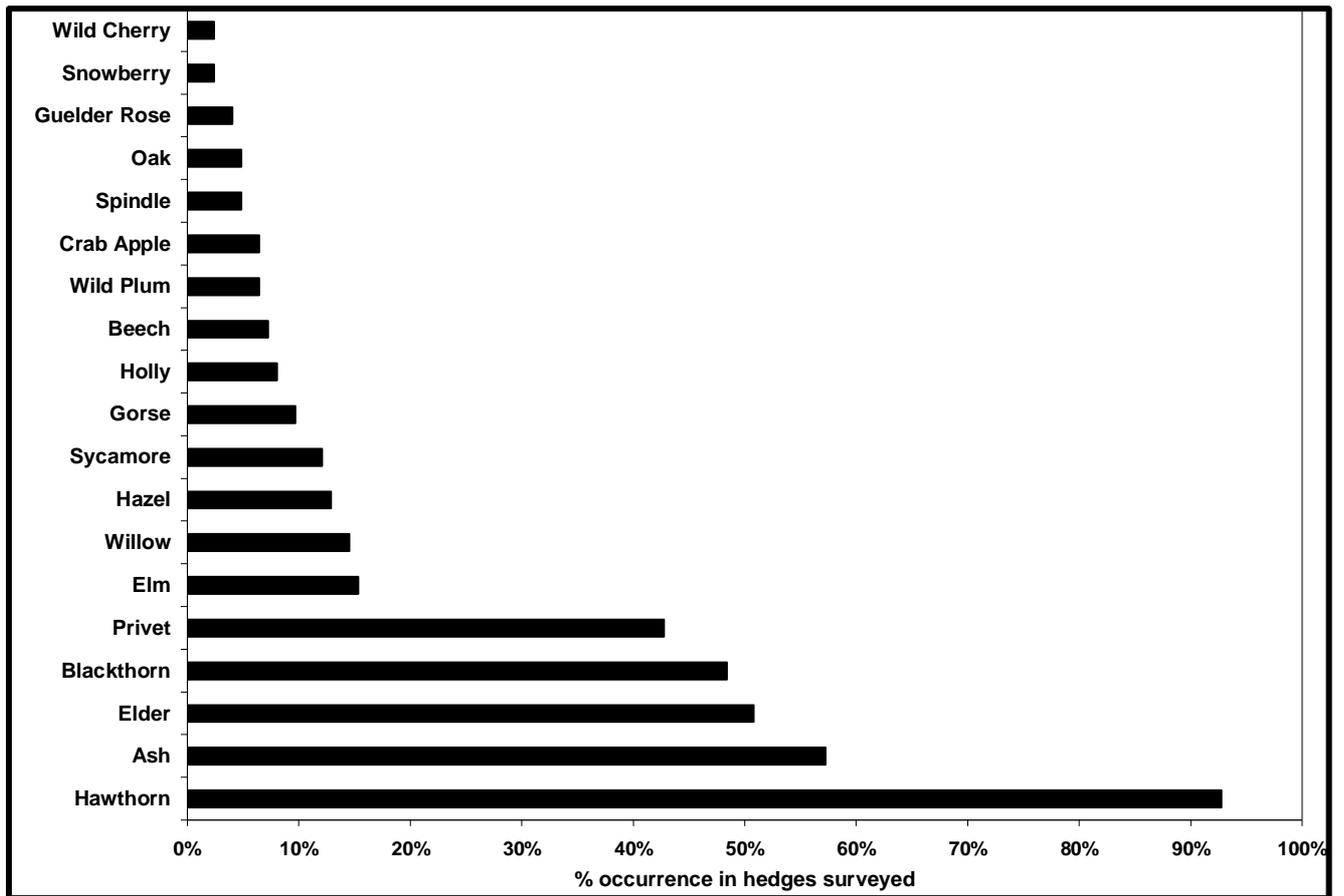


Figure 7.2.1 Frequency of occurrence of main shrub species in sampled hedges in County Kildare

Woody Climbers

Bramble (*Rubus fruticosus*) was recorded as being present in a total of 94% of County Kildare hedges surveyed which is consistent with results from counties Longford, Laois and Offaly (no comparative data from other surveys). Wild Roses (*Rosa* species) were recorded in 62% of samples which is slightly below the south midlands where roses were present in over three quarters of the samples, but much higher than in County Longford (37%). Honeysuckle (*Lonicera periclymenum*) was recorded in just 11% of the County Kildare sample. This is much lower than any of the other counties where data is available.

Recordings of woody climbers are presented in Table 7.2.2 below, with a graphical representation of their level of abundance using the DAFOR scale in Figure 7.2.2.

Table 7.2.2 Frequency of woody non-shrub species occurrence in sampled hedges

| Latin Name | Common Name | Frequency of occurrence (%) |
|------------------------------|-------------|-----------------------------|
| <i>Rubus fruticosus</i> agg | Bramble | 94 |
| <i>Rosa</i> spp | Wild Rose | 62 |
| <i>Lonicera periclymenum</i> | Honeysuckle | 11 |

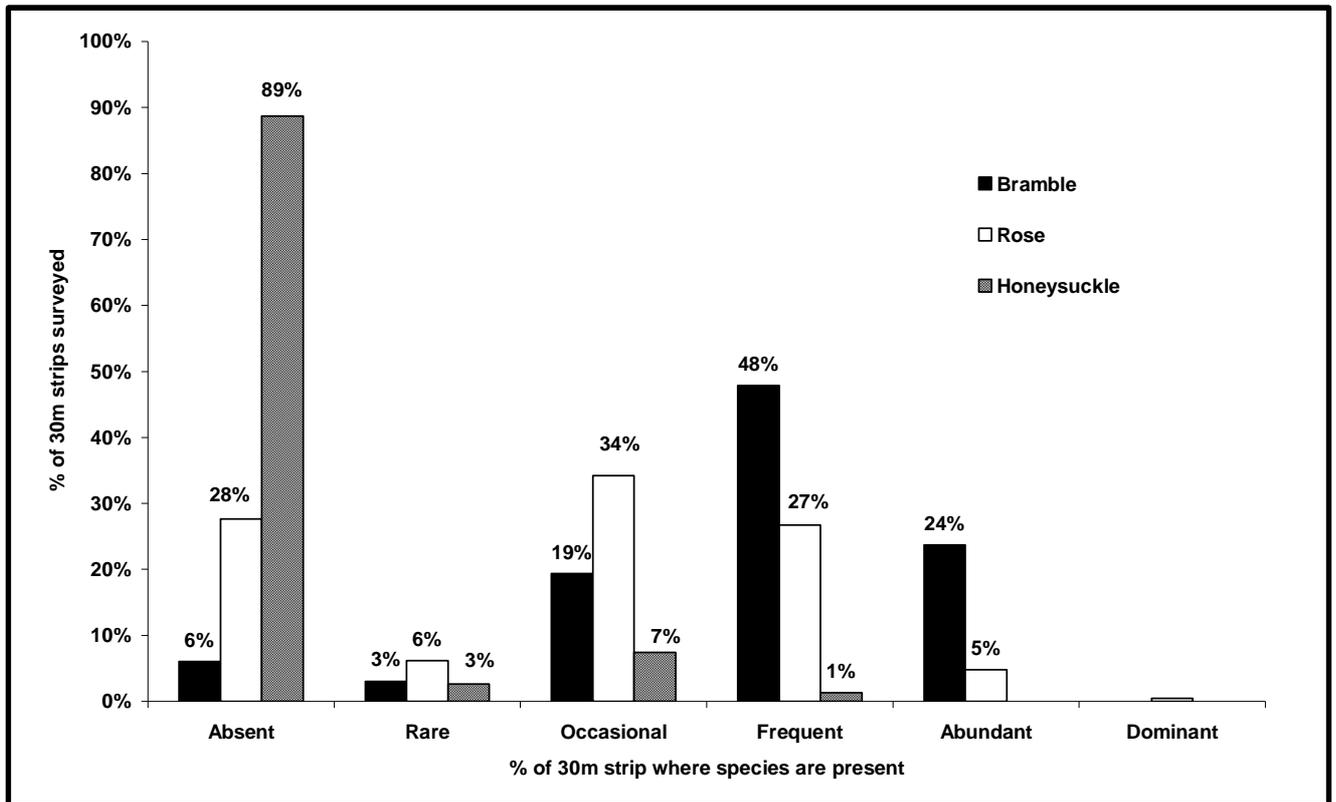


Figure 7.2.2 Level of abundance of woody non-shrub species in sample strips in County Kildare

Hedge Species Diversity

The '*species diversity*' of an individual hedge is defined as the number of shrub species found in a representative sample strip (usually 30 metres) of a hedge. As two 30m sample strips were recorded for each hedge in this survey, the average number of species from the two strips is the most representative figure of species diversity for each sampled hedge.

Species Rich Hedges

There are no defined criteria for what is considered to be a species rich hedge in Ireland. In the absence of a standard, I have based my assessment on British measures, where a species rich hedge is defined as one that contains five or more native woody species on average in a 30m strip (UK Biodiversity Action Plan, website). In northern England, upland Wales, or Scotland the presence of four or more native species qualifies as being species rich. As Ireland's native flora overall is less diverse than that of England, Wales and Scotland, four species per 30m length could be considered as species rich here. Only native species, based on Webb (1977) are included for the calculation of native species diversity.

Species Diversity Figures

The average number of species in the two 30m strips was calculated. The breakdown of percentages for the different levels of species diversity found in the sample hedges is shown in Figures 7.2.2 and 7.2.3. Figures 7.2.2 shows diversity of all species, both native and non-native while Figure 7.2.3 shows just those species considered to be native to Ireland.

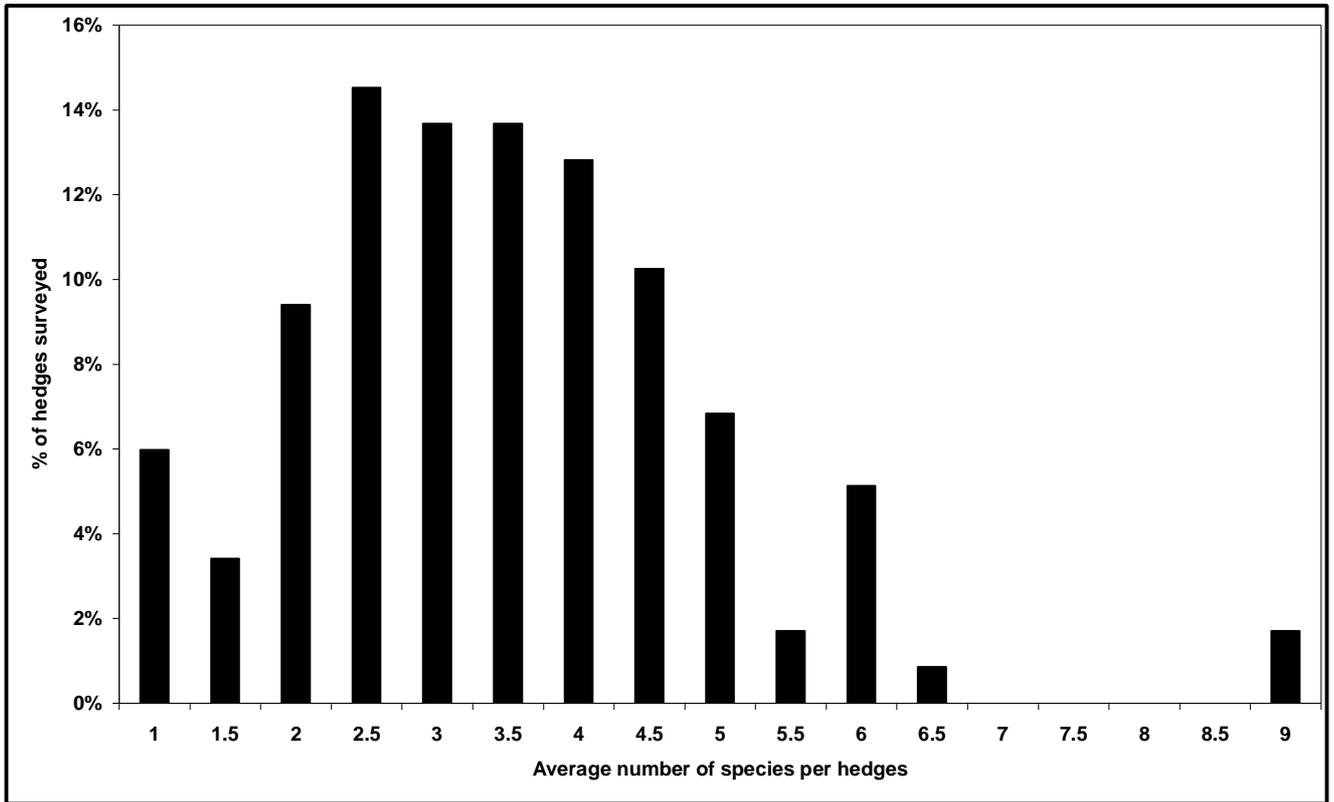


Figure 7.2.3 Percentage breakdown of (average) species numbers in sample hedges (all species)

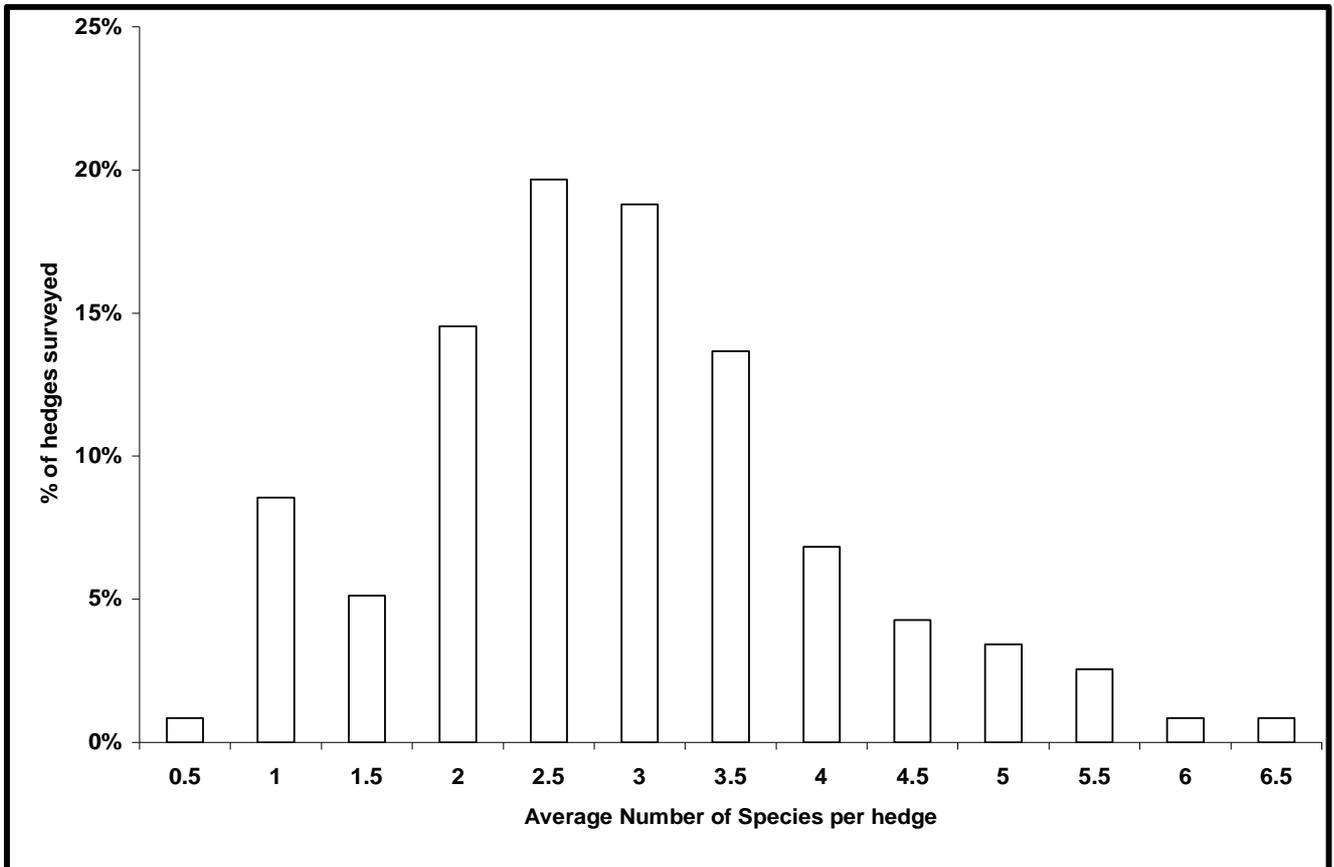


Figure 7.2.4 Percentage breakdown of (average) native species numbers in hedges

It is interesting to look at species diversity results from different perspectives. Table 7.2.3 shows an analysis of the species diversity figures for the sampled 30m strips in County Kildare. These can be compared with the results from counties Longford, Laois and Offaly which are also shown.

Table 7.2.3 Comparison of species diversity figures in 30m sample strips in Counties Kildare, Longford, Laois and Offaly

| Species Diversity criteria in 30m sample strips | % of sample in County Kildare | % of sample in County Longford | % of sample in County Laois | % of sample in County Offaly |
|--|-------------------------------|--------------------------------|-----------------------------|------------------------------|
| an average of 4 or more native species | 18.8 | 15.4 | 44.7 | 31.5 |
| 4 or more native species in at least 1 strip | 29.9 | 26.6 | 59.1 | 56.9 |
| a combined total of 4 or more native species in the two 30m strips | 60.7 | 48.7 | 66.0 | 66.9 |
| an average of 4 or more (all) species | 40.2 | 26.9 | 52.2 | 49.2 |
| 4 or more (all) species in at least 1 strip | 44.0 | 34.6 | 69.2 | 69.2 |

These results indicate the variability in the species composition of individual hedgerows. Nearly two thirds of the County Kildare hedges sampled contained four or more native species, in total, in the two 30m strips samples but only 19% had an average of four or more species over the two strips. The results show that in many hedges the species are not necessarily the same species in the two strips which suggests that the hedges are even more diverse than the general species diversity figures might portray.

47 separate recordings were made in 31 hedges of species that were present in sample hedges but were not present within the two 30m strips.

In terms of native species only this amounted to 33 recordings in 24 hedges.

The average species diversity for all hedges recorded in six County hedgerow surveys is shown in Table 7.2.4.

Table 7.2.4 Comparison of species diversity statistics

| County | Mean Species Diversity (All) | Standard Deviation | Mean Species Diversity (Native) | Mean Total number of species in 2 x 30m strips (All) | Mean Total number of species in 2 x 30m strips (Native) |
|-----------|------------------------------|--------------------|---------------------------------|--|---|
| Laois | 4.00 | 1.5 | 3.56 | 5.10 | 4.45 |
| Offaly | 3.81 | 1.4 | 3.25 | 4.92 | 4.09 |
| Kildare | 3.48 | 1.5 | 2.88 | 4.46 | 3.80 |
| Longford | 3.26 | 1.2 | 2.80 | 4.20 | 3.57 |
| Westmeath | 2.80 | 1.1 | unavailable | unavailable | unavailable |
| Roscommon | 2.50 | 1.0 | unavailable | unavailable | unavailable |

Relationship of individual species to overall species diversity

The relationship between the presence of certain individual native species and the overall species diversity of the hedge was examined. The ‘*overall average*’ is the average species diversity (all species) of all the hedges recorded. The ‘*mean species number*’ is the average species diversity of

those hedges where the listed species recorded a Domin value in one or other of the two 30m strips for that hedge. The results are shown in Table 7.2.5.

Table 7.2.5 Relationship between species occurrence and species diversity (all species) in County Kildare

| Hedges Containing | Mean Species Number |
|------------------------|---------------------|
| <i>Overall average</i> | 3.48 |
| Guelder Rose | 5.90 |
| Oak | 5.75 |
| Holly | 5.50 |
| Spindle | 5.33 |
| Hazel | 4.78 |
| Elm | 4.58 |
| Willow | 4.53 |
| Gorse | 4.50 |
| Blackthorn | 4.36 |
| Crab Apple | 4.31 |
| Ash | 3.91 |
| Elder | 3.75 |
| Hawthorn | 3.47 |

These figures would suggest that the presence of Guelder Rose, Oak, Holly or Spindle is a good potential indicator of species diversity in a hedge. Relating these findings with those from other studies would suggest that Guelder Rose and Hazel are the two best indicators of species rich hedges, with Spindle also a useful guide.



Guelder Rose in Staplestown hedge (KE04)

It would be expected that individual species would be more likely to occur in species rich hedges than the norm. Figure 7.2.4 shows the relationship between the occurrence of each of the major species in species rich hedges and their overall occurrence rate in county

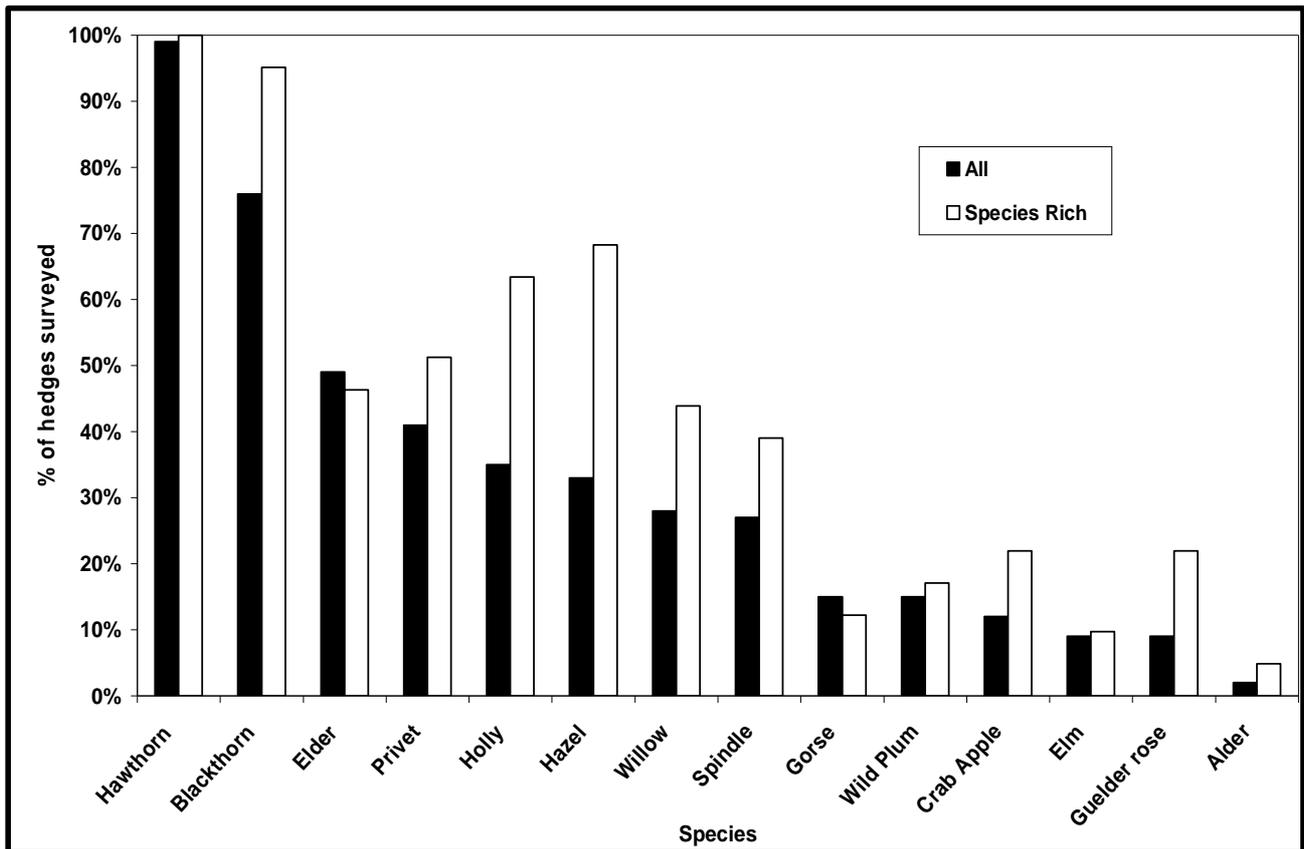


Figure 7.2.5 Relationship of individual species to overall species diversity

Hazel, Holly, and Guelder Rose all occur substantially more frequently in species rich hedges than non-species rich hedges. Hazel in particular is interesting. While it occurs in 33% of all hedges, it is found in 68% of the species rich hedges. This is consistent with findings in counties Longford, Laois and Offaly where a similar comparison was made. Conversely, Elder and Gorse are less likely to occur in species rich hedges. These observations are unsurprising. Elder is a good initial coloniser of whitethorn hedgerows but is often quite short lived so is more likely to be found in relatively recently established hedges. Gorse, as a spreading shrub, tends to be a major component of hedges where it is present. Its dense cover will tend to inhibit other species from seeding into the hedge. It is often found on thinner, poorer soils which have less capacity to support a wide variety of species. Based on this and previous surveys, Guelder Rose and Hazel are consistently much more likely to be found in species rich than non species rich hedges, and can be considered good identifier species for species richness.

Townland Boundary and Roadside hedges

14% of all of the randomly chosen hedges surveyed in County Kildare were townland boundary hedges. 15% of hedges sampled were adjacent to public roads. These percentages are slightly higher than in the other county hedgerow surveys. Table 7.2.6 shows a comparison of the species diversity of townland boundary hedges and roadside hedges with average species diversity figures.

Table 7.2.6 Comparison of average species diversity figures for townland boundary and roadside hedges

| | Average Species Diversity (All species) | Average Species Diversity (Native species) |
|--------------------------|--|---|
| All hedges | 3.48 | 2.88 |
| Townland boundary hedges | 3.50 | 3.00 |
| Roadside hedges | 3.56 | 2.94 |

In previous studies roadside hedges and townland boundary hedges have been shown to be significantly more species rich than non-roadside and non townland boundary hedges. In this study of County Kildare the difference is less marked. Both roadside and townland boundary hedges are slightly above the average species diversity figures, but only marginally so.

Distribution of species rich hedges

An examination of the distribution of species rich hedges around County Kildare shows that they are more concentrated in the north and south of the county. 55% of those recorded were found in the five most northerly sample squares.

TREE LAYER

'Hedgerow trees' are any trees within the hedge that have been deliberately or incidentally allowed to grow distinct from the shrub layer of the hedge. Hedgerow trees were recorded as present in 74% of the recorded hedges in County Kildare. A total of 33 tree species were found in sampled hedges in this survey. 13 of the tree species recorded were native species. One hedge in the Ballymore Eustace square (KE13) had been planted with 14 different (predominantly non-native) species of saplings which boosted the overall numbers considerably. The most commonly occurring hedgerow tree in County Kildare is by far the Ash (*Fraxinus excelsior*) which is found in 58% of hedges (79% of hedges that contain trees). Hawthorn (Whitethorn) had reached tree proportions in 28% of hedgerows. Oak, Sycamore, and Beech were all found in over 10% of hedgerows. The latter two species are non-native and would generally be considered to be unsuitable as hedgerow trees due to the dense shade that they cast on the shrub layer. Table 7.2.7 lists the tree species recorded and their frequency of occurrence. Figure 7.2.6 shows the frequency of occurrence of the main species in the tree layer.

Table 7.2.7 Frequency of tree species occurrence in sampled County Kildare hedges

| Latin Name | Common Name | Frequency of occurrence (%) |
|--------------------------------------|----------------|-----------------------------|
| (*denotes non-native species) | | |
| <i>Fraxinus excelsior</i> | Ash | 58% |
| <i>Crataegus monogyna</i> | Hawthorn | 28% |
| * <i>Acer pseudoplatanus</i> | Sycamore | 14% |
| <i>Quercus spp</i> | Oak | 12% |
| * <i>Fagus sylvatica</i> | Beech | 11% |
| <i>Salix spp</i> | Willow | 9% |
| <i>Malus sylvestris</i> | Crab Apple | 5% |
| <i>Prunus Avium</i> | Wild Cherry | 5% |
| <i>Betula spp.</i> | Birch | 4% |
| * <i>Populus nigra</i> | Black Poplar | 3% |
| * <i>Acer spp.</i> | Maple | 3% |
| <i>Alnus glutinosa</i> | Alder | 3% |
| <i>Ilex aquifolium</i> | Holly | 3% |
| <i>Sambucus nigra</i> | Elder | 3% |
| <i>Ulmus spp</i> | Elm | 3% |
| * <i>Chamaecyparis lawsoniana</i> | Lawson Cypress | 2% |
| * <i>Larix spp</i> | Larch | 2% |
| * <i>Picea spp</i> | Spruce | 2% |
| * <i>Tilia spp</i> | Lime | 2% |
| * <i>Aesculus hippocastanum</i> | Horse Chestnut | 2% |
| * <i>Pinus sylvestris</i> | Scots Pine | 2% |
| * <i>Prunus domestica</i> | Wild Plum | 2% |
| * <i>Liriodendron spp</i> | Tulip Tree | 1% |
| * <i>x Cupressocyparis leylandii</i> | Leylandii | 1% |
| * <i>Carpinus betulus</i> | Hornbeam | 1% |

| | | |
|--------------------------|------------------|----|
| <i>*Castanea sativa</i> | Spanish Chestnut | 1% |
| <i>*Eucalyptus spp.</i> | Eucalyptus | 1% |
| <i>*Northofagus spp.</i> | Southern beech | 1% |
| <i>*Populus alba</i> | White Poplar | 1% |
| <i>Populus tremula</i> | Aspen | 1% |
| <i>*Quercus rubra</i> | Red Oak | 1% |
| <i>Sorbus aria</i> | Whitebeam | 1% |
| <i>Taxus baccata</i> | Yew | 1% |

Tree Species Diversity

31% of the hedges where trees were recorded had just one tree species. A further 31% contained two tree species, 20% had three species, 11% had four species and 7% had five or more species. One sample hedge in square LD13, Ballymore Eustace had a total of 16 different tree species in it, fourteen of these were planted into the hedge as saplings. County Kildare ranks along with County Offaly as having the highest diversity of tree species in its hedgerows.

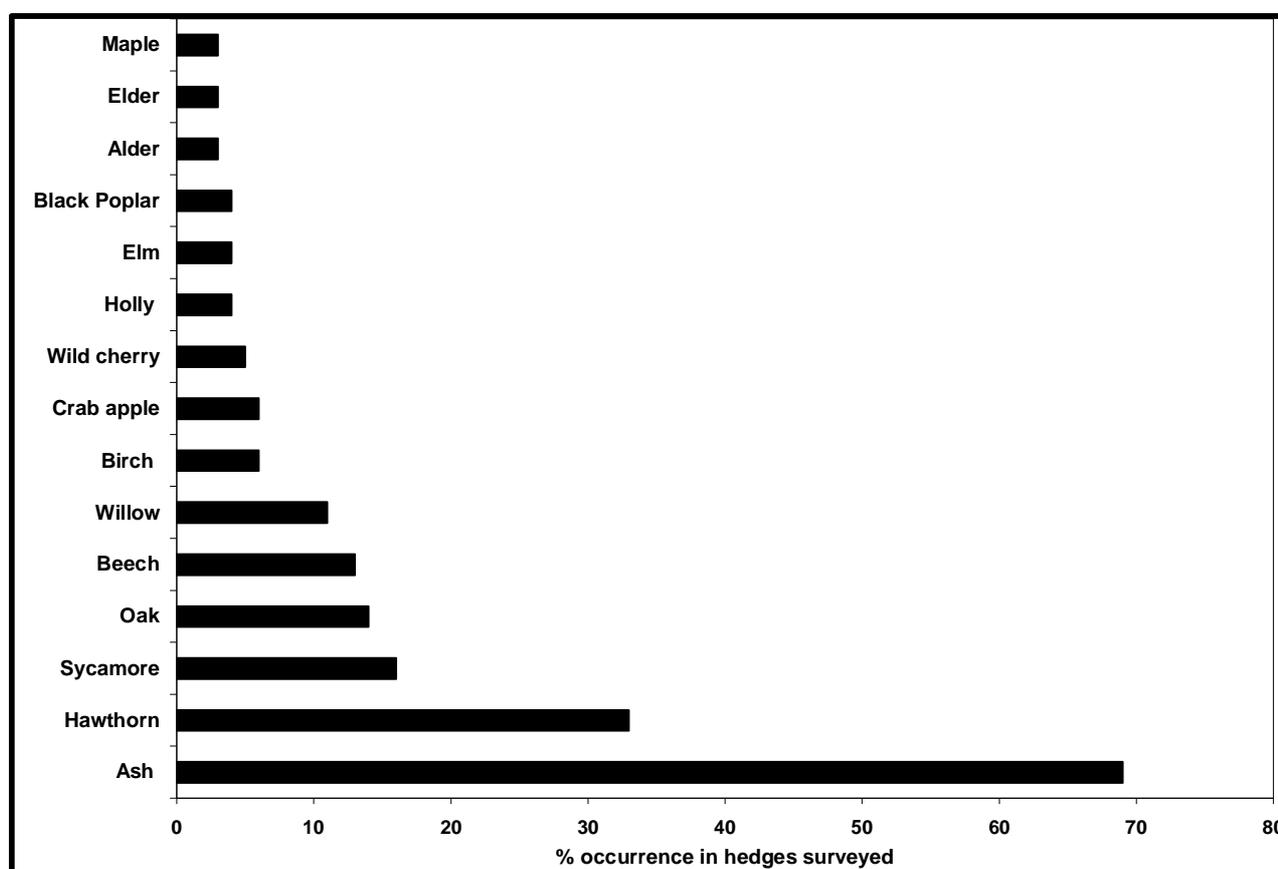


Figure 7.2.6 Frequency of main tree species occurrence in sampled hedges in County Kildare

LANDSCAPE CHARACTER AREAS

Chapter 18 of the Kildare County Development Plan gives details of the 'Landscape Character Areas' of the county. Sampled hedgerows were related to the Landscape Character Areas in which they occurred. Figure 7.2.7 shows a breakdown of how the samples were distributed within the different landscape classifications, including the distribution of species rich hedges

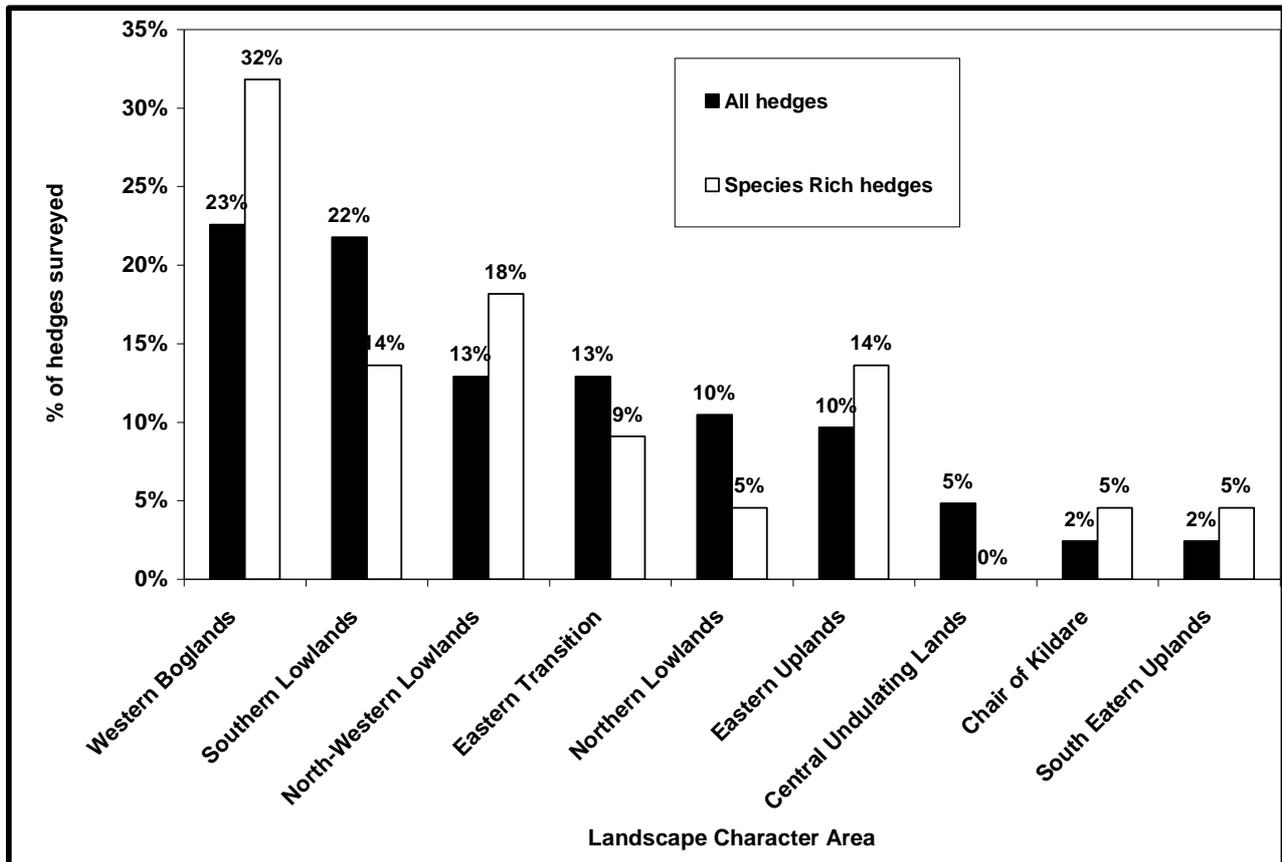


Figure 7.2.7 Sample hedges related to landscape character areas

RARE SPECIES

Whitebeam (*Sorbus aria*) is an uncommon hedgerow species, but was found in two sample hedges in square KE16 (Athy). A single specimen of Bird Cherry (*Prunus padus*) was noted in square KE01 (Cadamstown), but this was not in a sample hedge. The plant was healthy and flowering.



Whitebeam in Athy hedgerow (KE16)



Bird Cherry near Cadamstown (KE01)

IVY

Ivy occurs frequently in County Kildare's hedgerows. It was present in 83% of sample 30m strips. The specifications for the REP Scheme permit the control of ivy where it poses a threat to the stability or long term viability of hedgerows. This is set in the context of the importance of ivy for wildlife and the statement that '*Wherever possible ivy should be retained and allowed to develop*' (Specifications for REPS Planners, 2004).

Figure 7.2.8 shows the Domin level of ivy at canopy level in the sampled hedges.

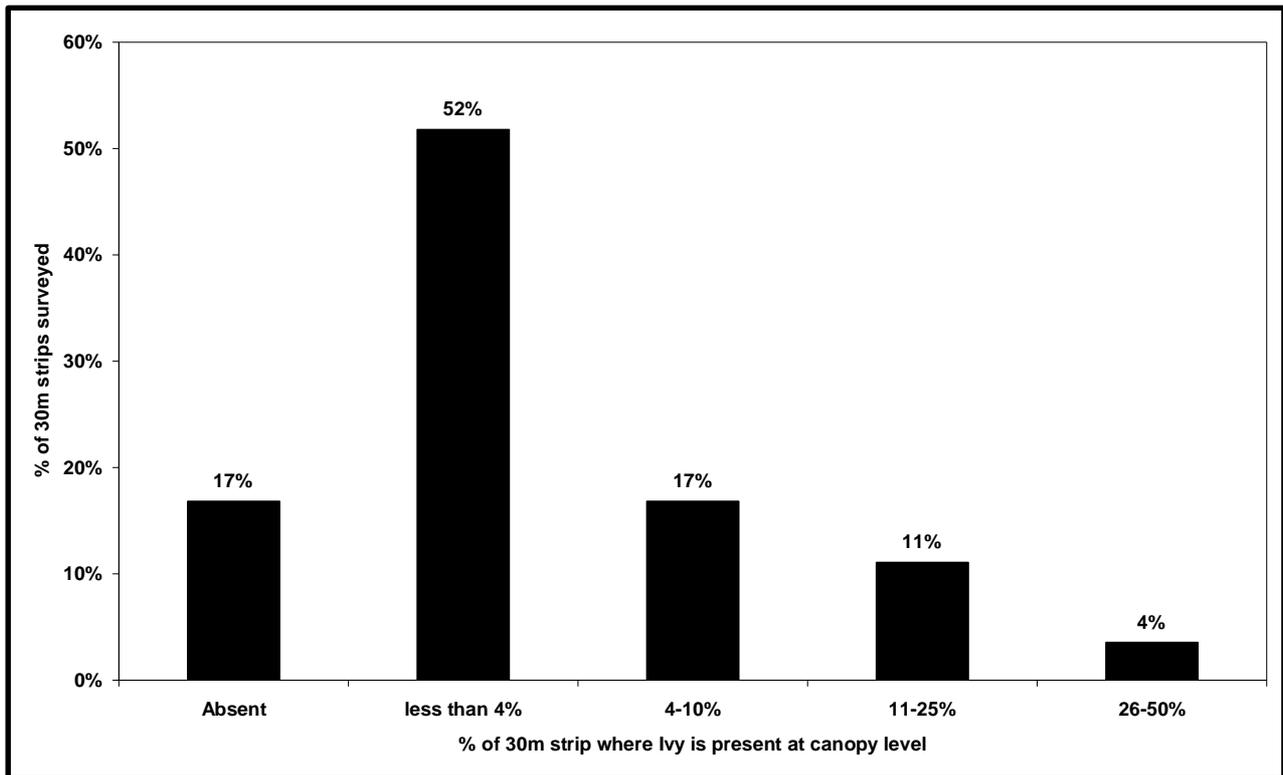


Figure 7.2.8 Percentage breakdown of domination of ivy at canopy level

Levels of ivy at less than 10% would be unlikely to be a threat to the long term viability of the hedge. There is more cause for alarm when the domination exceeds 25%. This is the case in just 4% of the hedges surveyed. This is lower than the levels witnessed in counties Longford, Offaly and Laois and significantly below the 20% figure recorded in County Westmeath. 11% of hedges are in the 11-25% coverage category where a watching brief is advised.



Ivy is dominating this hedgerow in Derrinturn (KE03)

7.3 GENERAL ECOLOGICAL, HISTORICAL, AND AGRICULTURAL CONTEXT OF HEDGEROWS IN COUNTY KILDARE.

The biodiversity value of individual hedges is related to the general ecology of the area in which they occur and how they interconnect with other natural and semi-natural landscape features. In order to examine the overall ecological context of County Kildare’s hedgerow resource a record is made of both the type of land adjacent to the sampled hedges and any link the hedge makes with other habitat types. The classifications are based on Fossitt (2000).

Adjacent Land Use

Figure 7.3.1 shows the breakdown of the adjacent land use of the sampled hedgerows. Over 66% of the land adjacent to the sample hedges is related to intensive farming. This is slightly lower than in Counties Laois and Offaly where the figure was approximately 75% but higher than the 56% in Longford. Exactly 50% of the hedges sampled are bordered solely by either arable land or intensive grassland.

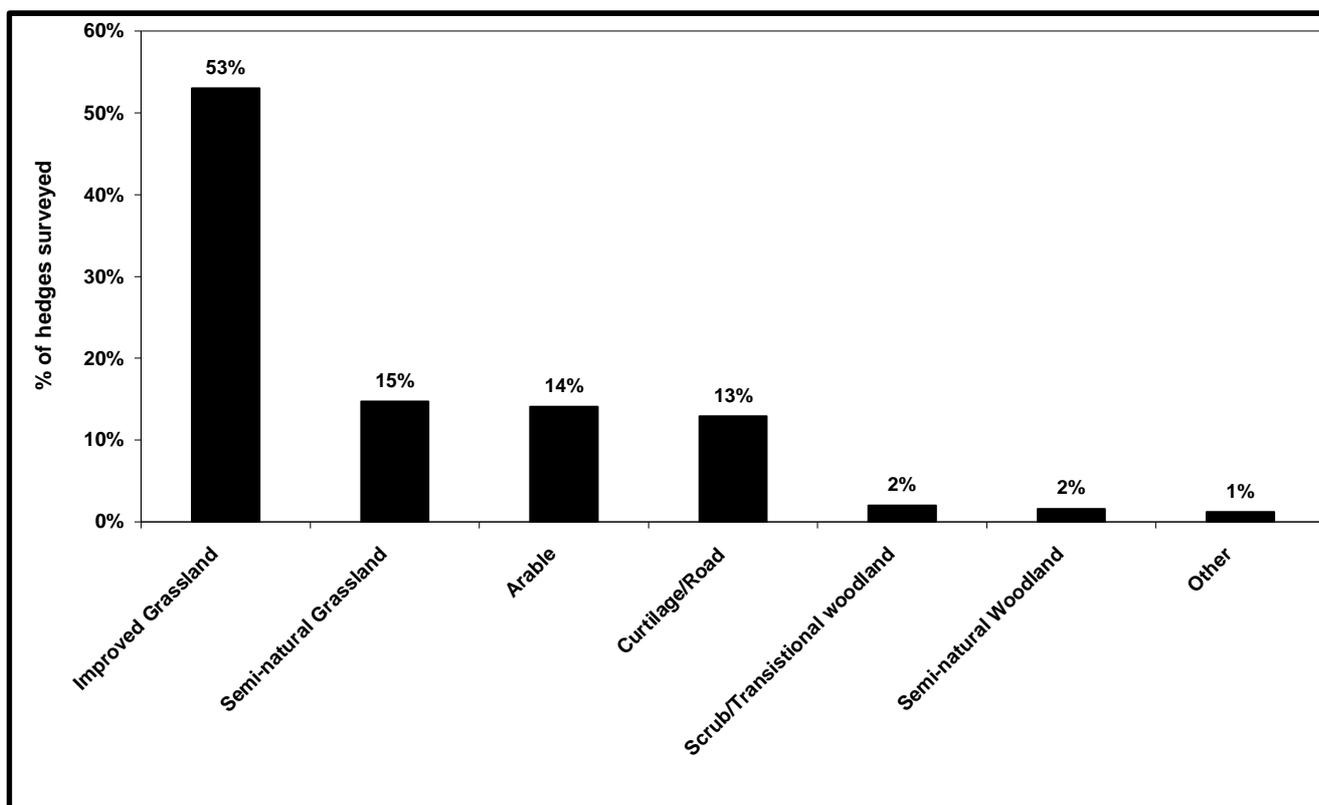


Figure 7.3.1 Habitat category of land adjacent to sampled hedgerows.

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. Figure 7.3.2 shows the breakdown of how the sampled hedges connected with other hedgerows and other habitat types. 19% of the sampled hedgerows had no link at one end with any other natural or semi-natural habitat (including other hedgerows), with almost 2.5% having no link whatsoever. Only County Offaly showed more hedges failing to link in to other habitats (22%). In County Longford the figure was just 4%. These results would indicate that the fragmentation of hedgerow networks in County Kildare is an issue that needs to be considered in any bio-diversity strategy for the county.



Hedgerow left with no end link after Motorway development near Enfield (KE02)

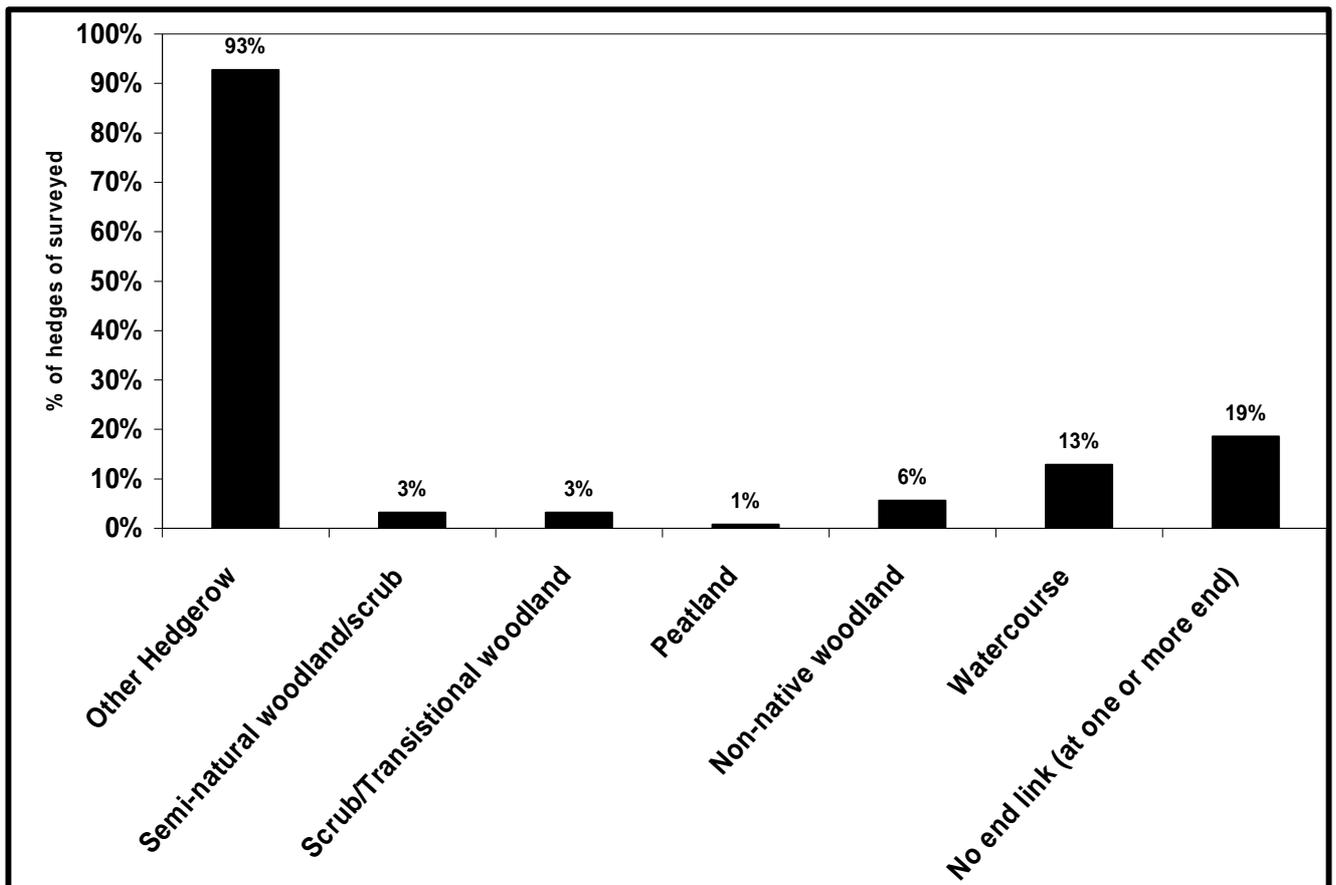


Figure 7.3.2 Links of sampled hedgerows with natural or semi-natural habitats in County Kildare

Hedgerow History

All sample hedges were compared with boundaries marked on the first and second edition Ordnance Survey maps dating from 1837-8 and 1907-09 respectively. It cannot be known for certain if the boundaries marked on these maps were hedgerows, but the absence of any boundary marking would clearly indicate the absence of a hedgerow at that period. 19% of the sample hedges were not present on the first edition maps from 1837-8. The second edition O.S. maps (1907-09) show less than 7% of the sample hedges were not present.

Since there has been a small degree of realignment of townland boundaries between the first and second editions of the Ordnance Survey, townland boundary hedges were identified using the second edition maps. In County Kildare they accounted for approximately 14% of the sample; the range from other county hedgerow surveys is from 10% to 14%. Townland boundaries are less likely to be removed in field boundary rationalisation programmes since they often form farm boundaries. Therefore they are more likely to be sampled in Counties, like Kildare, with larger field sizes since they form a higher proportion of the total hedgerow network. 'Infill' hedges are all those that don't fall into any of the other categories (railway side, canal side). Roadside hedges are at the forefront of the public's perception of hedgerows. In County Kildare 15% of hedges surveyed were road side; this is around the average figure for all surveys which indicates that roadside hedges form a significant proportion of the whole resource. Streams are much more likely to be associated with townland boundary hedges Figure 7.3.3 compares the historical origins of sampled hedgerows

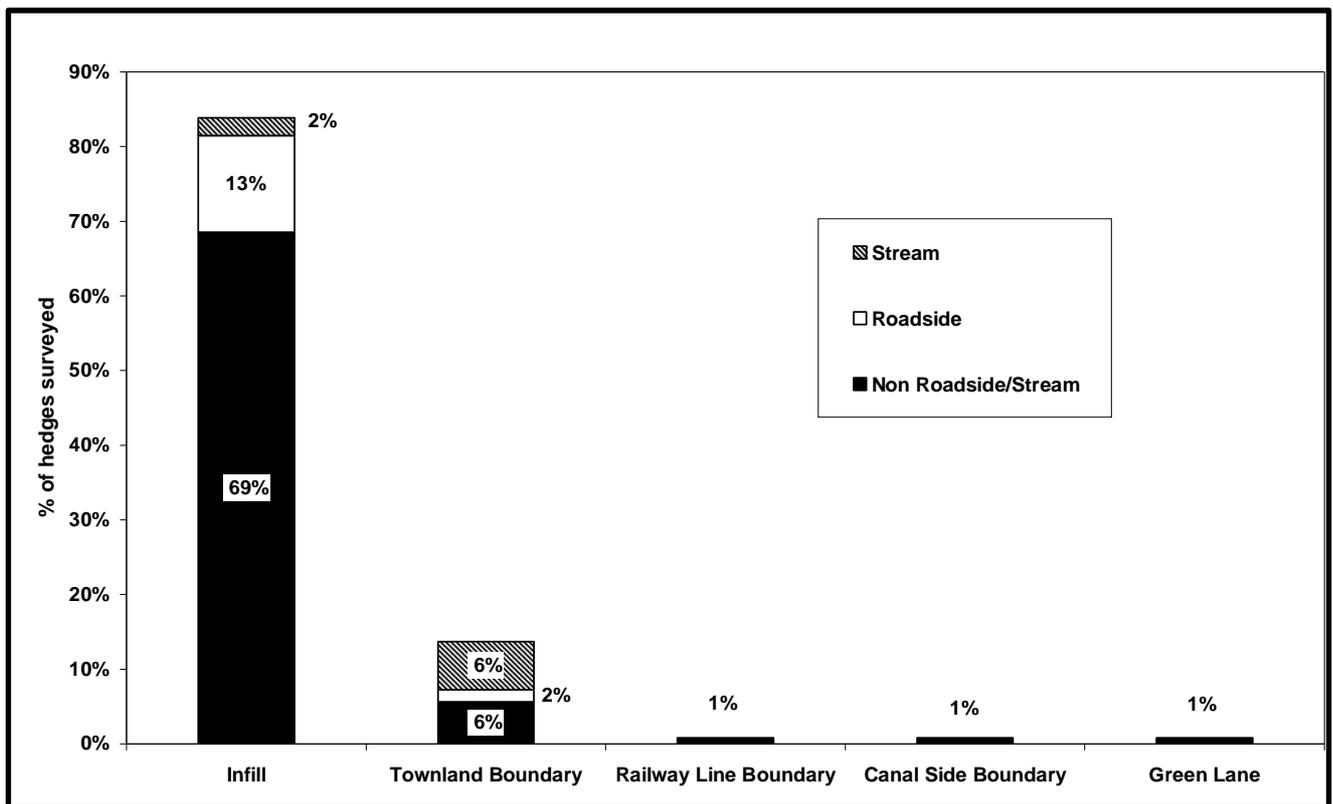


Figure 7.3.3 Historical context of sampled hedgerows



Green lane near to Enfield (KE02)

Boundary Function

To assess the relevance of hedgerow boundaries to modern agriculture, a record was made as to whether the hedgerow formed part of an active farm boundary. A '*redundant boundary*' is one where stock would have uncontrolled simultaneous access to the land either side of the hedge. 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.



'Redundant' boundary near to Kildare (KE11)

85% of hedgerows in County Kildare are considered still to be part of active divisions or subdivisions of farms, with 15% adjudged to be redundant. A similar ratio was found in County Westmeath, but the ratio was 92:8 in both Counties Laois and Offaly.

7.4 CONSTRUCTION OF HEDGES IN COUNTY KILDARE

'Construction' relates to the physical infrastructure of the hedge. This survey recorded details of the linear outline of sampled hedges, the linearity of the hedgerow shrubs, and details and dimensions of any associated features such as banks, walls and drains.

In County Kildare 85% of the hedges surveyed were considered to be linear and regular in outline. Of the 15% having a more irregular outline 37% were associated with a road and 26% were part of townland boundaries. In total 29% of townland boundaries were non-linear which is significantly lower than in County Longford where the figure was 75%. This is partially accounted for by the fact that more townland boundaries in County Longford follow the course of streams or rivers than in County Kildare.

Figure 7.4.1 shows a breakdown of the construction type of the County Kildare hedges surveyed. A single line of shrubs with a bank and drain is the most common form of construction.

A very distinct feature of County Kildare is the large double ditch construction of some hedges. This is where there is a large earthen bank with a drainage ditch on each side. Many are believed to date back to Norman times. They accounted for almost 2.5% of the sample. None of the sampled hedges contained a stone wall.



Fine example of a double ditch near to Derrinturn (KE03)

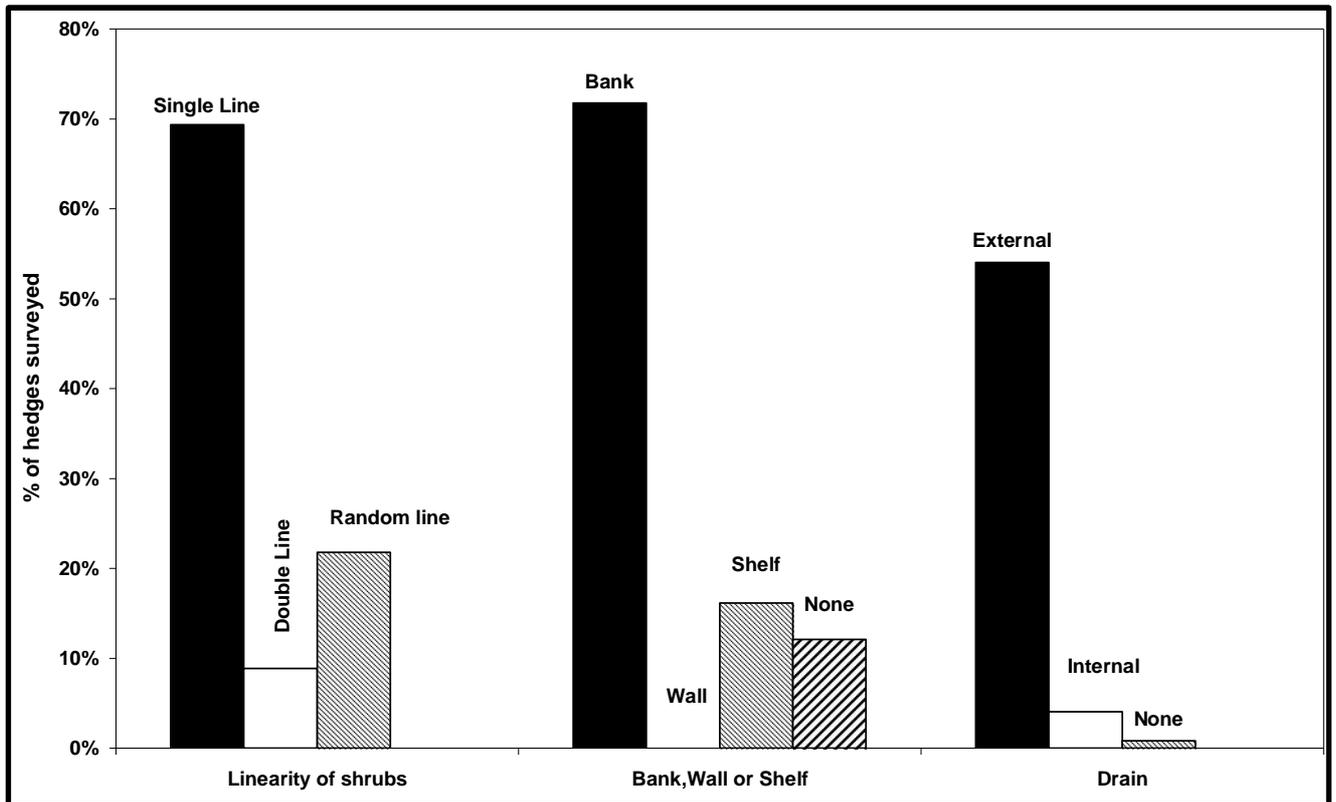


Figure 7.4.1 Boundary construction of samples hedgerows

Figure 7.4.2 shows how the sampled hedges fared in the various size categories for banks, walls or shelves. Although the overall percentage of hedges with banks is similar in County Kildare to other counties, 34% of hedges surveyed in County Kildare were in the largest size category which is higher than the other counties surveyed where the average figure is 23%.

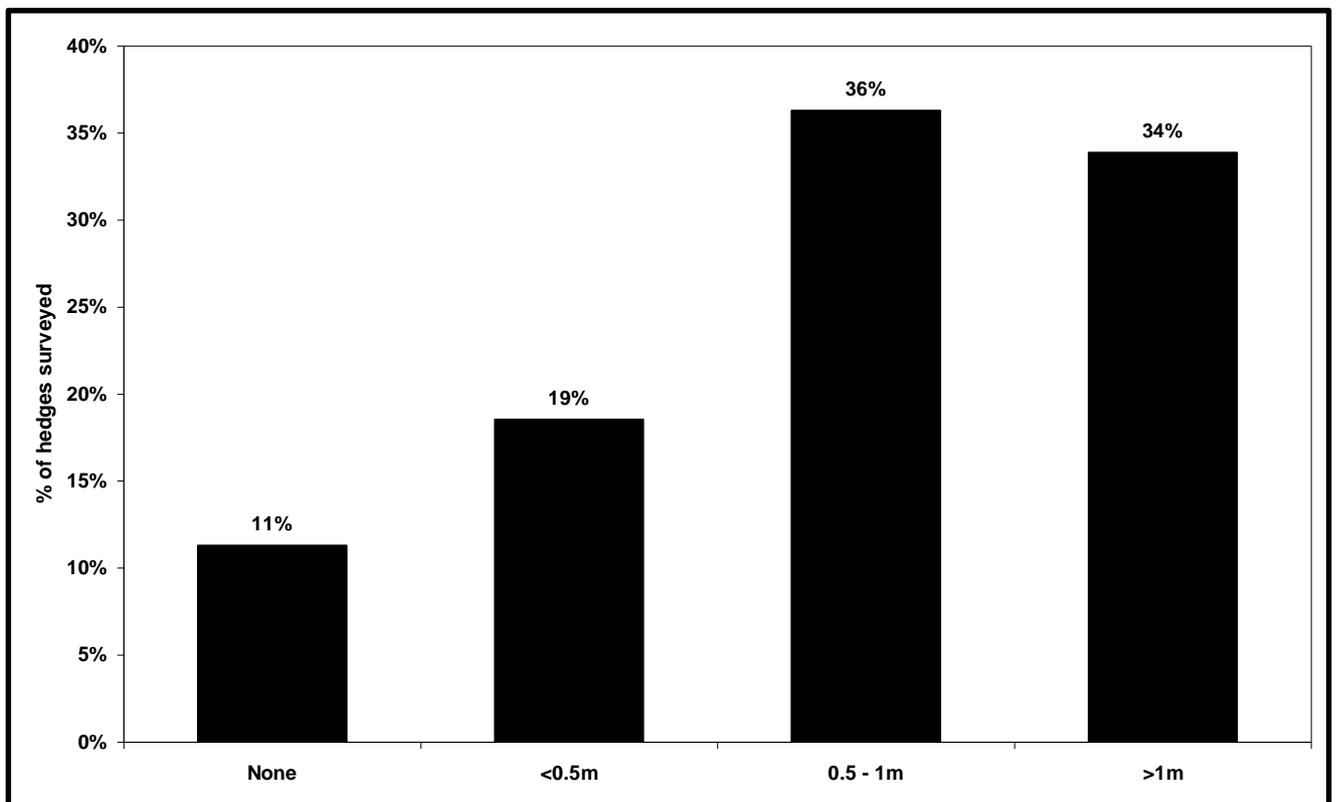


Figure 7.4.2 Proportion of hedges in bank/wall/shelf size categories

Hedgerows often have an associated function of being part of the drainage scheme of land. This is particularly the case in areas of higher rainfall or poor soil porosity. The results from County Kildare are similar to those from County Westmeath and County Laois in terms of the presence and size of drains associated with hedgerows. 59% of hedges have drains, most of them in the largest category. Hedge banks would generally be constructed from the material removed to create the associated drain. Large hedge banks would, therefore, necessitate large drains to provide the material. In County Longford and County Roscommon a greater proportion of hedges have drains.

Figure 7.4.3 shows the breakdown of the various drain size categories

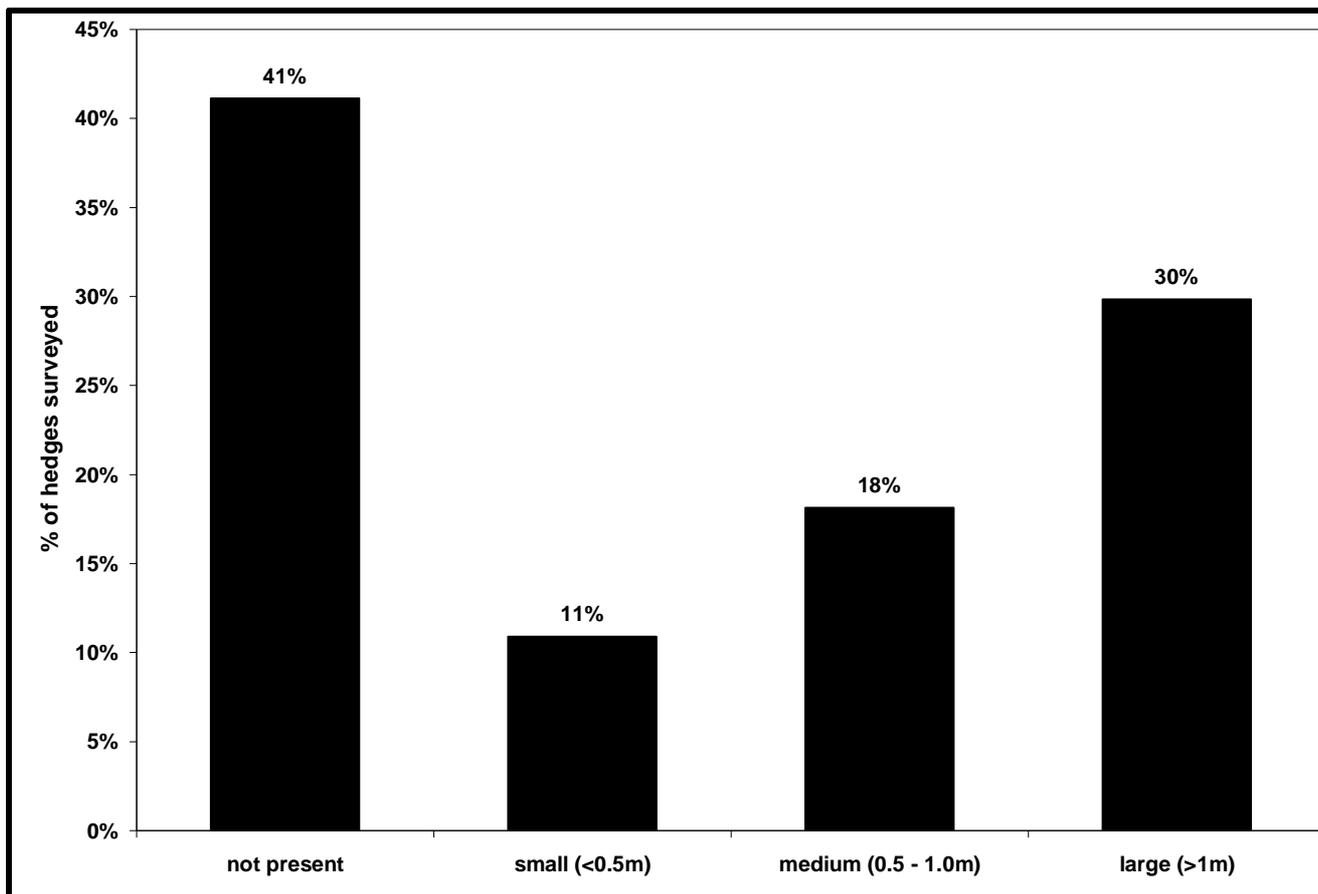


Figure 7.4.3 Proportion of hedges in drain size categories

7.5 STRUCTURE AND CONDITION OF HEDGES IN COUNTY KILDARE

Detailing the ‘*structure*’ of the sampled hedgerows involved recording information on the average height, average width, the cross sectional profile, the percentage of gaps, the woody structure of the hedge base, and the presence of hedgerow trees. These features are indicators of the agricultural, ecological and landscape status of the hedge.

Assessing the ‘*condition*’ of the hedge involves qualities such as bank/wall erosion, tree age composition, and overall vigour. These factors can be indicators of the long-term viability or sustainability of the hedge.

Hedge Height

Figure 7.5.1 shows a breakdown of the sample in terms of the hedge height categories.

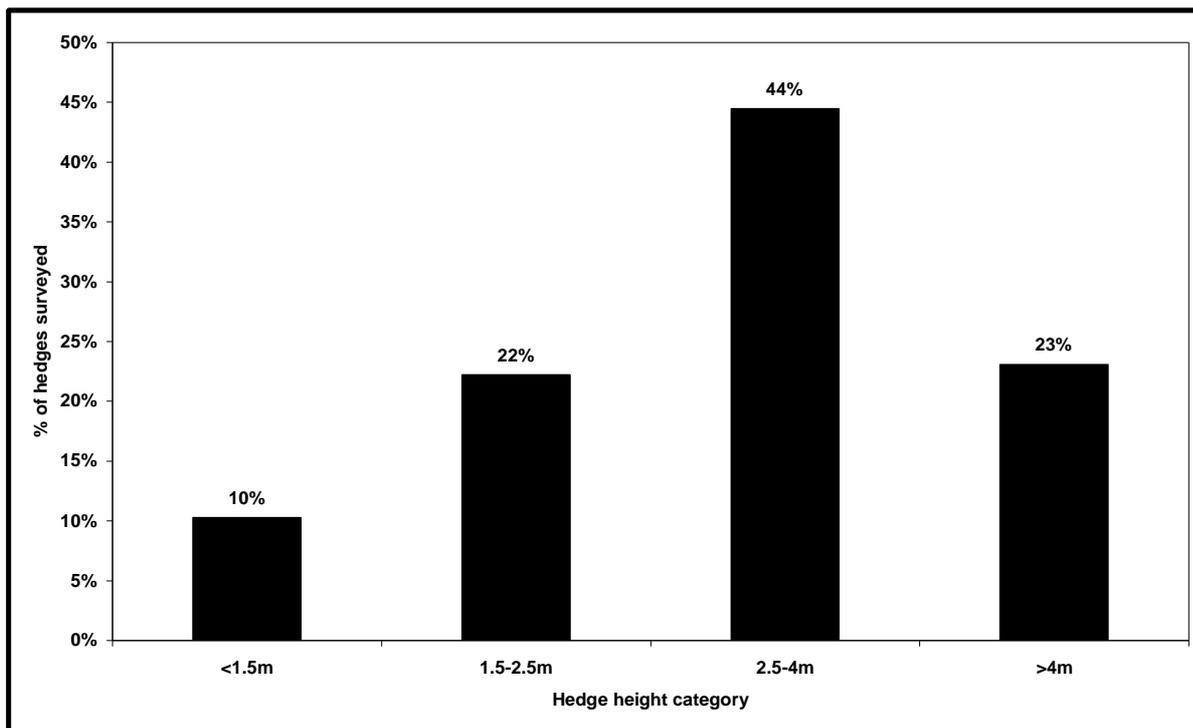


Figure 7.5.1 Proportion of hedges in hedge height categories

Research indicates that taller hedges are generally better from a wildlife perspective. With two thirds of the hedges recorded being in the two highest height categories, County Kildare’s hedges compare very favourably with the other counties so far recorded. Maintaining hedges below 1.5m in height is not considered a desirable feature from a biodiversity perspective. In this regard only County Roscommon (at 9%) has fewer hedges in the smallest height category than County Kildare. In counties Longford, Laois and Westmeath these excessively low hedges account for between 17% and 21% of the sample.



Hedge maintained in good structural condition near Narraghmore (KE15)

Hedge Width

Increasing width generally correlates with improved biodiversity in hedgerows. As can be seen from Figure 7.5.2, the results of the survey show that 91% of hedges surveyed in County Kildare are over 1m wide. This is very much in line with findings in other studies.

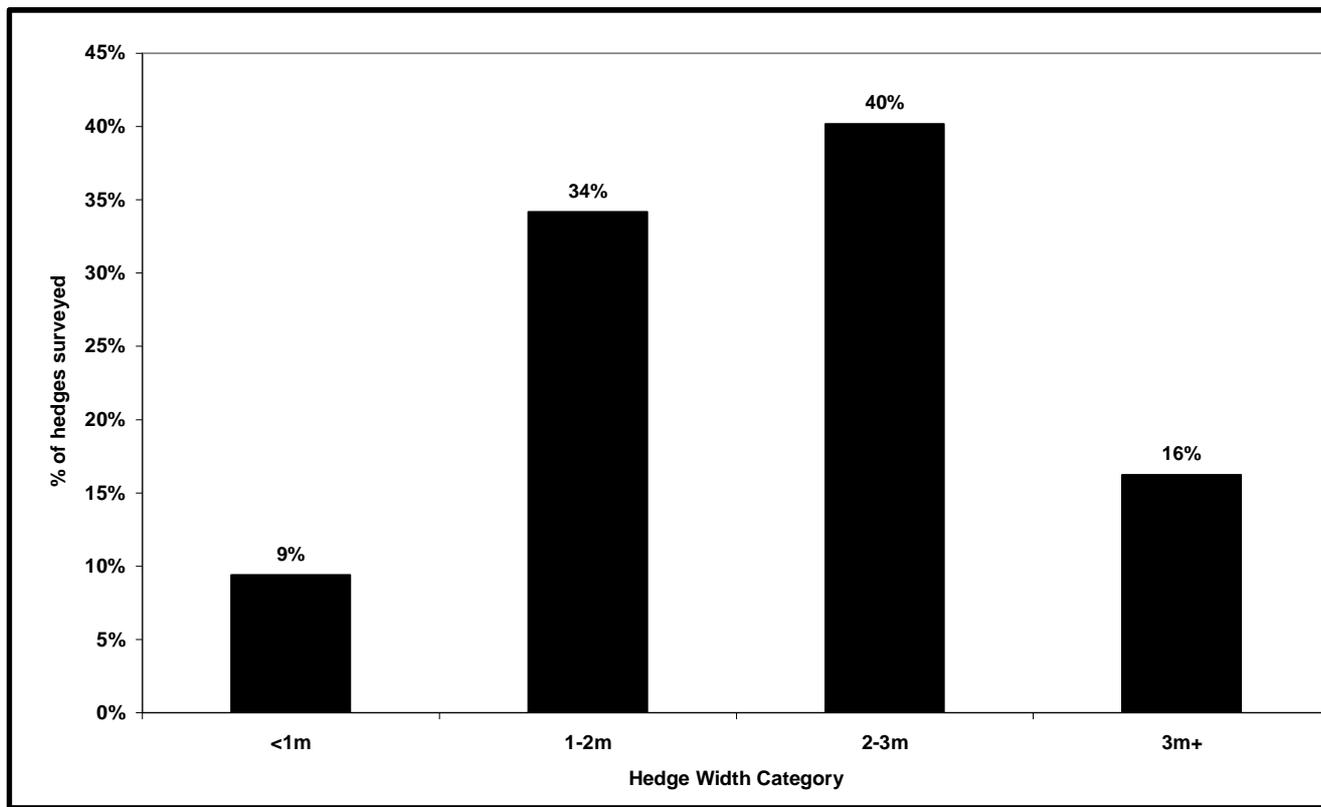


Figure 7.5.2 Proportion of hedges in hedge width categories

Percentage of Gaps

'Gappiness' is an assessment of the percentage of the length of the hedge that no longer has a cover of hedgerow shrubs. Gaps are associated with a weak hedge structure and are often a symptom of the deterioration of the hedge often caused by the demise of plants through age or inappropriate management. Some hedges have very well defined individual gaps, other have a low stocking density of shrubs and trees that result in a lateral weakness in the structure. Figure 7.5.3 shows the breakdown of the sample in terms of percentage gaps over the length of the hedge.



Hedge with high percentage of gaps near Cadamstown (KE01)

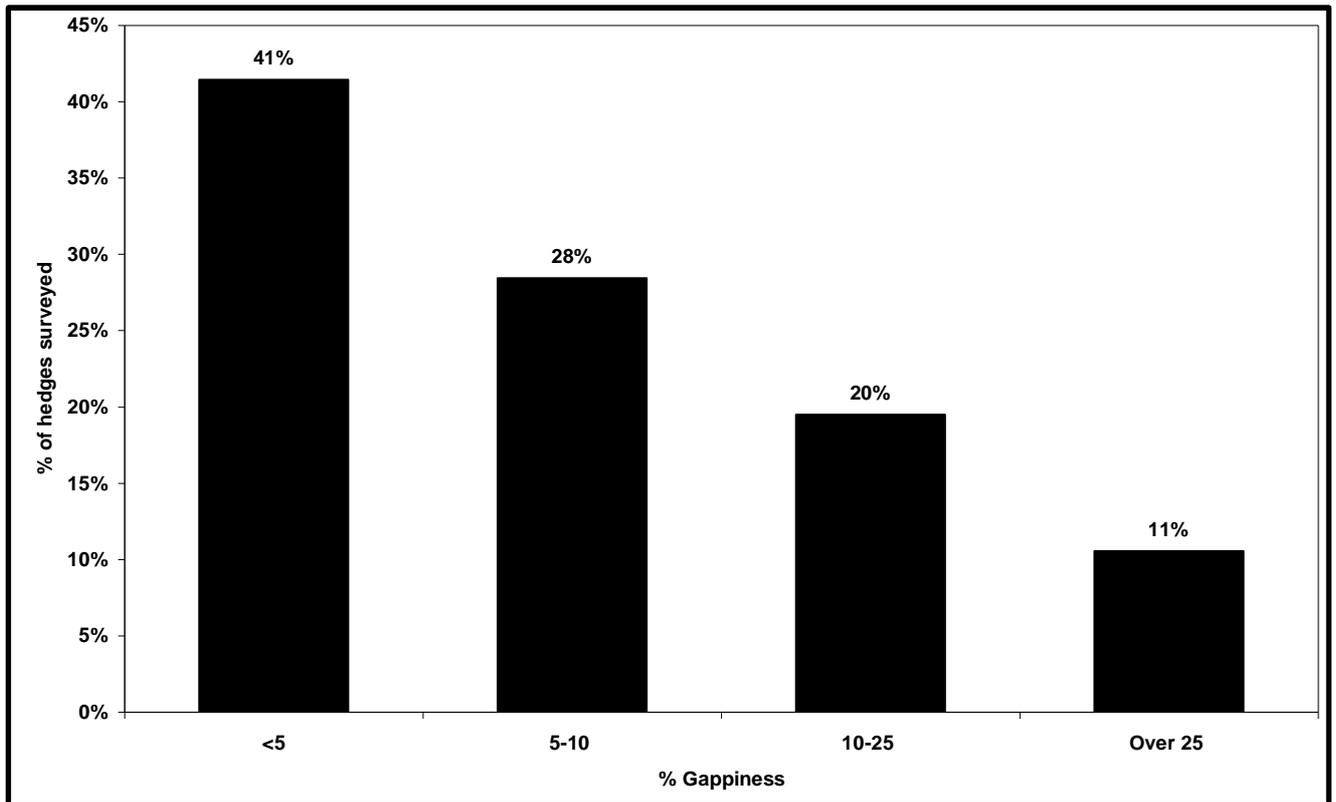


Figure 7.5.3 Proportion of hedges in ‘percentage gaps’ categories

These figures exclude remnant hedges which by definition contain over 25% gaps. In absolute terms there is clearly potential for reducing the level of gappiness in County Kildare’s hedges. However, in relative terms County Kildare has the highest proportion of hedges (41%) in the lowest category of percentage gaps. This is over twice the figure recorded in Counties Roscommon and Westmeath.

Basal Density

Recording how dense the growth of hedge shrubs is in the bottom metre of the hedge is an important indicator of the hedge structure both environmentally and agriculturally. A hedge where the woody shrub growth is dense at the base is obviously better from a stock control perspective but it also considered beneficial for the hedges ability to support wildlife. Figure 7.5.4 shows the breakdown of how the samples fared in terms of the hedge base categories.



Hedge with a dense base – Curragh (KE12)

Once again County Kildare hedges compare favourably with the results from other counties in having fewer hedges with an open base and a greater proportion of hedges with a dense base structure. County Kildare is the only county, so far, to record over half of its hedges with a dense base. Also, the proportion of hedges having an open base is almost twice as high in County Longford and over three times higher in counties Roscommon and Westmeath.

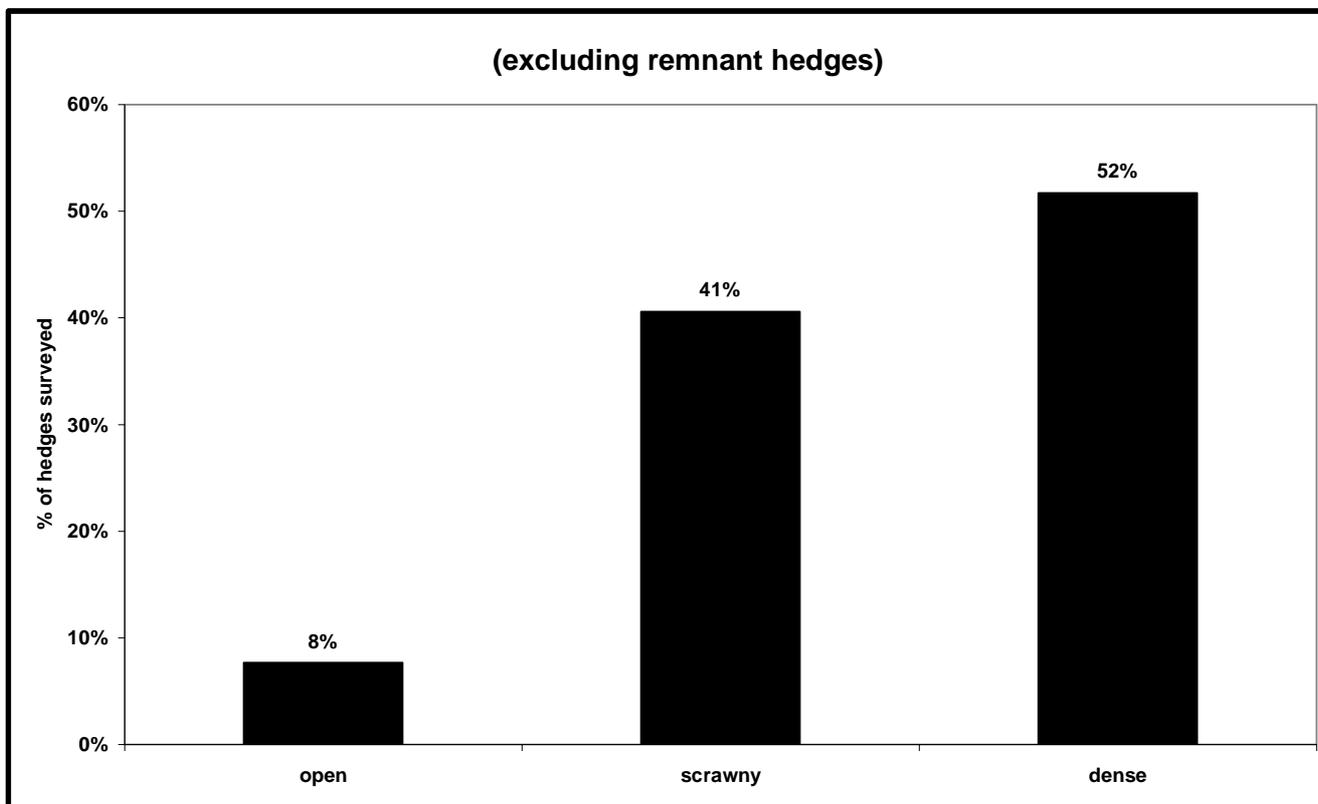


Figure 7.5.4 Proportion of hedges in basal density categories

Hedge Profile (cross section)

As hedgerow shrubs mature, growth near to the base generally declines as the plant is no longer threatened by browsing. This process is recorded as ‘*losing structure*’, and without management intervention plants can revert to their natural tree form with an empty or open base. Assessing the profile or cross sectional area of a hedge can be a good indicator of this process and the hedges potential need for rejuvenation. Hedgerows that contain a high proportion of spreading shrubs like blackthorn and gorse can eventually spread to a point where they are no longer considered to be hedges and are re-classified as other habitat types, most commonly scrub/ transitional woodland. The survey noted where the profile of the hedge included a significant element of outgrowths to the side of the main hedge line. An assessment of the findings in the sample hedges is shown in Figure 7.5.5.



Hedge losing base structure near Clane (KE05)

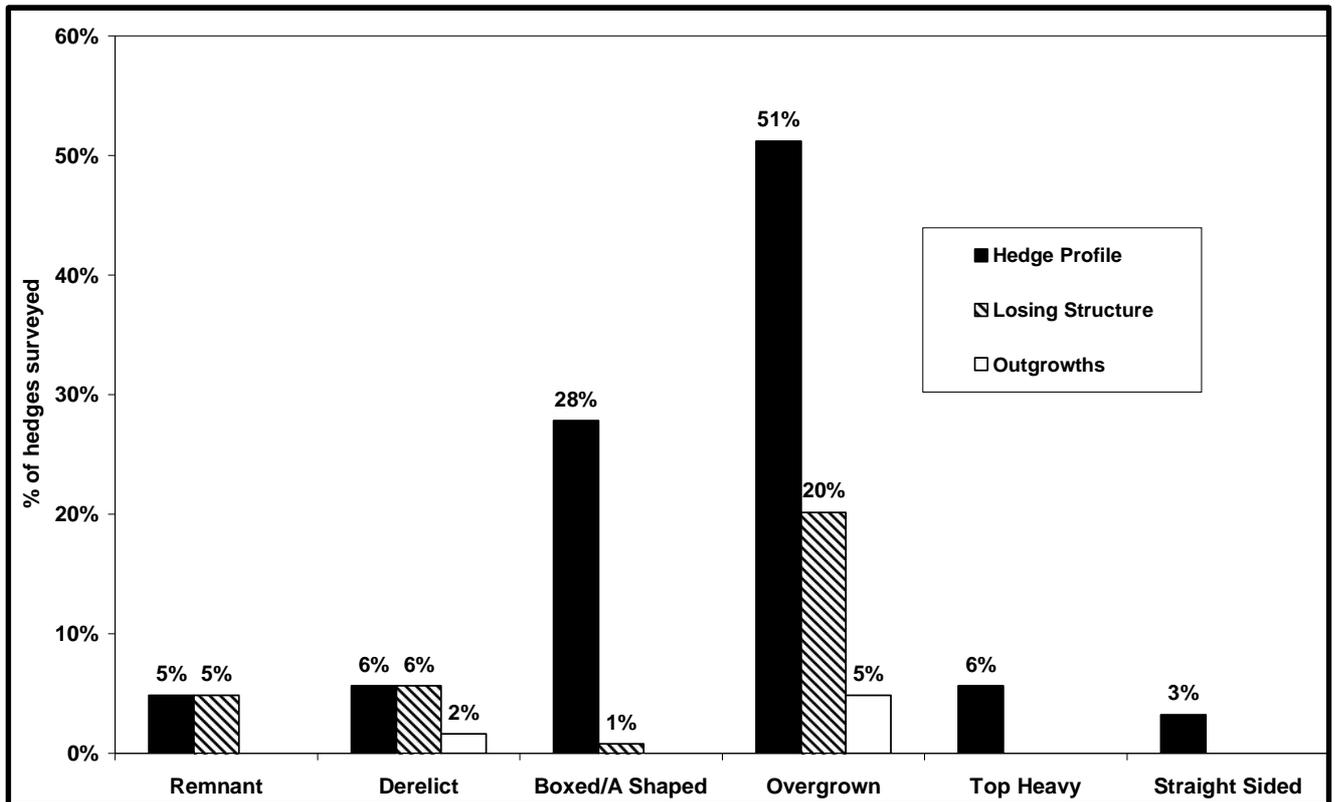


Figure 7.5.5 Proportion of hedges in profile categories

County Kildare is similar to the south midland counties of Laois and Offaly in having a relatively low proportion of derelict and remnant hedges. The average for these three counties is 10%, against an overall average of 16% when the north midland counties of Longford, Roscommon and Westmeath are included. 40% of overgrown hedges in County Kildare (20% of the total) were considered to be losing their base structure and reverting to tree form which can be considered a sign of deteriorating quality.



Remnant hedge near Ballymore Eustace (KE13)

Hedgerow Trees

This survey looked at both the abundance of trees in hedges (Figure 7.5.6) and also the age composition of the trees (Figure 7.5.7).

Hedgerow trees are a distinct feature of County Kildare hedgerows being present in 74% of hedges sampled. Although counties Longford and Westmeath recorded a higher proportion of hedges containing hedgerow trees County Kildare hedges tend to have more trees in them with over a third being classed as having either abundant trees or being a line of trees.



Line of trees near Kildare (KE11)

Hedgerow trees can be the result of intent where young trees have been purposefully allowed to grow and mature as part of a management regime, or they can be a consequence of lack of management. Colonising species such as ash and sycamore become established in hedges and grow unchecked by management activities. Only 14% of hedges containing trees in County Kildare were classed as being long-term unmanaged so the high presence of hedgerow trees appears to be by design rather than accident.



Fine Oak tree in Ballymore Eustace hedge (KE13)

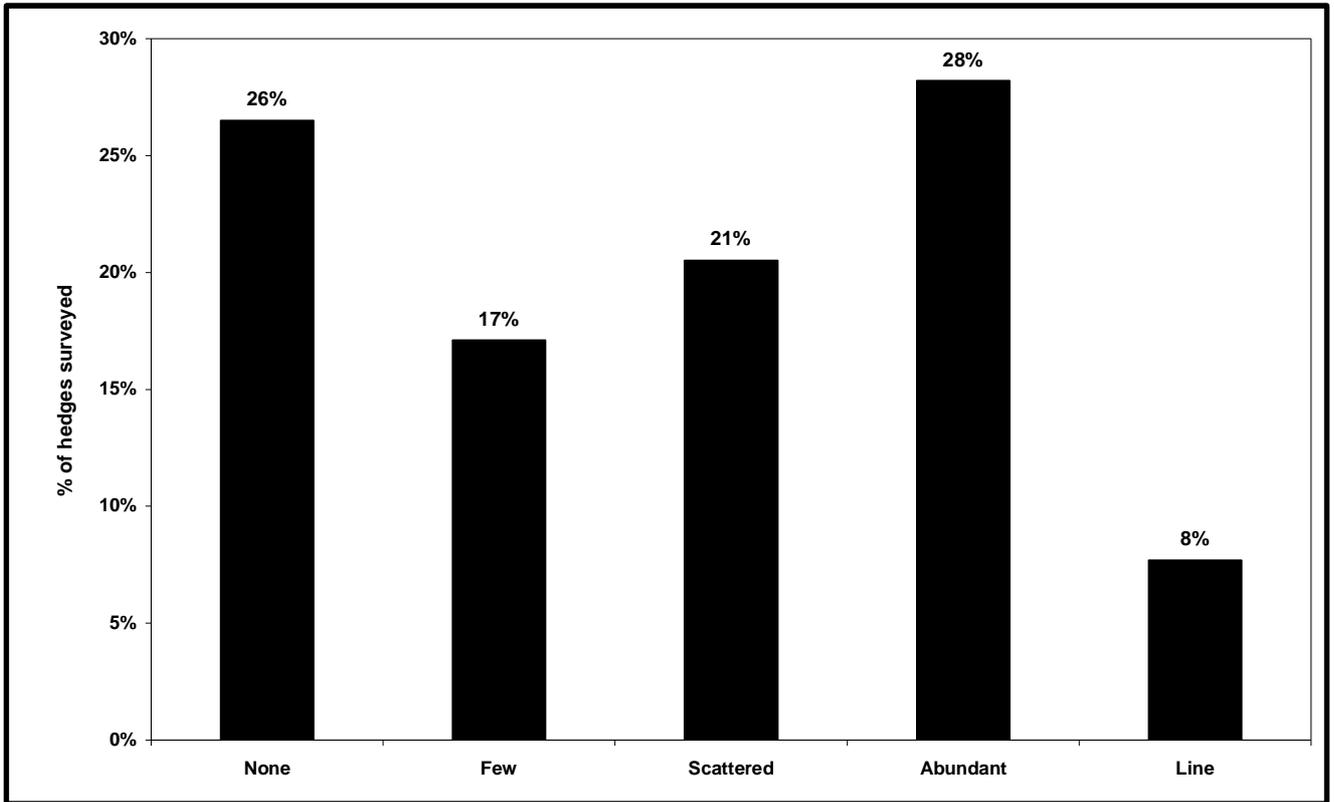


Figure 7.5.6 Proportion of hedges in abundance level of hedgerow trees categories

Tree Age Composition

It is generally considered that to achieve sustainable levels of hedgerow trees a balance between young, medium and older trees needs to be maintained. 77% of the County Kildare hedges which had hedgerow trees recorded young trees as being present. This is a positive sign for the future. County Offaly, which has a similar proportion of hedgerows containing trees, had only 48% with young trees.

Bank/Wall Degradation

Where hedgerow shrubs are established in hedge banks the viability of the hedge can be threatened if the bank is damaged. Root systems are exposed to damage, drying and infection with the result that overall stability can be reduced. Ground flora is also compromised. Sampled hedges were examined for damage to the supporting structure and the results are shown in Figure 7.5.8.



Severe bank erosion near Enfield (KE02)

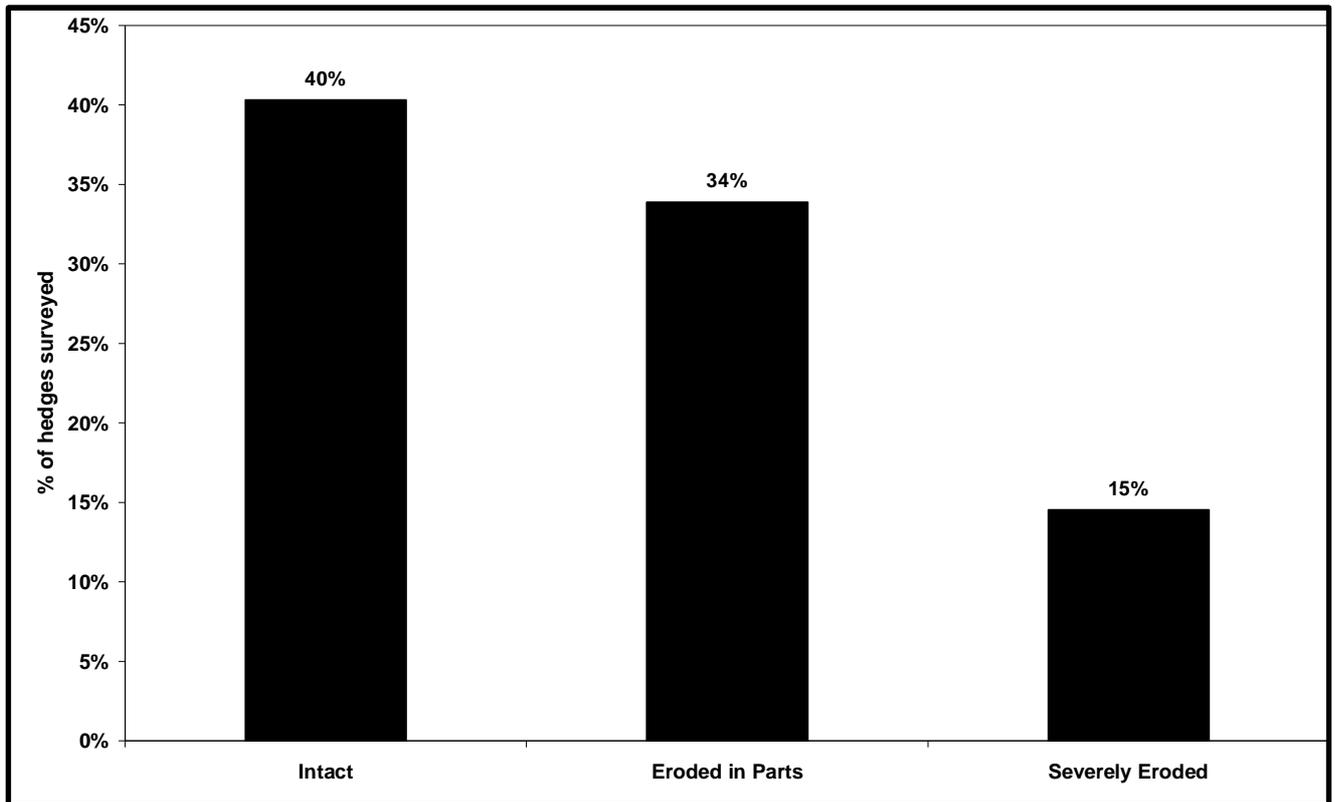


Figure 7.5.7 Proportion of hedges having degraded banks or walls

Degradation of hedge banks has been a common feature in all of the county hedgerow surveys conducted to date. With 15% of hedges being classed as having severe degradation to the fundamental structure of the hedge this should be an issue for some concern. The positive features of sound structure of the woody component of a hedge can be negated where the hedge bank is badly damaged. Renovation of the damage accompanied by protective fencing may be required to rectify the problem.

Vigour

With a view to long term viability an assessment was made of the overall vigour of the sampled hedges. Only 3% of the sample was deemed to be lacking vigour which is the lowest figure recorded in any of the county hedgerow surveys. Where hedges were showing reduced vigour it was almost invariably a result of farming practices. Spray drift from herbicide applications was the most common cause, but one hedge was severely damaged by the nutrient run-off from a large volume of manure in close proximity to the hedge. These statistics do not include remnant hedges.



Effects of spray drift on elder leaves in Derrinturn hedge (KE03)

7.6 MANAGEMENT OF HEDGES IN COUNTY KILDARE

The management of hedges affects the hedge structure, condition and sustainability which in turn impacts on functional, biodiversity and aesthetic values. For these reasons an in-depth assessment of hedge management forms an important part of this survey. The implications of management variables recorded are presented in section 8.0.

Figure 7.6.1 gives a breakdown of the hedgerows sampled by their type of management.

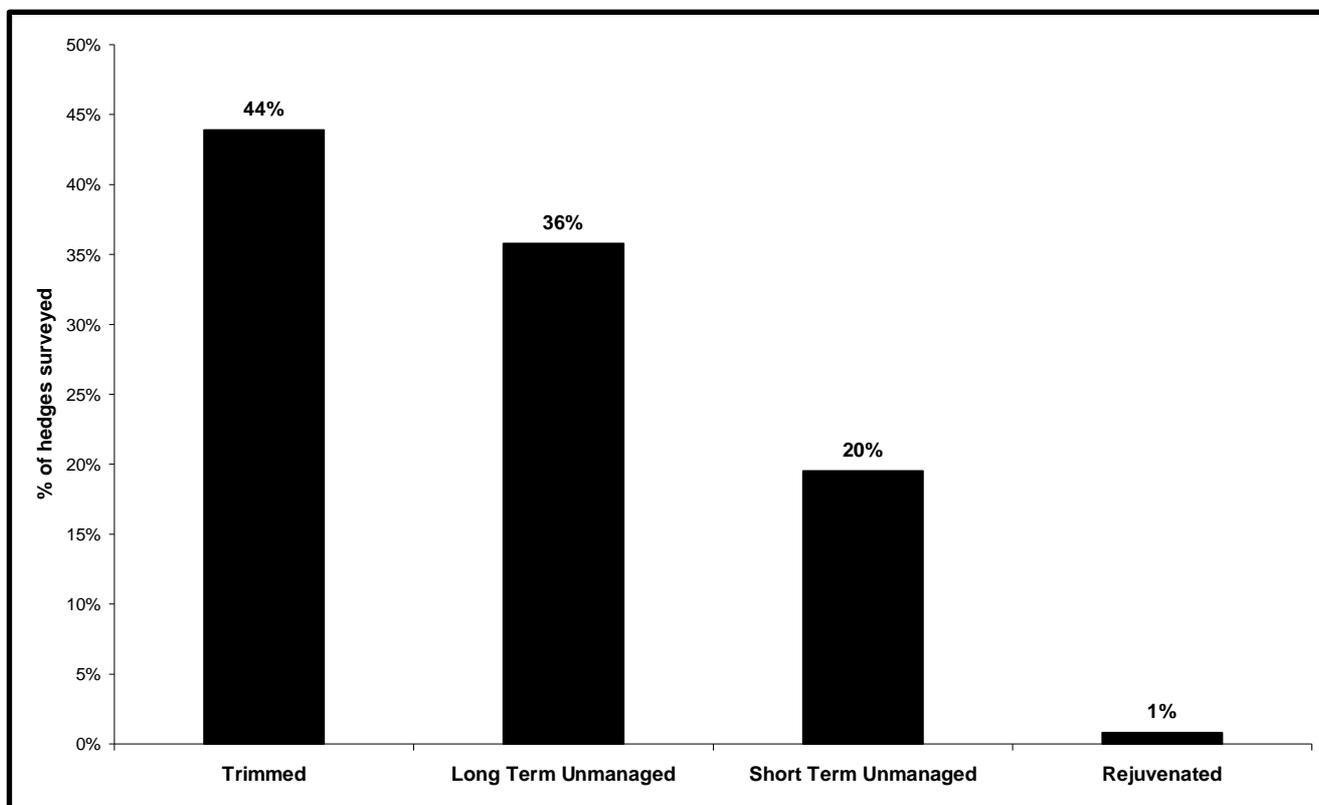


Figure 7.6.1 Breakdown of the management type of the sample

There has been a considerable contrast in the degree to which hedges are managed across the country. Based on the county surveys conducted to date they range from County Laois where 77% of hedges have received some degree of management intervention in the recent past (last eight years) down to County Roscommon where the figure is just 38%. County Kildare falls at the upper end of the spectrum, with 64% of the hedges sampled showing some evidence of recent management, with 44% being managed in the last year.

Abandonment of management is regarded by most experts as the principle cause of dereliction and eventually the demise of hedgerows. It is generally considered that hedge rejuvenation needs to be carried out on most hedges at least every 30 years in order to maintain sustainability. This means that overall 3.3% of hedges would need to be rejuvenated on an annual basis. In this survey just 1% of the hedges surveyed in County Kildare showed evidence of rejuvenation within the last few years, implying that current rates of rejuvenation are not sufficient to maintain a sustainable resource.

The method by which hedges were managed was also investigated. Where hedges have been managed in the short-term past, but not during the current season, detecting the precise means by which the management was carried out can be difficult to establish, Figure 7.6.2 shows the breakdown.

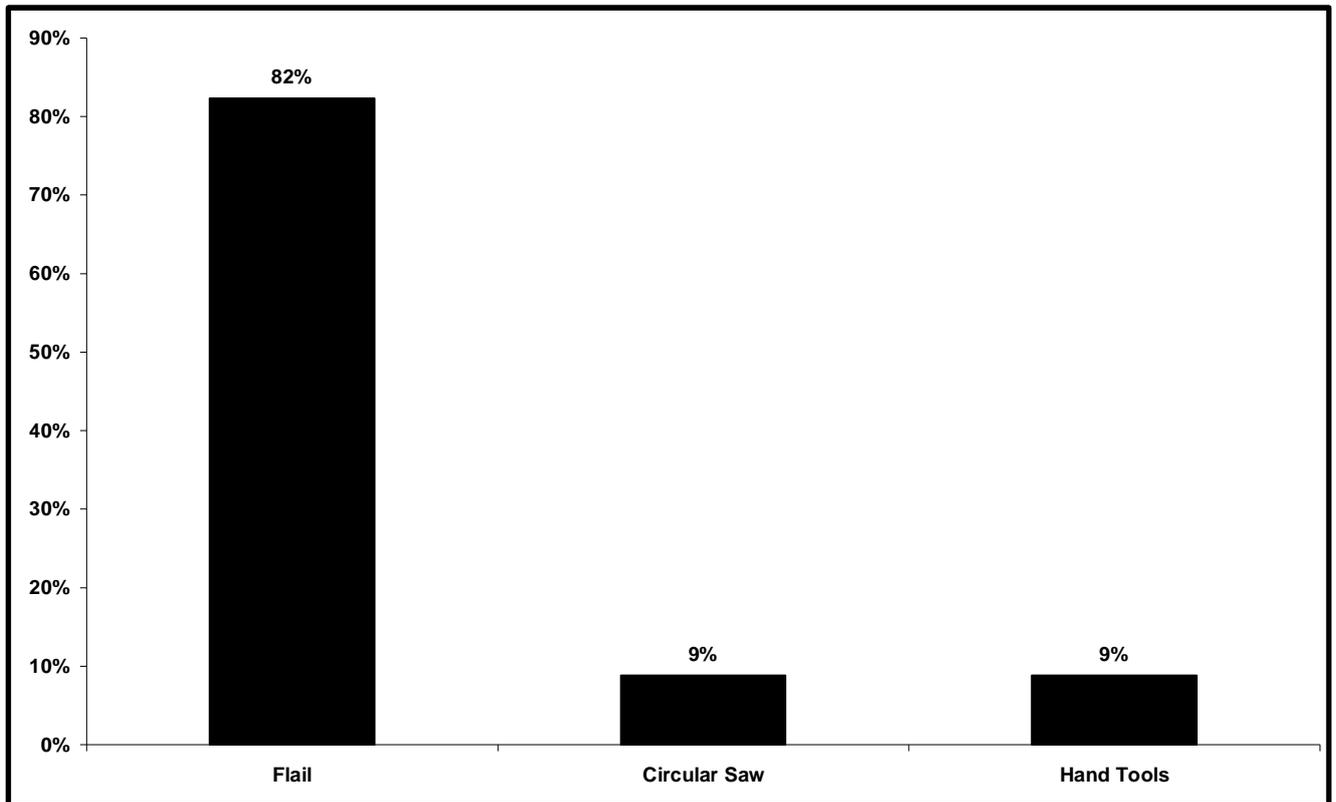


Figure 7.6.2 Proportion of managed hedges in management method categories.

In common with the other south midland counties of Laois and Offaly the flail is by far the most commonly used method of managing hedges. A breakdown of the trimming profiles for routinely managed hedges showed that proportion of hedges being trimmed to the A-shaped profile recommended by the REPS and Teagasc to those being trimmed to a more conventional box profile was 13:87. In absolute terms this is a disappointing result, but is vastly superior to results from other counties where there are few examples of hedges trimmed in the recommended manner.



Rathangan hedge trimmed to A-shape profile (KE06)

The use of hand tools to manage 9% of hedges was somewhat surprising, but was largely accounted for by the use of hand-held reciprocating bar hedge cutters to trim hedges on stud farms. Only County Longford (at 13%) has recorded a higher percentage of hedges managed with hand tools, but the nature of the hand management was of a slightly different nature there.

The principal original function of hedges was to act as stock-proof barriers. The current survey looked at to what extent the hedgerow network is being reinforced with additional fencing to maintain its stock retaining capacity. The results are shown in Figure 7.6.3.

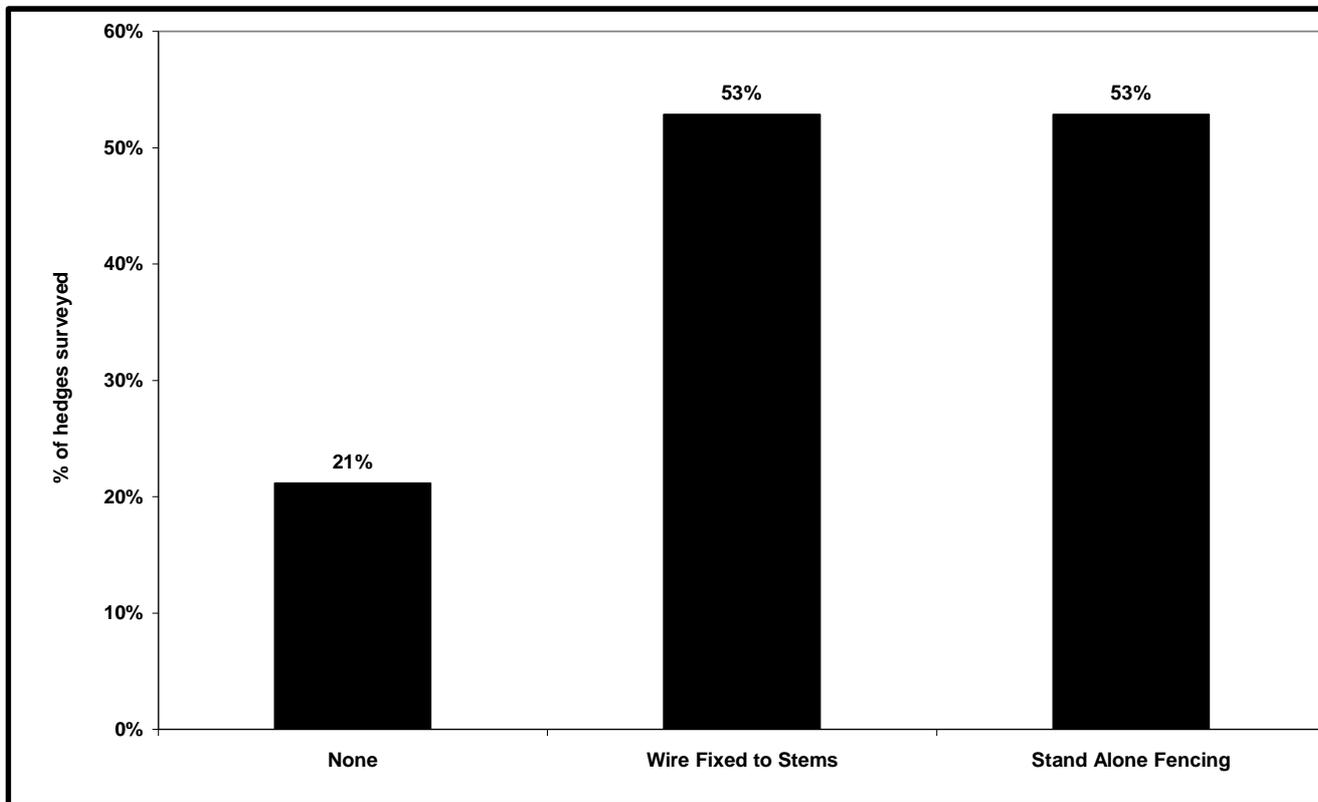


Figure 7.6.3 Additional fencing of hedgerows

Most hedges (79%) in County Kildare are reinforced with some other type of fencing. In a third of cases the additional fencing simply involves the fixing of wire to the existing hedgerow shrubs and trees, but some hedges have more than one layer of additional fencing.



Seven strands of wire attached to this Derrinturn hedge (KE03)

By eliminating redundant boundaries from the analysis the percentage of hedges that are fenced increases to 83%. Although the percentage of long-term unmanaged hedges decreases from 36% to 34% if these redundant boundaries are ignored, this still means that 50% of redundant boundaries are being actively managed. Details are shown in Figure 7.6.4.

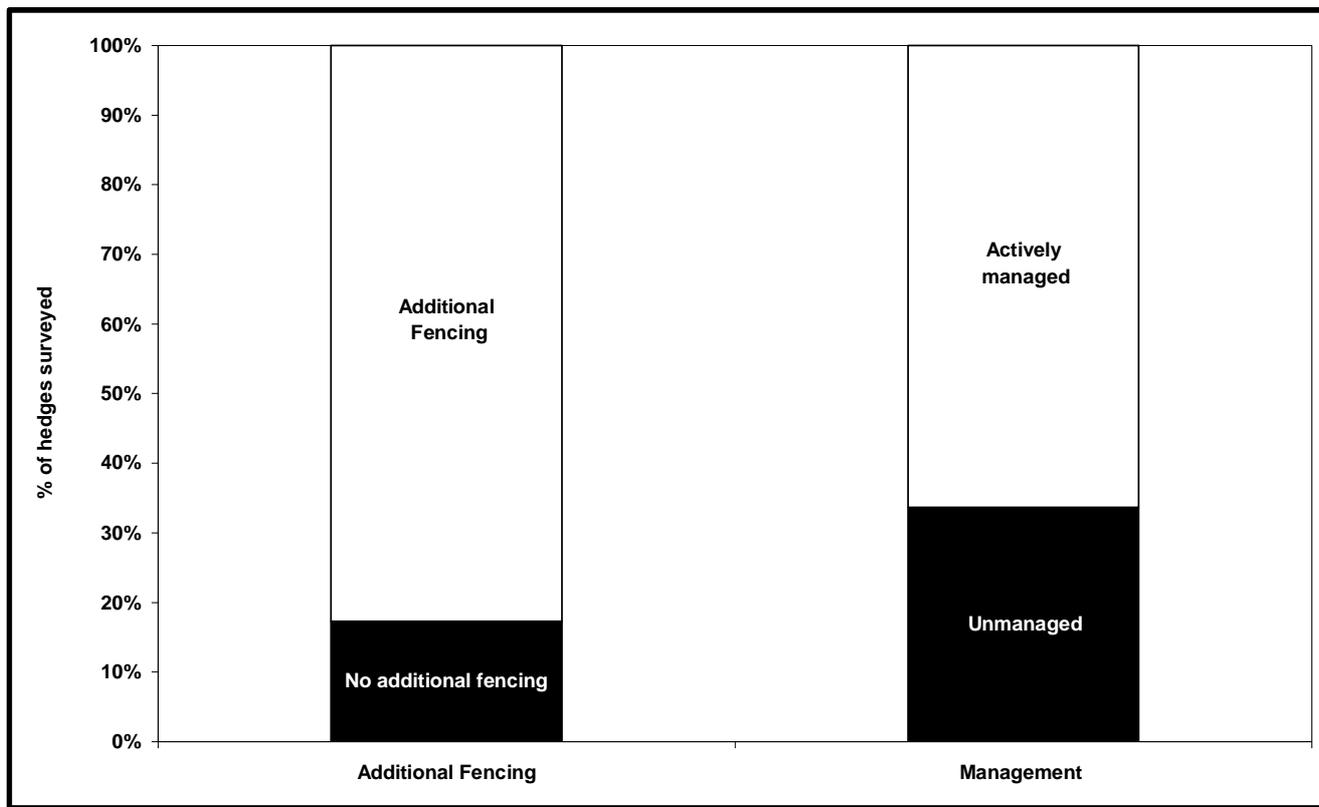


Figure 7.6.4 Fencing and management of hedgerows along active boundaries

15% of the hedges recorded showed proof of having been laid in the past. Evidence of old hedge laying can be difficult to detect in dense hedges or those with dense ground vegetation so it should be assumed that these results are on the conservative side. Counties Westmeath and Offaly have both recorded figures of over 25% in this category. The tradition of laying hedges tends to reduce further west, with counties Roscommon and Longford at 12% and 6% respectively. An ongoing survey in County Leitrim has yet to find a single example of this management technique. Despite the promotion of hedge laying as a means of rejuvenating hedgerows in the REPS, no recent examples of hedge laying were recorded during the survey.



Evidence of old hedge laying in Ballymore Eustace hedge (KE13)

7.7 QUALITY OF HEDGES IN COUNTY KILDARE

Condition of Species Rich Hedges

The Steering Group for the UK Biodiversity Action Plan (UK Biodiversity Action Plan Website) have produced a list of nine criteria as to what constitutes 'favourable condition' for species rich hedges. Of these only five were sufficiently consistent with data recorded in the County Kildare Hedgerow Survey to allow comparison. These were

1. Average height at least 2m
2. Average width at least 1.50m
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.

There are no defined criteria for what is considered to be a species rich hedge or what is considered to be favourable condition for Irish hedgerows. In the absence of such criteria I have based my assessment on the British measures (see Recommendation 6.5).

All sample hedges were assessed against the above criteria.

23% of hedges sampled in County Kildare passed all of the above standards for favourable condition which compares favourably with results from other counties.

Of the sampled hedges in County Kildare, 18.8% were classed as species rich and of these 41% passed the above criteria for favourable condition. This is 7.7% of the total hedges sampled, an identical figure to that in County Offaly, but some way below the 14.5% of County Laois. All of the available comparative figures from the other County surveys are shown in Table 7.8.1.

Table 7.7.1 Comparison of the 'favourable condition' status of hedges in midland counties

| County | % of hedges in favourable condition | % of Species Rich Hedges | % of species rich hedges in favourable condition | % of total sample that are species rich hedges in favourable condition |
|-----------|-------------------------------------|--------------------------|--|--|
| Kildare | 23.0 | 18.8 | 41.0 | 7.7 |
| Longford | 6.4 | 15.4 | 16.7 | 2.6 |
| Laois | 20.0 | 44.7 | 32.4 | 14.5 |
| Offaly | 4.8 | 31.5 | 24.4 | 7.7 |
| Roscommon | Not available | 4.8 | 55.6 | 2.6 |
| Westmeath | Not available | 4.6 | 14.3 | 0.7 |

Figure 7.7.1 shows a breakdown of how the sample compared against each of the favourable condition criteria.

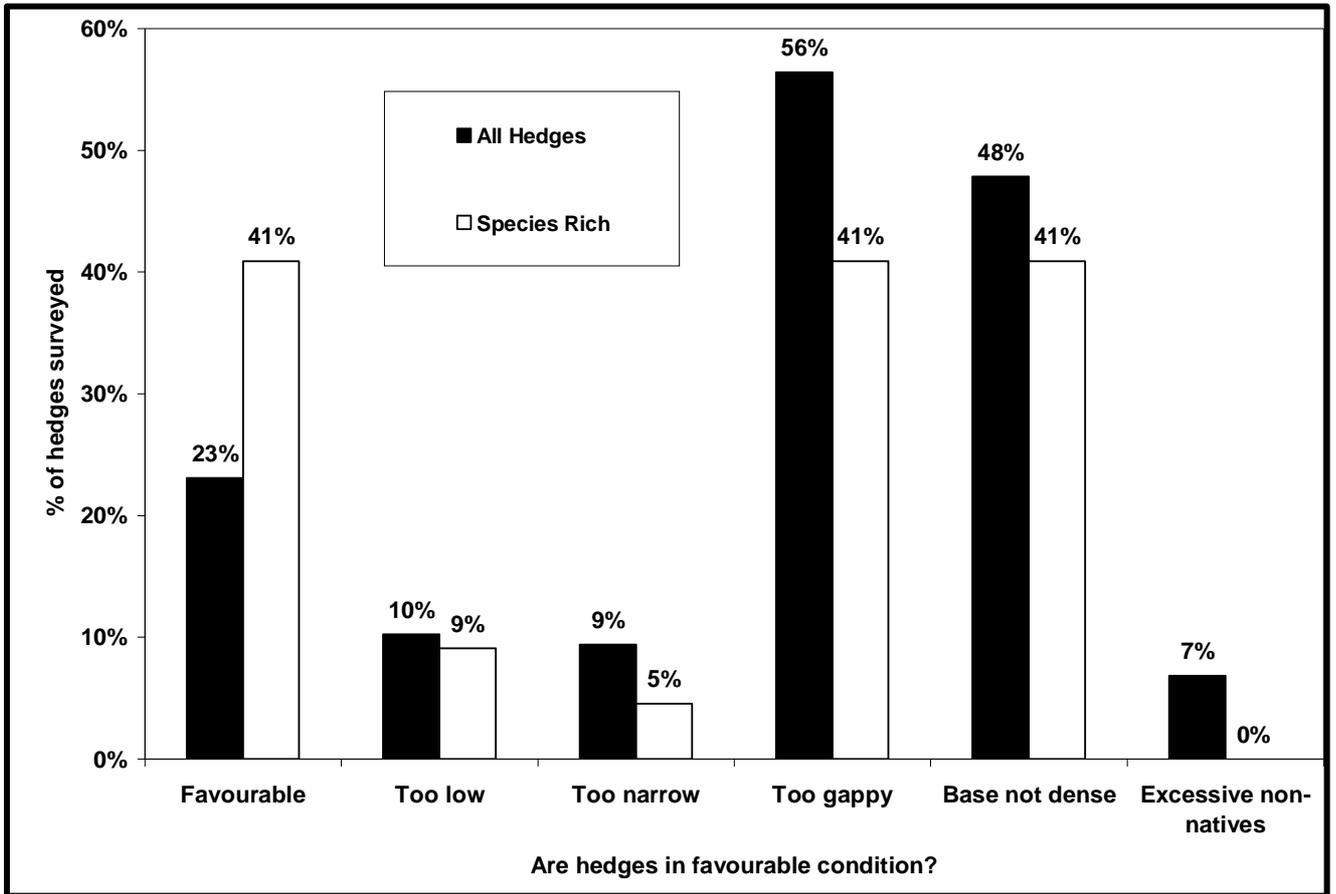


Figure 7.7.1 Favourable condition status of hedges



Hedge in favourable condition in Kilmeague (KE07)

An examination of how the hedges fared in each of the favourable condition criteria categories reflects a similar pattern to that found in other counties. Lack of height and width are an issue in a

relatively small number of hedges and are relatively easy to rectify, but of much more significance are the level of gaps and the base structure of the hedge. Excessive gaps and lack of base structure are factors generally associated with lack of management intervention. They will almost certainly require greater levels of appropriate management involvement to achieve favourable status.

The non-native species that is present to excessive levels is almost invariably Wild Privet. The species is considered native to certain parts of Ireland, but, according to Webb (1977), not County Kildare. Beech and Sycamore are other species that impact on the statistics in this category. The increasing use of sycamore in afforestation schemes makes it probable that its presence in hedgerows will increase in the future as it a ready coloniser.

7.8 OTHER OBSERVATIONS

A number of observations were made during the period of fieldwork which could not be recorded as part of the survey methodology but are considered to be worthy of note.

New Hedges

New and young hedges which would not be included on old O.S. maps and which would be too small to register as distinct linear features on aerial photographs (or have been planted in the five years since the aerial photographs were taken) could only be recorded if detected during the field survey. There was encouraging evidence of new planting in certain areas, and in my opinion there was more evidence of recent planting than in any of the other county surveys. This includes the planting of saplings in to existing hedgerows. With the development of the REPS the extent of new hedgerows would be expected to grow over the next number of years.

The mitigation planting observed in respect of Motorway development left much to be desired in respect of species selection and quality of work.



Oak sapling planted and protected in Athy hedgerow (KE16)

Summer Cutting

Accurate assessment of ‘out of season’ cutting cannot form a part of the overall survey methodology because it can take place any time from 1st March to 31st August whereas fieldwork may well be completed, as in this case, earlier in the season. Also, it can be almost impossible to ascertain later in the season whether a hedge was cut in February or a few weeks later. Only one sample hedge was noted as having probably been cut after 1st March and it would be my observation that the degree of out of season cutting of hedgerows in County Kildare is less than that noted in most of the other county hedgerow surveys. Hedgerow survey reports in counties Laois and Longford have flagged this as a management issue.

Cutting hedgerows during the growing season is potentially damaging to the health of hedgerow shrubs and to much wildlife dependent on the hedge. It is also contrary to the conditions of REPS agreements. However, some out of season cutting may be necessary in respect of public health and safety.

Appropriate Boundary Treatments

Hedgerows can form a most appropriate boundary around developments in many areas of the countryside. My observation during the course of this survey is that there is a lack of consistency in the approach to this subject. This is a planning issue. Without access to the relevant planning consents it is not possible to state whether this is at the application or the enforcement stage.

The GAA might be expected to favour the use of native species in their boundary hedges. In my experience the opposite is usually the case. Credit is due to the Grangenolvin Club on the hedge that bounds their grounds, a photograph of which is shown below.



Mature native species hedge bordering Grangenolvin GAA ground

Ground Flora and Fauna

The survey methodology does not have the scope to make any meaningful recordings of the wild flora and fauna associated with hedgerows. However, during the course of the fieldwork, record was made of any uncommon ground flora species. Table 7.9.1 is a list of those ground flora species recorded during the survey.

Table 7.8.1 List of ground flora species recorded

| Common Name | Latin Name |
|------------------------|-----------------------------------|
| Birdsfoot Trefoil | <i>Lotus corniculatus</i> |
| Bittersweet | <i>Solanum dulcamara</i> |
| Bladder Campion | <i>Silene vulgaris</i> |
| Bluebell | <i>Hyacinthoides non-scriptus</i> |
| Burdock | <i>Arctium spp.</i> |
| Butterbur | <i>Peaasites hybridus</i> |
| Charlock | <i>Sinapis arvensis</i> |
| Chickweed | <i>Stellaria media</i> |
| Columbine | <i>Aquilegia vulgaris</i> |
| Common Field Speedwell | <i>Veronica persica</i> |
| Common Poppy | <i>Papaver rhoeas</i> |
| Common Reed | <i>Phragmites australis</i> |
| Cowslip | <i>Primula averis</i> |
| Cransebill | <i>Geranium spp.</i> |
| Creeping Cinquefoil | <i>Potentilla reptans</i> |
| Dog Violet | <i>Viola riviniana</i> |
| Field Pansy | <i>Viola arvensis</i> |
| Field Wood-Rush | <i>Luzula campestris</i> |
| Figwort | <i>Scrophularia nodosa</i> |
| Garlic Mustard | <i>Alliaria petiolata</i> |
| Germander Speedwell | <i>Veronica chamaedrys</i> |
| Greater Stitchwort | <i>Stellaria holostea</i> |
| Hedge Woundwort | <i>Stachys sylvatica</i> |
| Herb Robert | <i>Geranium robertianum</i> |
| Hop Trefoil | <i>Trifolium campestre</i> |

Knapweed
 Lords and Ladies
 Marsh Bedstraw
 Meadow Vetchling
 Meadowsweet
 Nipplewort
 Ox-Eye Daisy
 Primrose
 Quaking Grass
 Red Dead Nettle
 Red Valerian
 Rosebay Willow Herb
 Scarlet Pimpernel
 Selfheal
 St. John's Wort
 Tormentil
 Vetch
 Watercress
 Wild Celery
 Wild Strawberry
 Wood Avens / Herb Bennet
 Yellow Iris

Centaurea spp.
Arum maculatum
Galium palustre
Lathyrus pratensis
Filipedula ulmaria
Lapsana communis
Leucanthemum vulgare
Primula vulgaris
Briza media
Lamium purpureum
Centranthus ruber
Epilobium angustifolium
Anagallis arvensis
Prunella vulgaris
Hypericum pulchrum
Potentilla erecta
Vicia spp.
Nasturtium officinale
Apium graveolens
Fragaria vesca
Geum urbanum
Iris pseudacorus

The above list is not exhaustive. The ground flora of Irish hedgerows is a subject worthy of more detailed study.



Columbine



St. John's Wort



Bittersweet

Numerous sample hedges have high proportions of nettles (*urtica dioica*) in the base of the hedge. This is generally an indication of high nutrient levels and can often be a result of slurry/fertiliser applications too close to the hedge.



Nettles dominating the ground layer of Moone hedgerow (KE17)

8.0 DISCUSSION

In this section the results of the survey are discussed in absolute and in relative terms.

In 'absolute' terms the hedgerow resource can be assessed in light of current thinking on best conservation practice and data can be compared against a set of agreed criteria for favourable attributes. The 'relative' assessment compares the resource with that from comparative studies in Counties Laois, Longford, Offaly, Roscommon, Westmeath, East Galway, and, where possible, with an ongoing study in County Leitrim.

In the future, a relative assessment could involve a follow up survey to compare the future resource with its current condition.

Hedgerow Extent

County Kildare has an extensive network of hedgerows throughout the county, with an estimated total length of 10305km.

Hedgerow Loss

It is anticipated, on the basis of observations made during the current study that there will be a measure of hedgerow loss in the coming decade unless development controls enforce mitigation for hedgerows lost as a result of development. There is also likely to be a measure of 'loss' through habitat change (see below) as some hedges spread to become areas of scrub as a result of less intensive agricultural management. The further development of the REP Scheme will create a measure of new hedge planting which will counteract losses in other areas. The extent data recorded during this survey sets a benchmark for future surveys. Repeat surveys in the future will enable quantification of the degree of gain/loss of hedgerows.

Hedgerow 'loss' can be a misleading term. It can reflect, as most people would expect it to, the direct loss or removal of hedgerows for agricultural, development or other purposes. Hedgerow loss figures would also include situations where hedgerows are re-classified as other habitats or features. For example, if a hedgerow deteriorates in quality to such an extent, particularly in respect of an increasing percentage of gaps, it can be re-classified as remnant hedgerow. Also of relevance to the current study is the situation where unmanaged hedgerows comprised of a high percentage of spreading or suckering species develop into small thickets or areas of scrub. Once a hedge line is greater than 4m in width it becomes re-classified as a new habitat type. Both of the above cases technically would be included in the figures for hedgerow loss. A similar circumstance can occur where areas of afforestation adjacent to hedgerows become sufficiently developed so that there is no distinction in the canopy between the forest and the hedge. The hedge is no longer a linear feature within the definition of the survey and the hedges are technically 'lost', despite not having been removed.



Blackthorn spreading to form scrub near to Clane (KE05)

Direct loss through removal for development purposes is likely to be an ongoing reason for a measure of hedgerow loss during the next number of years. Often, this involves short lengths to facilitate access and sight lines for new one-off houses. Loss rates are relatively small but habitat fragmentation may become an issue. A report by the Department of Environment: "Urban and Rural Roles" (2001), estimates that 420 km of hedgerow were removed in Ireland to facilitate sight-line requirements to new rural dwellings in 1999 alone. This rate of removal is 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).

Direct removal of hedges for agricultural purposes is not likely to be a significant factor due to the measure of protection afforded through REPS (REPS farmers are not permitted to remove hedgerows, and participation rates in REPS are expected to increase), but loss through deterioration in quality and ageing is likely to be a factor on farms if rates of rejuvenation are not increased. It will be an important component of any future survey that the nature of any future hedgerow loss be classified. Loss through change of habitat type may be considered a positive feature from a biodiversity perspective. This would depend on the new habitat type created; semi-natural woodland or scrub generally would be preferable to non-native woodland.

New, one-off, housing developments were a feature in a number of the sample squares. There was no consistency in how the existing roadside boundary hedges associated with these developments were dealt with. Greater care and protection is thus needed at the Local Authority planning level. There is evidence that hedgerow conservation measures included in planning consents are not being adhered to on the ground (McDonnell, 2005) and that greater enforcement of planning conditions is necessary.

The photographs below show three contrasting boundary treatments around new developments along the same stretch of road in County Kildare.



Native hedge removed and replaced with timber post and rail fence



Native hedge remove and replaced with (non-native) beech hedge



Native hedge retained

Some research is ongoing in County Roscommon to investigate the practicalities of physically moving mature hedgerows. If this can be carried out in a cost-effective way 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.

The hedgerow network is largely a feature of land ownership patterns and agricultural practices of the nineteenth century. Rationalisation of the resource particularly in light of modern agricultural methods has taken place on many farms particularly during the 1960's and '70's. Results from the hedgerow surveys undertaken indicate that this has happened to different degrees in different areas. In the south midland counties of Laois and Offaly just 8% of hedges were considered to be redundant, this figure rose to 15% in County Kildare putting it more on a par with the north midland counties.

Species composition

A total of 37 shrub species, including 18 native species, were found in the hedge layer of this sample of the county's hedges. The relatively high proportion of non-native species is an indication of the degree of settlement throughout the county. Few areas could be considered to be completely rural. Along with human settlement comes the introduction of species that would not be indigenous to the area. Just 42% of hedges were comprised solely of native species. Although the degree of species diversity within individual hedges is not as high as the south midland counties of Laois and

Offaly, County Kildare's hedges are generally more diverse than those of counties Longford, Roscommon and Westmeath with 19% of the County Kildare sample being classed as species rich (an average of four or more native species per 30m strip). Over 60% of hedges contained four or more native species in total along the length of the hedge.

Most hedges would be initially established using just one (usually whitethorn) or possibly two species. A number of factors contribute to the further development of the species composition of hedgerows through colonisation. Soil type and elevation can restrict the suitability for colonisation by certain species, as can the availability of a local source for the seed. Age can also be a factor in the colonisation process. Older hedges have more time to be colonised so are more likely to be more diverse than relatively younger hedges.

There does appear to be a geographic bias to the distribution of species rich hedges around the county. 55% of the species rich hedges noted in this survey were recorded in the five most northerly sample squares. There was also a small concentration of species rich hedges in the south of the county. The reasons for this distribution pattern are not clear.

Species rich hedges were assessed in relation to the Landscape Classification Areas in which they occur. With the exception of the Western Bogslands, there was a general trend for species rich hedges to be more likely to occur in areas with 'upland' as opposed to a 'lowland' classification. A possible explanation may lie in the fact that upland and bogland areas may be more likely to contain areas of semi-natural scrub and woodland which can act as a seed reservoir for hedgerow colonisation.

Results from the current study confirm the findings of previous hedgerow surveys that Hazel and Guelder Rose are found to be closely associated with species rich hedges.

Townland boundary hedges made up 14% of the sample, with hedges adjacent to public roads accounting for 15%. The figures are slightly higher than those from other county hedgerow surveys. A comparison of second edition Ordnance Survey maps with the current situation on the ground would suggest that there has been a degree of field boundary rationalisation in County Kildare. Townland boundaries (which are often farm boundaries as well) and roadside hedges are less likely to be removed as part of this rationalisation resulting in them forming a higher proportion of what remains. In previous hedgerow surveys, a specific study in County Kildare (Murray, 2001), and in Northern Ireland (Hegarty and Cooper, 1994) these two classes of hedge have been found to contain higher mean species richness than non townland boundary or non roadside hedges. This is assumed to be due to townland boundary and roadside hedges being generally of more ancient origins than non-townland boundary/roadside hedges. In the current study the difference exists but is less marked and there is no mathematical significance in the variation. However, townland boundaries not associated with streams have higher average species diversity than those adjacent to streams.

On the evidence from all of the surveys so far conducted the higher species diversity found for townland boundary and roadside hedges makes them candidates for particular care and attention in their management, and measures should be taken to avoid their degradation and removal wherever possible. There is currently little or no distinction, in terms of planning and development, or REPS between the different types of hedgerow recorded as part of this survey and their relative agricultural, ecological and aesthetic importance. The concept of '*Heritage Hedgerow*' should be considered to raise the status of certain hedgerows that have notable historical, structural, ecological or landscape qualities. Stakeholders will need to agree the criteria for what constitutes a Heritage Hedgerow. Hedgerows meeting these criteria could be noted on REPS plans; be identified in planning applications; be identified when land is re-zoned, etc. This should enable them to be monitored and might eventually enable their appropriate conservation to qualify for incentives for the landowner.



A row of balsam poplars has been planted beside this townland boundary hedge

33 tree species, of which 13 are native species, were found in the hedges of this survey with the majority of hedges (74%) having trees along their length. The most commonly occurring hedgerow tree in County Kildare (in common with all other counties) is by far the Ash (*Fraxinus excelsior*). Most of the non-native species would be related to hedgerows adjacent or close to dwellings. Despite the high number of non-native species recorded, Sycamore (*Acer pseudoplatanus*) and Beech (*Fagus sylvatica*) are the only non-native species found to any great extent in County Kildare hedgerows. Both of these species are not considered to be desirable as hedgerow trees on the grounds that they cast a heavy, suppressing shade and being non-native are of less value for wildlife than native tree species. With increasing housing development in rural areas the issue of the suburbanisation of the countryside by the introduction of non-native species (and native species of non-native seed origin) is one that needs to be debated. Allowing a greater percentage of the variety of native species present in County Kildare hedgerows to develop as hedgerow trees would, most likely, be a preferable option from a biodiversity perspective.



This crab apple could be allowed to mature into a tree instead of being trimmed

Ivy

Ivy was recorded as present in 83% of the 30m strips recorded in County Kildare. 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 view suggests that ivy can dominate its host and cause it to lose vigour and even eventually kill it. The other view 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. Just 4% of 30m strips recorded had ivy dominant at the canopy level for over 25% of their length. This is significantly lower than the 20% recorded in County Westmeath but is still an issue which needs to be monitored, since a further 11% of hedges were in the 11-25% cover category.

History and Landscape Context

The majority of the current hedgerow landscape in County Kildare was established during the period from the mid 18th century up to the early part of the 20th century, although a portion is likely to be older. Townland boundary hedges tend to be of more ancient origins than non-townland boundary hedges. Older boundaries frequently are non-linear and are often demarcated by natural features such as watercourses. In particular, the feature of a double ditch (comprised of a large hedge bank, often containing shrubs and trees, with a drainage ditch on either side) is characteristic of the county and is believed to originate from the Norman period.

An examination of the first and second edition maps (6" to the mile) produced by the Ordnance Survey can give an indication as to the period of origin of individual hedgerows.

In County Kildare, the first edition of maps was produced in 1837-8, followed by the second edition in 1907-09.

Where a boundary is present on the second edition Ordnance Survey maps, but is absent from the first edition it is possible roughly to date the origin the hedge to the period 1837 to 1909. 19% of the sample hedges were not present on the first edition maps from 1837-8. The second edition O.S. maps (1907-09) show less than 7% of the sample hedges were not present.

Boundary lines shown on the original edition maps were not necessarily hedgerows. However, some boundaries shown include small tree symbols to indicate the presence of timber trees. This could indicate an avenue or tree line but could also represent a hedgerow containing mature trees. More recently established hedges (that are not present on the second edition O.S. maps), are most likely associated with Land Commission property divisions. These hedges are almost invariably species poor. The average native species diversity of those hedges not present in 1837 was 2.32 species per hedge compared with an overall average of 2.88 native species per hedge. The second edition O.S. maps in general show the greatest degree of field division, indicating that although land enclosure was well established before the famine, further sub division of lands was ongoing up to the end of the nineteenth century. From that period to the present there has been a degree of field enlargement and also realignment, most probably during the latter half of the twentieth century. There are exceptions to this general rule. One sample square (KE13, Ballymore Eustace) has shown that an area sub divided into 11 fields on the first edition O.S. maps was just one field by the time of the second survey. So, presumably, hedgerow removal is not solely a recent phenomenon.

85% of hedges surveyed in County Kildare were linear in outline. This is generally an indication that the boundary was laid out by a surveyor and the hedges are relatively recent in origin. A high proportion (68%) of the non-linear hedges recorded form part of either a townland boundary, a roadside or stream boundary. This would tend to support other findings that non-linear hedges are normally associated with hedges of antiquity (Murray, 2001).



Non-linear hedgerow near Derrinturn (KE03)

The period of origin of other hedges may be established by other means. Road-side, canal-side and railway-side hedges are likely to have their origins at the period of the development of the particular route. Documentary evidence should enable quite precise dating of certain hedges adjacent to such features, but was beyond the scope of this survey.

Hedgerows exist in the wider framework of the landscape. How hedges interface with the wider environment can have a significant bearing on their relative value in the landscape and their ability to support biodiversity. Where hedgerows sub divide improved grassland or arable land their absolute value for supporting a diverse ecology is reduced, but their relative importance for biodiversity in that area is increased. Two thirds of the County Kildare hedges surveyed occur within the context of intensive farming. Maintaining these hedges in a favourable condition for wildlife is relatively more important than for hedges in more extensively managed agricultural areas. In the extensive areas there is likely to be a range of potential habitat, in intensively managed farmland hedges may be the only habitat. In the context of REPS it would be very useful if a full habitat survey of each farm were conducted (in line with Fossitt, (2000)). This should enable greater prioritisation of management actions in order to maintain and enhance biodiversity.



Contrasting types of land adjacent to hedges near Rathangan (KE06)

Relative to other counties that have conducted hedgerow surveys, County Kildare hedges show fewer links to other natural and semi-natural habitats, with the exception of County Offaly. In general there is a higher degree of fragmentation of the resource with 19% of hedges not linking to these other environmentally benign habitat types, largely as a result of housing development. This

probably indicates that, overall, the ecology of the hedgerow landscape in County Kildare is less favourable towards biodiversity. However, some new housing developments are much more environmentally benign than others. It is outside the scope of this survey to assess the wildlife conservation value of hedgerow links but it might be a useful component of a biodiversity strategy if a simple biodiversity appraisal of houses and gardens could be developed for housing developments.

Hedge Construction

Hedgerows vary in their construction based upon numerous factors including soil type, topography, farming practice, tradition and legislation. In wetter areas or where soils are poorly drained, a bank would need to be constructed to prevent shrub roots from becoming water-logged. A drain to carry away surplus water would also be common. Where stony soils are frequent, hedge banks often contain quantities of field stone cleared from adjacent farmland when under tillage. Sometimes there is sufficient stone to construct a wall in association with the hedge. Older hedges may follow natural landscape features, such as streams; whereas other hedges were marked out by surveyors and follow straight lines. Certain Acts of Parliament prescribed specifications for hedgerow construction including dimensions for banks and drains, and methods of planting (Feehan 1983). Many landowners included such details as clauses in tenants' leases. Whitethorn was the preferred choice of hedgerow shrub, but crab was also recommended (Hayes 2003). Few hedges contain crab, but one hedge in square KE13, Ballymore Eustace complied very closely with establishment advice from the 19th century in having a mix of whitethorn and crab in the shrub layer, interspersed with mature timber trees (oak and cherry in this case).

The majority of hedges surveyed in County Kildare were of what could be considered a fairly standard construction of a single line planted hedge growing on a bank, often with an associated drainage ditch. However, the double ditch is a distinct feature of County Kildare. 2.5% of the hedges sampled were of this form of construction, all being in the north of the County.

Hedge banks, walls, and drains create niche environments for many wildlife species adding much to the habitat value of a hedge. They also improve the stock retaining capacity of hedges, particularly against sheep, and have a shelter value. In County Kildare, 34% of hedges had very large hedge banks, which are often also a good indicator of hedges of antiquity. None of the sampled hedges contained a stone wall as part of the hedge.

Hedgerows and their associated banks and drains act as buffers to nutrient loss from agricultural land, but there has been little or no research carried out in Ireland to evaluate to what extent. Given that the EU Nitrates Directive (1991) has been adopted on a national basis in Ireland research is needed to quantify the buffer role of different types of hedgerows in various agricultural situations.

Hedge Structure and Condition

There is a wide contrast in the structure hedgerows around the County, from the precisely managed hedges on stud farms and tightly managed tillage hedges to the less formal hedges on the less intensively managed lands further to the west.



Contrasting hedgerow landscapes around County Kildare

Many 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, and Lysaght, 1990).

In relative terms, the hedges recorded during the County Kildare survey compare favourably with those from other counties in respect of their basic structural characteristics.

10% of hedges recorded in County Kildare are maintained below 1.5 metres in height. This has been shown to be least beneficial to nesting birds. Research indicates that increasing hedgerow height correlates positively with increasing diversity of bird species in a hedge (Arnold, 1983; Lack, 1987). Taller hedges also provide better shelter for farm animals. In terms of farming, landscape and wildlife perspectives the fewer hedges recorded in this category, the better. Only County Roscommon has recorded a lower percentage of low cut hedges than County Kildare, with counties Laois and Westmeath both showing 20%+ hedges in this category. Three quarters of the low cut hedges in County Kildare were associated with either arable land use or were roadside hedges. County Kildare also recorded more hedges in the tallest hedge category (4m+) than any of the other counties.

As with hedge height, it is generally accepted that the wider the hedge, the better it is for wildlife, although agriculturally, allowing hedgerows to occupy too much land is less likely to be acceptable. A reasonable compromise would be not to reduce hedges below one metre in width. 91% of County Kildare hedges surveyed were greater than one metre wide.

It is generally acknowledged that lack of hedge management can lead to a weakening of the hedge base and lead to a gappier structure. Increasing levels of gaps in the hedge structure correlates with lower species diversity (Murray, 2001), as do smaller and lower hedges. At 41%, County Kildare has the greatest proportion of hedges in the 'fewest gaps' category. Also, it has the fewest hedges in the 'most gaps' category. As most hedge functions are diminished if the level of gappiness is too high, these results are encouraging, although there is room for improvement in absolute terms.

The density of shrub growth in the bottom metre of the hedge is also an important indicator of the hedge structure. Continuous hedges with a good basal structure are more agriculturally valuable as they may not need additional fencing, and good growth from the bottom of the hedge also improves the shelter value. Several studies have shown that density of growth in the hedge base also influences the hedges capacity for supporting wildlife (Arnold, 1983; Osborne, 1984). Kildare is the only county to record over half of its hedges as having a dense base structure.

The most commonly occurring hedge profile in County Kildare is the 'overgrown' category (51%) an indication of the fact that the hedges have not been subject to intensive recent management. This can be beneficial for wildlife. There are negative implications if hedges are left unmanaged for longer periods. Significantly, 20% of the overgrown hedges were considered to be losing their base structure, which is often a result of lack of appropriate management and would be considered an undesirable feature.



Overgrown hedge with good base structure near Enfield (KE02)

Just over a quarter of hedges have either the ‘boxed’ or ‘A-shaped’ profile characteristic of routine management. The Department of Agriculture and Food (REPS), and Teagasc recommend that when hedges are trimmed this should be done so that the hedge is wider at the base, tapering to a narrow top (A-shape). This reduces self shading and helps maintain a dense base to the hedge that is essential for stock control and also beneficial to the nature conservation value of a hedge. The county wide hedgerow surveys have shown that the message of the A-shape profile is slow to filter through to hedge cutting contractors with the vast majority of hedges still being cut to a box shape. In this survey there was greater evidence of hedges cut to an A-shape, although the balance is still 87:13 to the box shape.

Some out of season trimming of hedgerows may be necessary for health and safety reasons. This generally relates to roadside hedges. The impact of the use of different types of hedge cutting machinery should be investigated to determine whether certain types of cutter are less damaging to nesting birds.

Previous results from hedgerow surveys and other research from Britain (Sparkes et al., 2000) have shown that a high proportion of routinely managed hedges have little or no flowers or fruit. For best practice it is necessary to achieve a balance between maintaining hedge structure and density, and allowing hedges to flower and fruit. For the future this might best be achieved by annually or biennially trimming the hedge sides to taper in to an ‘A-shape’ whilst still allowing a portion of the top of the hedge to grow freely in order to flower and fruit. 6% of the sample was considered to have this (top-heavy) profile, compared with 7% in County Offaly and 16% in County Laois.



Moone hedge trimmed to ‘top-heavy’ profile (KE17)

Remnant and derelict hedges account for 11% of the sample in County Kildare. Remnant hedges are those where the shrubs have reverted to their (often aged) tree form with extensive gaps. They have declined to the extent that they can no longer be called hedges and are deemed to be beyond rejuvenation. They can be considered as being unsustainable. Without intervention derelict hedges will become remnant over time, and hedges that are classed as losing structure (where many of the shrubs and thorns of the hedge no longer display low dense growth, and most of the stems are visible) can, similarly, become derelict. These problems are not as evident in County Kildare as they are in Counties Westmeath and Roscommon.

In common with the results from the other county hedgerow surveys, damage to banks is a frequent occurrence in County Kildare. Livestock, particularly sheep, are generally the main agents of erosion. Reparation of this basic component of hedgerow composition needs to figure more in management plans for hedgerows, particularly in the REPS.

Management of hedgerow trees

Hedgerow trees are not only a very significant landscape feature; they are, especially when mature, also beneficial to the overall ecology of the hedge. Quantity and diversity are features of the tree component of County Kildare's hedges. Most of the hedges with trees have young trees as well as mature trees which is a positive feature from a sustainability perspective.

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. Over 14% of hedges recorded ash at Domin value of 6 or more (26% plus cover). This is particularly evident underneath overhead cables where hedges have to be topped on a regular basis.



Ash is beginning to dominate this hedge growing under telephone lines

For hedgerow condition, trees can pose their own set of problems in terms of competition for light and moisture with the shrub layer. Heavily shading non-native species such Sycamore (14% of hedges) and Beech (11%) can be a particular problem, while the leaf structure of the Ash tree allows greater penetration of light and thus does not impact hedge structure to the same extent.

Given the increased volumes of afforestation which include sycamore there is likely to be increased colonisation of hedgerows by sycamore in the future. This situation should be monitored and it may be necessary to put controls in place through the REPS.

Roadside Trees

The view has been expressed to the author 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 purely from a health and safety perspective, but must be weighed against the enormous aesthetic and wildlife value of roadside trees. County Kildare recorded the lowest percentage of roadside hedges containing trees (44%) In other parts of the country (including County Laois and County Westmeath) over 70% of roadside hedges have trees. It is 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.

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 (often unintentional) damage by machinery during the course of ordinary hedgerow management work. This can often impact on their health and ultimately their stability.

Responsibility, and hence liability, for the safety of roadside trees rests with the landowner. The costs of dealing with unsafe trees can be considerable. Anecdotal 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.

Hedgerow Management

Hedgerows are predominantly man-made features and most require a degree of management intervention to fulfil agricultural and biodiversity functions and remain sustainable. The Department of Agriculture & Food, through the Rural Environment Protection Scheme (REPS) sets guidelines for appropriate hedgerow management as part of its contract with participating farmers.

Measure 5 of the scheme concerns the Maintenance of Farm and Field Boundaries. The objective of the measure is to conserve, maintain and enhance hedgerows in the interest of stock control, bio-security, wildlife and scenic appearance of the area. Some of the guidelines for REPS Planners most relevant to the recordings of this survey are outlined below;

- Where ivy infestation is a risk to the stability or long-term viability of a hedgerow it should be controlled.
- If possible, one side of a hedge should be trimmed in a season.
- Careful consideration should be given when prescribing the lowering of the height of a hedgerow.
- The quest for neatness should not take precedence over ecological and landscape considerations.
- Hedgerow maintenance must be avoided during the bird nesting season (March 1st- August 31st).
- Where hedgerows are cut, they must be cut to an A-shaped profile.
- The crushing of hedgerows by heavy machinery is not permitted.
- Fencing wire should not be attached to hedgerow trees and shrubs.

Participants in REPS3, the most recent scheme, must also chose from a number of biodiversity options to qualify for additional payments. In respect of hedgerows, this can involve planting a minimum of three metres of new hedgerow per hectare annually, or rejuvenating a minimum of two

metres of hedgerow per hectare annually through either coppicing or laying on a maximum of 20 hectares of their holding.

The latest statistics from the Department of Agriculture indicate that, in County Kildare, there were 537 active participants in REPS on 30/04/06. County Kildare is at the lower end of the scale in terms of farmer uptake onto the Scheme. Despite this, almost €27 million has been paid out to farmers in the county since the scheme launched in 1994. The original costings for the Scheme suggested that 20% of spending by participant farmers would be on Measure 5 which would equate to an input of over €5 million from the Department of Agriculture towards farm and field boundary maintenance in the County since 1994.

Although one of the principle functions of hedgerows to agriculture is that they can act as barriers to the movement of stock, evidence from previous and current hedgerow surveys indicate that a significant proportion of hedges are either reinforced with wire or displaced as the principle barrier by stand alone fences. Only a fifth of hedges in this survey had no additional fencing. Over a half had some independent form of fence to supplement the hedge. Of more significance is the fact that over a half of hedges surveyed had wire attached to the hedgerow stems. This is an indication that the hedge is no longer totally fulfilling its function as stock barrier. Attaching wire to live wood 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 (45% of hedges containing wire were trimmed by mechanical means). Where wire is attached to hedgerow stems it can lead to bacterial and fungal infections which weaken the structure of the plant. In the worst case it can even threaten the viability 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.



Post and wire fence renders stock control function of hedgerow redundant

Some excellent examples of the traditional craft of hedge laying were detected during the survey, although no hedges recorded this type of management in the recent past. There is a distinct geographic bias to the results with 56% of the samples recorded in just three squares (KE08, KE12 and KE13). All of these squares (near to Naas, Kildare Town, and Ballymore Eustace) have strong connections with the racing industry and most of the laid hedges were recorded on stud farms. Overall 15% of hedges showed some evidence of having been laid at some point in their history. This is lower than the 24% and 26% recorded in counties Offaly and Westmeath respectively.

Rejuvenative hedge management refers to hedge laying, coppicing and the planting of new hedgerow stock to replace losses. Despite the increasing awareness of the value of rejuvenating hedgerows and its necessity for the sustainability of the hedgerow resource, this category of (recent) management was only recorded in 1% of the sample. Current rates of rejuvenation are not sufficient to maintain a sustainable resource.



New whitethorn quicks help to rejuvenate this Curragh hedge (KE12)

Interestingly, 50% of boundaries considered to be redundant are still being actively managed. Although the sample base is small the results are broadly consistent with those from the other county surveys. It would be interesting to canvass the opinion of farmers on what they consider to be the main benefits of hedgerows from an agricultural perspective and what are their management objectives.

Hedges can be managed to provide a supply of fuel-wood particularly given the abundance of ash, which makes excellent firewood. The abundance of multi-stemmed ash in hedgerows is evidence of it having been cut in the past, most probably for this purpose and a continuance of this practice would be consistent with Ireland's commitment under the Kyoto Protocol.



Ash that has been cut in the past, Moone (KE17)

Ground Flora

High densities of nettles and cleavers in the base of many hedges prevent the development of a more environmentally benign ground flora. High nutrient levels in the hedge base are often caused by inappropriate fertiliser and slurry application. With the implementation of the Nitrates Directive improved methods of slurry application are being promoted which should lead to reduced fertility in the base of hedgerows. This should create improved conditions for the restoration of a diverse herbaceous layer in the hedge base. However, research carried out in Britain (Marshall et al, 2001) suggests that more active intervention may be necessary to introduce environmentally desirable species compositions.

New Hedges

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 2,000 km of new hedgerows being planted annually under the scheme.

In Britain approximately 3500 km's of new hedgerows were planted annually during the 1990's. A sample study by Bickmore (2005) for DEFRA reviewed the establishment success of these hedgerows and concluded that ground preparation, quality of planting stock, soil type, and aftercare were all factors in successful establishment. Teagasc are promoting all of these aspects in their support of new planting to farmers in the REPS. Unlike in Britain and Northern Ireland there are no mandatory standards to which new hedges planted under EU agri-environmental schemes must comply. In five county wide hedgerow surveys the best examples of new hedge establishment that I have seen have been around new one off housing developments, and the worst in agricultural situations. One of the key problems is that protective fencing is invariably placed too close to the new hedge leading to browsing by stock. Within the next two years, Teagasc should carry out a similar specific study (on REPS farms) to that undertaken in Britain to assess the effectiveness of any new planting under the scheme. Anecdotal evidence from talking to farmers during this dry summer is that failure due to drought also has been a significant problem this year.

More stringent specifications need to be made in respect of mitigation hedgerow planting for motorway development if those examples observed during the survey are representative. Some of the issues noted include; use of non-native species, poor quality planting stock and planting too close to protective fences. Some of the examples observed, including the one in the photograph below near Enfield, appeared to be comprised mainly of species that were part of landscape plantings and not particularly suitable for forming the bulk of hedgerows.



Motorway mitigation planting near to Enfield (KE02)

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

More information is needed on the status and production capacity of the hedgerow nursery sector in Ireland.

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 1950s and 1960s, 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.

23% of all hedges sampled in County Kildare met all of those 'favourable condition' criteria of the UK Biodiversity Action Plan which were consistent with the recording details of this survey.

41% of the species rich hedges recorded were classed as being in favourable condition, compared with 24% and 32% in County Offaly and County Laois respectively.

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

The level of gappiness and the basal structure are the two categories responsible for the majority of the hedges failing to meet the criteria.

It would be beneficial if criteria were agreed by relevant stakeholders as to what constitutes 'favourable condition' for Irish hedgerows. Management plans in REPS could then be designed to achieve favourable status for hedges on REPS farms.

Comparison with Badger and Habitat Survey Data

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

The estimated hedgerow length in County Kildare was 9,809 km, based on the definitions and results of the *Badger and Habitats Survey of Ireland*.

By comparing the results of the two surveys an approximation of 'hedgerow change' during the period between the two surveys should be possible. This varies between 13 and 17 years as the *Badger and Habitats Survey* was conducted during the period 1989-1993.

The results from this survey would suggest that there has been a gain of 496km of hedgerows throughout County Kildare in the period between the two surveys. This would equate to an increase of 5.1% in the hedgerow network which is most likely to be an anomaly. More serious discrepancies occurred in County Roscommon (Foulkes and Murray, 2005b) and County Longford (Foulkes, ongoing study), where increases of approximately 40% were indicated.

Young hedgerows (less than 20 years old) were observed during this survey but total lengths were relatively small and an explanation of this variation must be sought elsewhere. In fact, observation of recent hedgerow removal for development purposes most probably exceeded that of any new planting.

There has been some suggestion that not all of the sample squares were recorded during the Badger and Habitats study and this could have an impact on the overall result. More probable is that certain areas in transition landscapes were classified as scrub in the *Badger and Habitats survey* but the current study would have identified individual lengths of hedgerow within these areas resulting in a higher figure for total hedgerow length.

Comparing recent hedgerow survey data with the Badger and Habitat survey results from Westmeath, Offaly and Laois indicated hedgerow loss at rates of 1.1% and 3.8%, and 6% respectively in a similar period

The discrepancy between the figures produced between the recent hedgerow surveys in Counties Longford and Roscommon and those of the Badger and Habitats Survey would suggest that any direct comparison between the current hedgerow surveys and the Badger and Habitats study is irrelevant unless the sources for the above discrepancies can be deduced.

Methodology

When examining individual hedgerows the figure of 30m is generally considered as the standard sampling size for recording information on the floristic composition of the hedge. This is based on the work of Dr. Max Hooper (1970) in Britain. The U.K. Hedgerow Regulations, however, require that one 30m strip per 100 metres of hedge must be surveyed and the result is then averaged to give an average species diversity figure per hedge.

The methodology for this survey states that two randomly selected 30m strips per hedge should be selected from which to record hedgerow species composition data.

28% of the sample hedges in County Kildare showed a difference of 2 or more in the species count between the two 30m strips. In County Offaly the figure was 27% and 23% in Counties Laois and Longford. In County Roscommon and County Westmeath, where overall species diversity was lower, the figures were 19% and 14% respectively. These figures would justify the decision to record two strips and would suggest that there is a need to review the method for assessing representative sampling of hedgerows for species composition in Ireland.

This sample survey covers approximately 1% of the area of County Kildare, with the sample areas chosen on a semi-random basis. There was a suggestion from someone with an extensive knowledge of the county that the areas selected were not particularly representative of the county as a whole (Aidrian King, personal communication). It is vital that the data collected during sample surveys such as this one are sufficiently representative of the total area otherwise a false picture can be created. The sampling method outlined in the survey methodology has been used for numerous habitat related studies as a systematic approach is considered to be very efficient for sampling landscape types (Harrison and Dunn, 1993). In Britain it is considered that subdividing the sample into areas or 'strata' with similar characteristics is likely to improve the statistical accuracy of the survey sample (Bickmore, 2002). This stratification is usually based on landscape classification. Since there is no landscape classification to cover the whole of the Ireland, using this model in counties where such classifications exist would then make county studies incomparable. However, I would advocate a review of the sampling method used for regional based hedgerow surveys in Ireland.

9.0 RECOMMENDATIONS

The recommendations included in this section are based on the results of this survey considered in the light of current best conservation practice. Hedgerow conservation is within the remit of numerous stakeholders who have differing degrees of influence over the resource. In order to better target the recommendations, their relevance to each of the stakeholder groups is tabled at the end of the section with lead partners identified where appropriate. A copy of this report should be circulated to a representative of each of the stakeholder groups.

9.1 CONTEXT

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

Change has been a constant feature of the Irish landscape. It is an insufficient reason to try to conserve hedges just because they are there. Instead, their continuing role needs to be assessed in the context of the changing needs of agriculture, biodiversity, the environment, and the 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 wildlife conservation is more highly regarded. The role played by hedges in maintaining water quality is insufficiently understood but in light of current research in Europe (Viaud et al., 2001), 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 & Policy) most especially through the REP Scheme. Within the context of these changes, the heritage 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 fully 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 dynamic factor. Hedgerows are considered to be sub-optimal woodland edge habitats for wildlife. Most of the species that utilize hedgerows would be more at home in native woodlands. If, in any region, the area under native woodland were to increase significantly, the need for hedgerows as habitats in that area may diminish yet their importance as habitat corridors in order to maintain viable populations of woodland wildlife might increase.

The key to 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. The former may be a sub-optimum habitat for many species in its area; the latter might be the *only* habitat.

If hedgerow conservation is to be more than just aspirational then a series of practical, cost effective conservation measures need 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 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 generally 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 significant percentage of the current network has fallen in to disrepair over a period of decades. Reparation of degraded hedgerows involves substantially higher costs than the routine maintenance of hedges in good condition.
- Lack of knowledge/skill base.
 - Intensification of agriculture has tended to diminish the agricultural value of hedgerows. Prior to the introduction of the REPS in 1994 there were no external incentives for farmers to retain hedgerows whereas grants have been available for land reclamation and drainage which have involved hedgerow removal. Declining agricultural functional value led to a fall off in the practical knowledge and skills needed 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.
 In 2002, the number of agricultural holdings in Ireland totalled 136,500, compared with 419,500 in 1855, less than a third the number (CSO, 2002).
 Agricultural methods have changed significantly, especially in relation to mechanisation. In addition, the decline in the number of people engaged in agriculture is of consequence.

The recommendations included in this section are based on the results of the survey, considered in the light of current conservation best practice. Hedgerow conservation is within the remit of numerous stakeholders who have differing degrees of influence over the resource. In order to better target the recommendations, their relevance to each of the stakeholder groups is tabled at the end the section, with lead partners identified, where appropriate.

9.2 POLICY RECOMMENDATIONS

NATIONAL POLICY LEVEL

No.

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| | Any hedgerow conservation policy or actions need to be cost effective. Cost effectiveness can only be assessed when the full costs and benefits have been quantified. |
| 1.01 | A full cost / benefit analysis of the hedgerow resource should be carried out. |

REPS

| | |
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| 1.02 | REPS plans should show a distinction between active and redundant farm boundaries. Unless there are specific conservation or management objectives, resources should not be directed into hedgerows that form part of redundant field boundaries. Conversely, ancient, species rich, and other notable hedges should be given particular and carefully targeted management attention, where appropriate. |
| 1.03 | REPS 3 and REPS 4 need to prioritize the filling of gaps in existing hedgerows over the planting of new hedgerows. |
| 1.04 | The restoration and protection of degraded hedge banks and walls should be fully costed and included in the options for hedgerow management under REPS 4. |
| 1.05 | The creation/ restoration of a diverse herbaceous layer in the base of hedgerows currently populated with nettles, cleavers and other ruderal species should be fully costed and included in the options for hedgerow management under REPS 4. |
| 1.06 | 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 should be stated for the spacing of protective fencing from newly planted hedges in the REPS specifications and considered best practice for non REPS situations. |
| 1.07 | Ivy is a valuable wildlife plant but can, when over-dominant, be potentially detrimental to the long term viability of hedgerows. Its control may be deemed to be a necessary part of a hedgerow management programme (as in REPS). Guidelines should be given to REPS participants as to the timing of cutting ivy so as to minimize the wildlife disruption. This will need to be based on research evidence and then should be considered best practice for non-REPS situations. |
| 1.08 | Planners and Inspectors operating the REP Scheme need to become familiar with recognised Standards in hedgerow management. |
| 1.09 | Protection and enhancement of hedgerows that connect to other wildlife habitats such as woodlands and scrub will have a positive impact on the connectivity of wildlife habitats throughout the landscape and the stability of wildlife populations. Hedges that provide direct connections to other natural or semi-natural habitats should be prioritised for protection and enhancement, and where new planting is to take place, further wildlife corridor establishment be promoted. |

Afforestation

Afforestation with non-native forestry species, e.g. sycamore, has the potential to impact on the species composition of hedgerows in the longer term.

- 1.10 Forest Biodiversity Guidelines should include consideration of the potential impact of the new forestry on the wider ecology in the locality.**

LOCAL POLICY LEVEL

Local Planning and Development

There is a need for Kildare County Council to deal systematically with the relevant issues of this report and to give status to the recommendations. A policy document could set policy, standards and targets; and assign areas of responsibility.

- 1.11 As part of the County Kildare Biodiversity Action Plan, Kildare County Council should draw up a ‘Hedgerow Conservation Policy’ document.**

There is currently little or no distinction, in terms of planning and development, between the different types of hedgerow recorded as part of this survey and their relative agricultural, ecological and aesthetic importance. For example townland boundary hedges, hedges with good species diversity or those containing rare species, should be safeguarded more stringently in roads, construction, and other development operations.

- 1.12 In the planning process, greater consideration should be paid to individual hedgerows in light of their particular qualities and characteristics. The concept of “Heritage Hedgerow” should be introduced for hedgerows which have notable historical, structural, or species composition characteristics.**

Simple and systematic methods should be developed for dealing with hedgerows within the planning process.

- 1.13 Guidelines should be produced for planners and road engineers dealing with hedgerows in planning applications.**

- 1.14 Hedges on agricultural land that has been re-zoned for development should be surveyed and hedges with significant biodiversity, historical value, or containing rare species should be identified and incorporated into the GIS database.**

Paragraph 2.27 of The National Biodiversity Plan states that “For the future, the overall goal should be to have no net loss of the hedgerow resource”.

- 1.15 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. This should consist of a hedge of similar length and species composition to the original, established as close as is practical to the original and where possible linking in to existing adjacent hedges. Native plants of a local provenance should be used for any such planting.**

There is evidence from around the country that although measures to protect hedgerows are included in planning consents, lack of enforcement is resulting in less than optimum performance on the ground.

- 1.16 A study should be initiated to investigate the impact of development control in relation to hedgerows and to determine degrees of compliance with hedgerow related planning conditions by landowners.**

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| 1.17 | Greater enforcement of hedgerow conditions in planning consents is required. Enforcement of hedgerow conditions in planning consents could be achieved by making the retention, re-location, or re-establishment of hedgerows in planning consents 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. |
|-------------|--|

New Planting

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| 1.18 | The use of locally provenanced native plant species should be specified for any hedgerow planting (including hedgerow trees). Encouraging a diversity of native hedge species consistent with the findings of this survey is recommended. |
| 1.19 | Nurseries and garden centres in the County should be encouraged to carry sufficient stock of the above. |

Roadside Hedgerows

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|-------------|---|
| 1.20 | Although roadside hedges make up only approximately 11% of the overall hedgerow extent, the fact that they are at the front line of public perception of hedgerows, and that they tend to be relatively species rich due to historic factors, makes their appropriate maintenance particularly important. Special emphasis should be placed on the best practice maintenance of roadside hedgerows and verges. |
| 1.21 | In the period from late April to mid May during the fieldwork stage of this project numerous examples were seen of recent cutting of hedges which had no obvious justification on the grounds of Public Health and Safety. Cutting hedgerows during the growing season is potentially damaging to the health of hedgerow shrubs and to much wildlife dependent on the hedge. All of the relevant Stakeholders listed in Table 9.1 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. They should also commit to implement forward planning in order to minimise the necessity for cutting for safety reasons. |
| 1.22 | 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 (or other body) in the case of any complaints or actions taken. Recording photographic evidence prior and subsequent to the action would also be recommended. |
| 1.23 | A pilot programme for the assessment of the condition and potential hazard of roadside hedgerow trees should 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.

Incentives

Not all of the species rich hedges within the County fall within the protection and support of the REPS. Given their role as ecological corridors it is important that the appropriate management of these hedgerows on non-REPS farms be incentivised in order to prevent a fragmented countryside. This could be done through Local Authorities, NPWS, or Heritage Council.

- 1.24 Incentives for the conservation of, or renovation to, favourable condition of all 'species rich' (or 'Heritage') hedges should be available to landowners not participating in the REPS.**

Disposal of hedge cuttings

Many land owners have expressed uncertainty over the legitimacy of disposing of woody residue from hedge cutting by burning. A clarification of the interpretation of the relevant section of the Air Pollution Act is needed, along with consistency of implementation. Coppicing and hedge laying can generate significant amounts of this type of material. If the burning of hedgerow waste is to be prohibited the infrastructure for acceptable alternative methods of disposal needs to be developed.

- 1.25 After consultation with relevant stakeholders, all Local Authorities jointly should set consistent standards for the interpretation and implementation of the section of the Air Pollution Act (and any other legislation) relevant to disposal of hedgerow waste. This interpretation should be communicated to farmers, landowners and contractors. Kildare County Council should take the lead in this process.**

As they dry out and decay piled hedgerow cuttings begin to form a habitat for wildlife. Burning once they have reached this stage is damaging for that wildlife.

- 1.26 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. Cuttings should either be disposed of promptly or allowed to bio-degrade.**

Fuel Wood Production

Producing a greater proportion of its fuel demands from hedgerows would be consistent with Ireland's commitments under the Kyoto Protocol.

- 1.27 Farmers and landowners should be encouraged to utilise hedgerows for fuel wood production in a sustainable manner.**
- 1.28 Technical advice should be provided to farmers and landowners wishing to produce wood fuel on cyclical basis from hedgerows.**

Re-survey

The results of this survey should act as a benchmark for the assessment of trends in the status of the Counties hedgerow resource.

1.29 A repeat hedgerow survey for the county should be carried out no later than 2016.

9.3 RECOMMENDATIONS IN RELATION TO HEDGEROW MANAGEMENT IN COUNTY KILDARE

Standards of management activities

Results from the survey indicate that there is room for improvement in the structural quality of hedgerows, which can be achieved by appropriate maintenance.

2.01 As a base line, in order to achieve management objectives, stakeholders should commit to ensuring hedgerow management works carried out under their responsibility should conform to recognised, basic minimum standards.

- **Routine trimming should be carried out by operators qualified to Teagasc Unit MT 1302 – Mechanical Hedge Trimming.**
(This module 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.)
- **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.**

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.

2.02 Opportunities for training to recognised Standards in hedgerow management should be made more widely available.

Hedge trimming

Breasting hedges but allowing the top to grow freeform is as a management technique that potentially satisfies both ecological and agricultural functions. It is also well suited for the management of many roadside hedges.

2.03 Breasting hedges but allowing the top to grow freeform should be encouraged as a management option for routinely managed hedges.

2.04 Farmers and landowners in County Kildare should be encouraged to not reduce hedge height below 1.5m during routine maintenance.

2.05 Farmers should take particular care during spraying applications to prevent spray drift having a negative impact on hedgerows.

Hedge rejuvenation

Sustainable hedgerow networks will only be achieved if appropriate management regimes

based on long term needs are implemented. Levels of hedgerow rejuvenation need to increase significantly from those detected in the survey.

2.06 Greater levels of rejuvenation of old and degraded hedgerows should be encouraged.

Hedgerow Trees

The species diversity in the shrub layer of Kildare hedgerows is not proportionately reflected in the frequency of occurrence of many of those species in the tree layer.

2.07 Landowners should be encouraged to allow more of the wider variety of native species already present in hedges to mature into trees.

2.08 Control of invasive non-native species (especially sycamore) should be encouraged, particularly in species rich hedges.

Safety

2.09 Farmers and Landowners should be strongly discouraged from attaching fencing to hedgerow stems and trees.

2.10 Removal of old wire/ netting/ staples from hedgerow stems should be encouraged for safety reasons.

9.4 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.

3.01 A study should be conducted of nursery suppliers and garden centres to determine the availability of native planting stock (including provenance) for the range of hedgerow tree and shrub species recorded in the County Kildare Hedgerow Survey. This information should be disseminated to interested parties.

3.02 A programme should be developed for the identification, registration, and certification of local provenance seed sites for woody hedgerow shrubs in County Kildare.

Nurseries and Nursery Stock

Contact with nursery growers and other professionals has indicated a likely shortfall of native provenance whitethorn for the 2005/6 season. 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.

3.03 The production capacity of nurseries producing Irish hedgerow stock from Irish seed sources should be determined.

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.

- 3.04 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 Contractors

The vast majority of hedgerow management is carried out by operators using tractor mounted machinery. Some anecdotal evidence has suggested that, given the restricted legitimate season of cutting, business viability may be threatened. At a technical level 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.

- 3.05 A survey should be undertaken of hedge-cutting machinery operators, to assess the operation and requirements of the sector.**

9.5 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.

- 4.01 Ensure all relevant staff (and any contractors used) have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation.**

- 4.02 Provide appropriate training for staff in aspects of hedgerow conservation relevant to their position.**

Education in terms of best practice management is best implemented with reference to good examples.

- 4.03 A number of showcase sites of best practice covering different aspects of conservation and management should be developed around County Kildare.**

- 4.04 General Awareness of the values of hedgerows should be encouraged among rural communities through circulation of educational materials, an increase in targeted education for schools, and with the introduction of initiatives such as the Golden Mile Competition.**

Managing species rich hedges depends on the ability to identify species.

- 4.05 A pictorial information leaflet should be produced to show all of the species native to County Kildare Hedgerows. This should be distributed to Teagasc offices, hedge-cutting contractors, marts, creameries, garden centres, etc.**

- 4.06 The benefits of hedgerows for tillage farmers should be more actively promoted.**

9.6 RECOMMENDATIONS FOR FUTURE RESEARCH

Ecology

- 5.01 Studies should be undertaken to determine the extent to which adjacent land type and use influences biodiversity in hedgerows, particularly species rich hedges.**

Since a certain amount of hedge cutting is always necessary during the summer months

for health and safety reasons it would be beneficial to try and minimise the impact of the work from a wildlife conservation point.

- 5.02 The impact of different types of hedge cutting techniques and machinery should be investigated to determine whether certain techniques or types of cutter are less damaging to birds during the bird nesting season (1st March – 31st August).**

Ivy

- 5.03 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.**

- 5.04 Research needs to be carried out to determine the optimum time for the cutting of ivy (where necessary) to minimize the disturbance to dependent wildlife.**

Water Quality

- 5.05 Research is needed to quantify the nutrient buffer effect of hedgerows in different agricultural situations.**

Investigating Data Sets from other surveys

This survey uses the same sample areas as the Badger and Habitats Survey of Ireland, the Countryside Bird Survey and other surveys carried out by NPWS (e.g. hare survey). This should allow some comparison of data sets. Even more concentrated recording of habitat data and how these habitats change over time should allow for a greater understanding of the factors that govern the fluctuations in wildlife populations.

- 5.06 Data from this Hedgerow Survey could be related to previous surveys which have used the same sample area to enable more specific analysis.**

- 5.07 A full habitat survey should be conducted in each of the sample squares of this survey on an ongoing basis.**

9.7 RECOMMENDATIONS IN RELATION TO THE SURVEYING OF HEDGEROWS

National Survey

A National Hedgerow Survey is needed to fully record the national hedgerow resource and to place the findings of this survey in their national context. This can be achieved on a county by county basis. A full and meaningful floristic classification of Irish hedges can only be carried out when consistent data is available for the whole country.

- 6.01 It is recommended that comparable hedgerow surveys be carried out in other counties across the country.**

Survey Methodology

Consistency is required in the recording of hedgerow data at a national level.

- 6.02 The methodology used for this survey, after suitable review, should be adopted as the standard methodology for carrying out national, countywide or regional hedgerow surveys in Ireland.**

- 6.03 Any future surveys carried out using the same methodology as this one should**

include an appraisal of the methodology as part of any report.

6.04 An appropriate method of assessing the representative species composition for hedgerows in Ireland should be determined.

6.05 Criteria for what constitute 'species rich', 'favourable condition' and 'rare' will need to be developed in relation to hedgerows in Ireland, and should be decided upon by the relevant stakeholders.

Standardising data input into Geographic Information Systems

6.06 A standard format for the presentation of hedgerow survey data in GIS should be agreed.

Table 9.1 Relevance of Policy Recommendations to Stakeholders

| Stakeholder Group | Recommendation reference number | | | | | | | | | | | | | | | | | | | | | | | | | |
|-----------------------------------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|---|---|
| | 1.01 | 1.02 | 1.03 | 1.04 | 1.05 | 1.06 | 1.07 | 1.08 | 1.09 | 1.10 | 1.11 | 1.12 | 1.13 | 1.14 | 1.15 | 1.16 | 1.17 | 1.18 | 1.19 | 1.20 | 1.21 | 1.22 | 1.23 | 1.24 | | |
| Agri/Environmental Consultants | | * | * | | * | | * | * | * | | | | | | | | * | | | | | | | * | * | |
| Community Groups | | | | | | | | | | | | | | | | | * | * | * | * | * | | | * | | |
| Department of Agriculture | L | L | L | L | L | L | L | L | L | | | | | | | | * | | | | | * | | * | | |
| Developers | | | | | | | | | | | | | | | | * | * | | * | | | | * | | * | |
| Environmental NGO's | | | | | | | | | | | | | | | | | | | | | | | * | | | |
| Farmers/Landowners | | * | * | * | * | | | | | | | | | | | | * | * | * | * | * | | | * | * | |
| Forest Service/Foresters | * | | | | | | | | | L | | | | | | | | * | | L | | | L | L | | |
| The Heritage Council | * | | | | | | | | | | | | | | | | | | | * | L | | | | | |
| Kildare County Council | | | | | | | | | | | L | L | L | L | L | L | L | * | * | * | * | * | * | L | L | |
| Management Professionals | | * | * | | | | * | | | | | | | | | | | | * | * | | | * | | | |
| National Parks & Wildlife Service | * | | | | | | | | | | | | | | | | | | * | * | * | * | | | | |
| Nurseries, Garden Centres | | | | | | | | | | | | | | | | | | L | | | | | | | | |
| Research Institutions | * | | | | | | * | | | | | | | | * | | | | | | | | | | | |
| Semi-State Bodies | | | | | | | | | | | | | | | | | * | | * | * | * | | | | | |
| Teagasc | * | * | * | * | * | * | * | * | | | | | | | | * | | | | * | | * | | L | * | * |

* denotes relevant recommendation

L indicates Lead Partner/s

Table 9.2 Relevance of Management; Infrastructural; and Education and Awareness Recommendations to Stakeholders

| Stakeholder Group | Recommendation reference number | | | | | | | | | | | | | | | | | | | | | |
|---|---------------------------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|---|
| | 2.0 1 | 2.0 2 | 2.0 3 | 2.0 4 | 2.0 5 | 2.0 6 | 2.0 7 | 2.0 8 | 2.0 9 | 2.1 0 | 3.0 1 | 3.0 2 | 3.0 3 | 3.0 4 | 3.0 5 | 4.0 1 | 4.0 2 | 4.0 3 | 4.0 4 | 4.0 5 | 4.0 6 | |
| Agri/Environmental Consultants | * | | * | * | * | * | * | * | * | * | | | | | | * | * | | | | | * |
| Community Groups | * | | * | | | | | | | | | | | | | * | | * | | | | |
| Department of Agriculture Developers | * | * | * | | * | * | | | | | | | | * | | * | * | | | | | * |
| Environmental NGO's | | | | | | | | | | | | | | | | | | | | | * | |
| Farmers/Landowners | * | | * | * | * | | * | * | * | * | | | | | | * | * | | | | | * |
| Forest Service/Foresters | * | | | | | | | | | | | L | L | L | | * | * | | | | | |
| The Heritage Council | | | | | | | | | | | | | | * | | | | | | | | * |
| Kildare County Council | * | | * | * | | | | | | | | | | | | * | * | L | L | L | | |
| Management Professionals | | | * | | | | | | | | | | | | * | * | * | | | | | |
| National Parks & Wildlife Service | * | | * | | | | | | | | | | | | | * | * | | | | | |
| Nurseries, Garden Centres | | | | | | | | | | | * | * | * | | | * | * | | | | | |
| Research Institutions | | | | | | | | | | | * | | | | * | | | | | | | |
| Semi-State Bodies | * | | | | | | | | | | | | | | | * | * | | | | | |
| Teagasc | | L | L | L | L | L | L | L | L | L | L | * | * | * | L | * | * | | * | * | | L |
| Tourist Sector | | | | | | | | | | | | | | | | | | | * | | | |

* denotes relevant recommendation

L indicates Lead Partner/s

Table 9.3 Relevance of Future Research; and Future Survey Recommendations to Stakeholders

| Stakeholder Group | Recommendation reference number | | | | | | | | | | | | | |
|-----------------------------------|---------------------------------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| | 5.01 | 5.02 | 5.03 | 5.04 | 5.05 | 5.06 | 5.07 | 6.01 | 6.02 | 6.03 | 6.04 | 6.05 | 6.06 | |
| Agri/Environmental Consultants | | | | | | | | | * | * | * | * | * | |
| Community Groups | | | | | | | | | | | | | | |
| Department of Agriculture | * | * | | | * | | * | | | | | * | | |
| Developers | | | | | | | | | | | | | | |
| Environmental NGO's | | | | * | | | | | | | | | | |
| Farmers/Landowners | | | | | | | | | | | | | | |
| Forest Service/Foresters | | | | | * | | | | | | | | | |
| The Heritage Council | | | | | | | | L | L | | | L | L | |
| Kildare County Council | | | | | | | | * | | | | | * | |
| Management Professionals | | | | | | | | | | | | | | |
| National Parks & Wildlife Service | | * | | | * | | * | | | | | * | | |
| Nurseries, Garden Centres | | | | | | | | | | | | | | |
| Research Institutions | L | L | L | L | * | L | L | | * | * | L | * | * | |
| Semi-State Bodies | | | | | | | | | | | | | | |
| Teagasc | * | * | * | * | L | | | | | | | * | | |
| Tourist Sector | | | | | | | | | | | | | | |

* denotes relevant recommendation

L indicates Lead Partner/s

10.0 CONCLUSIONS

The information gathered from this survey adds to the existing limited, but growing, knowledge of hedges in Ireland, and should be of value to a wide range of interests and stakeholders in County Kildare and the rest of the country. Recording and analysis of the various hedgerow characteristics should also foster a greater appreciation of the unique nature of these hedges, and enable a strategic approach to their conservation.

The resource should be a source of pride to the County and is largely a credit to the agricultural community that has been responsible for its conservation over the years.

In absolute terms, there is plenty of scope for improvement in the resource to maximise the full multi-functional potential, but in relative terms County Kildare compares fairly well in most categories with other counties previously surveyed, although overall hedges would be less diverse in their species composition than those of counties Laois and Offaly. In a number of categories, most notably the structural characteristics of height, basal density and extent of gaps, County Kildare's hedges are at the top of the table (so far!).

The recommendations presented, if implemented, should go a long way to conserving and enhancing this extensive and interesting resource into the future.

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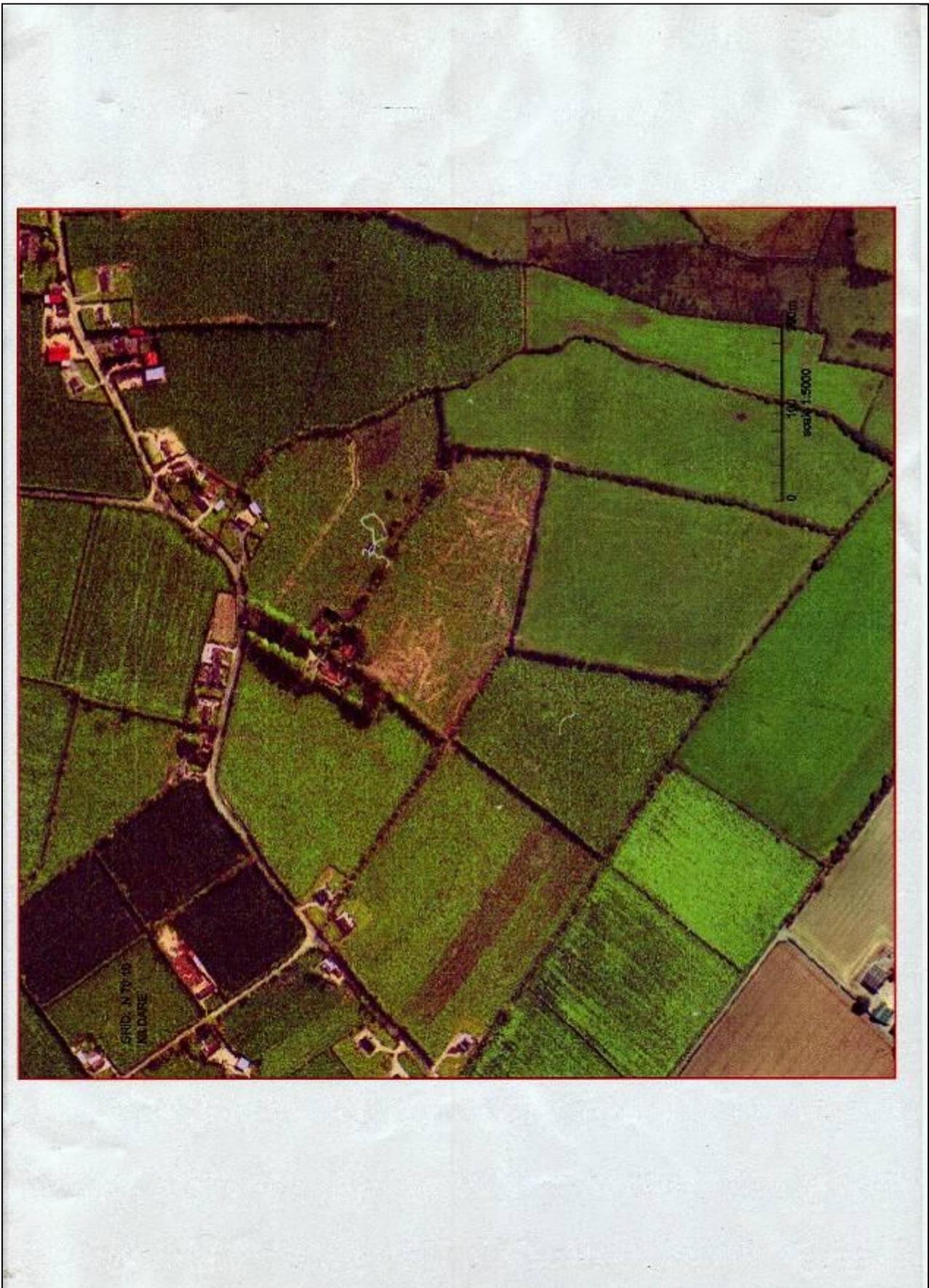
12.0 APPENDICES

12.1 SAMPLE SQUARES

| O.S. Grid Reference | Square Reference | Nearest Town / Village | Townlands |
|---------------------|------------------|------------------------|---|
| N 70 40 | KE01 | Cadamstown | <i>Cadamstown Clonuff Ballina</i> |
| N 80 40 | KE02 | Enfield | <i>Cloncurry Ballyvoneen</i> |
| N 70 30 | KE03 | Derrinturn | <i>Rathmore Drummond Kilpatrick Ticknevin</i> |
| N 80 30 | KE04 | Staplestown | <i>Hodgestown Garvogue Gilltown</i> |
| N 90 30 | KE05 | Clane | <i>Longtown Ovidstown Clonagh Baybush Irishtown Lower</i> |
| N 70 20 | KE06 | Rathangan | <i>Kilmoney North Drinnanstown North Cloncurry</i> |
| N 80 20 | KE07 | Kilmeage | <i>Clongorey Blacktrench Lattensbog</i> |
| N 90 20 | KE08 | Naas | <i>Monread South Maudlings Kingsfurze Naas East</i> |
| N 00 20 | KE09 | Kilteel | <i>Cupidstownhill Rathbane</i> |
| N 60 10 | KE10 | Monasterevin | <i>Coolnafearagh Clogheen</i> |
| N 70 10 | KE11 | Kildare | <i>Fennor Shanacloon Mooretown Silliothill</i> |
| N 80 10 | KE12 | Curragh | <i>Curragh Blackrath & Athgarvan</i> |
| N 90 10 | KE13 | Ballymore Eustace | <i>Couglanstown West</i> |
| N 70 00 | KE14 | Kilmead | <i>Loughabor Tinnakill Skerries North Skerries South Rathconnell Rathconnell Wood</i> |

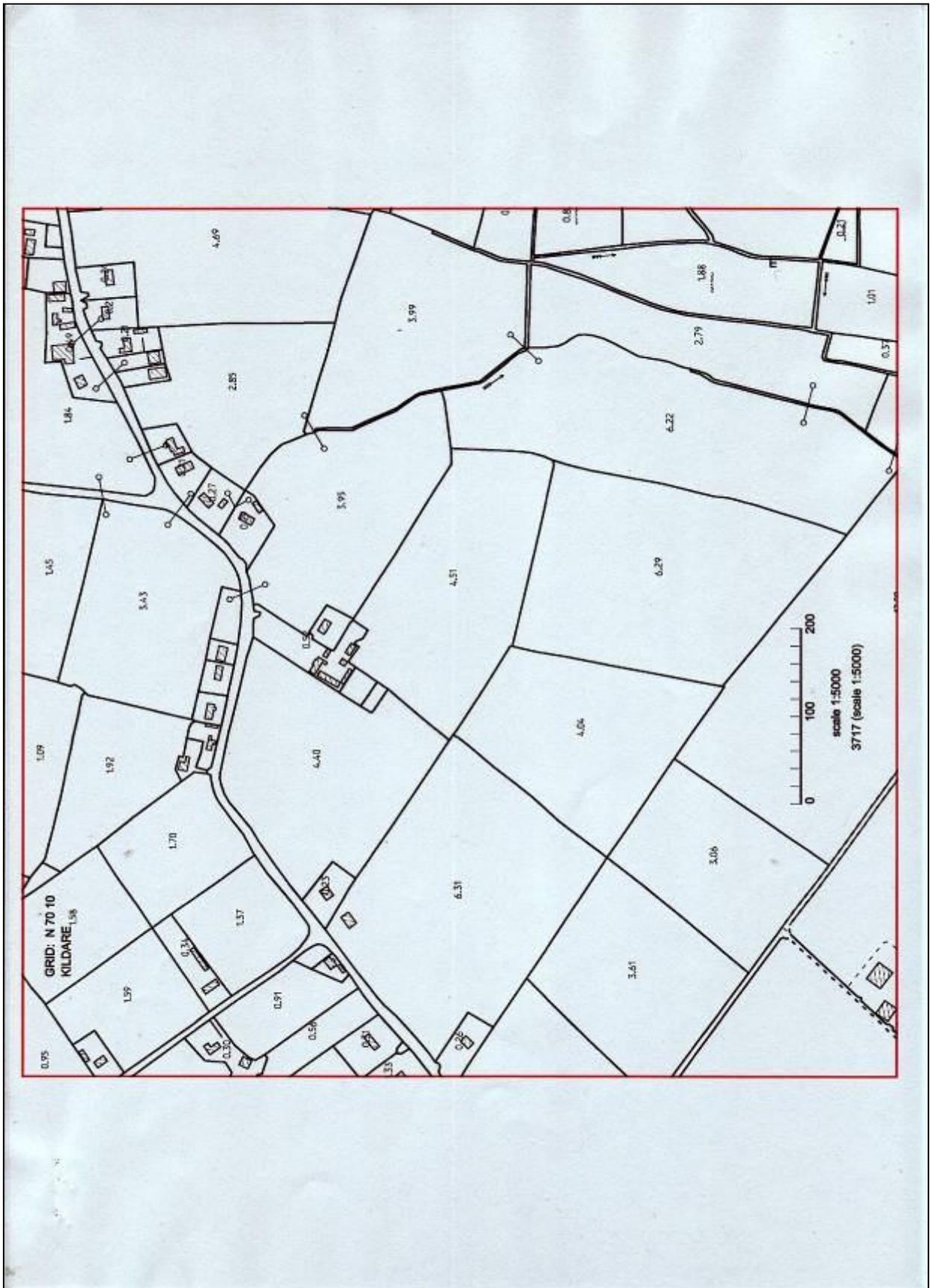
| | | | |
|---------|------|---------------|--|
| N 80 00 | KE15 | Narraghmore | <i>Lipstown</i> <i>Lipstown Lower</i> <i>Blackrath</i> |
| S 70 90 | KE16 | Athy | <i>Grangemellon</i> <i>Ballroe</i> <i>Heath</i> |
| S 80 90 | KE17 | Moone | <i>Killelan</i> <i>Newtown (E.D. Curriegen)</i> <i>Simonstown East</i> <i>Simonstown West</i> <i>Sherrifhill</i> |
| S 80 80 | KE18 | Knocknacree X | <i>Newtown</i> |

12.2 EXAMPLE OF AERIAL PHOTOGRAPH

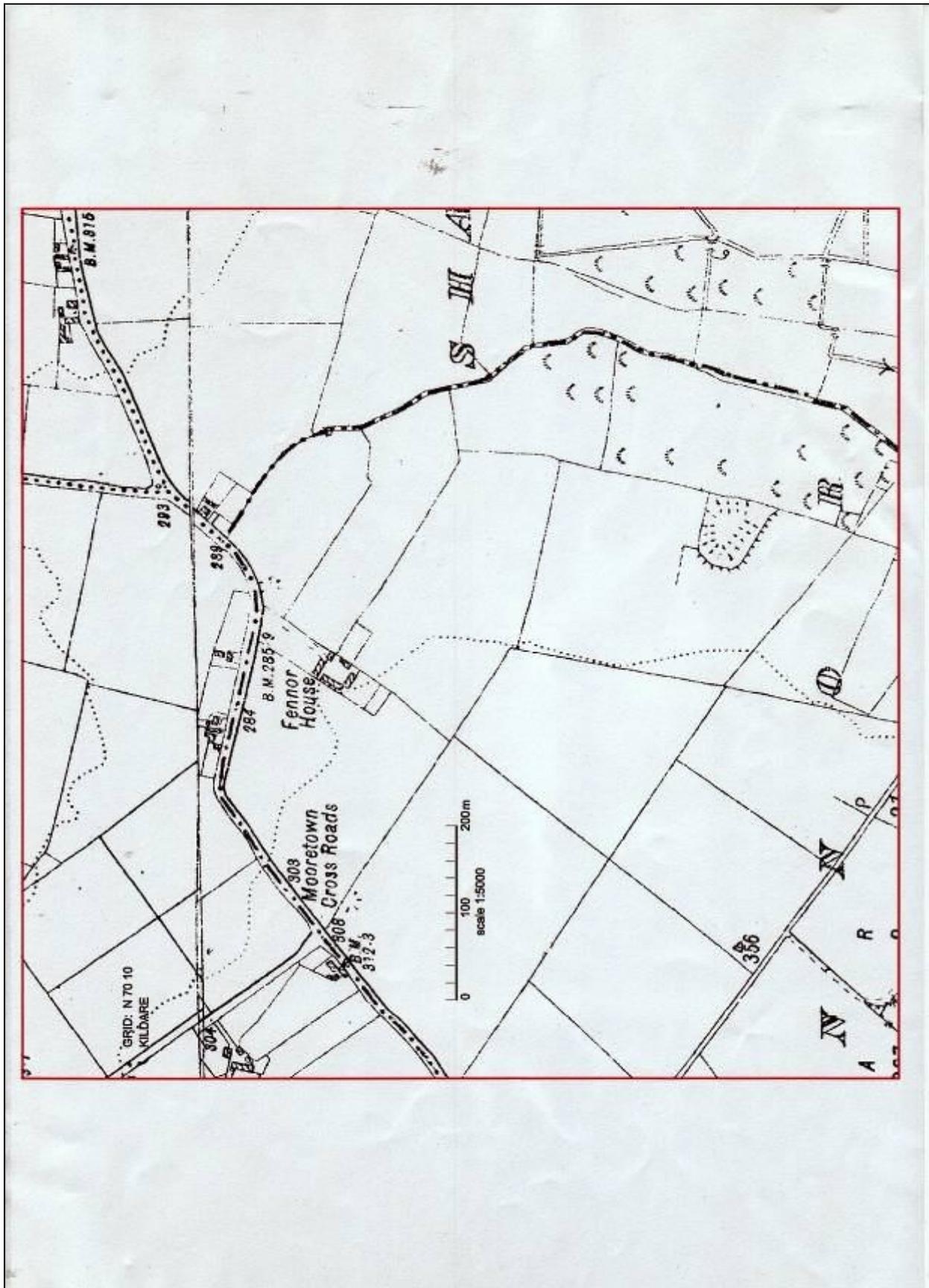


KE11 – Kildare

12.3 EXAMPLE OF VECTOR MAP



12.4 EXAMPLE OF ORDNANCE SURVEY MAP



KE11 - Kildare

12.5 BLANK 'FIELD RECORDING SHEET'

2006 Kildare Hedgerow Survey

Square ref.:

Survey duration:

Date:

Grid ref.:

Surveyors:

| | | | | |
|---|--|---|---|---|
| <p>Context</p> <p>A FARM TYPE</p> <p>a tillage b dairy c cattle d sheep e mixed stock f mixed stock + crops g stud h other</p> <p>B HISTORY</p> <p>1x infill 2x townland boundary 3x canal side boundary 4x railway line boundary x1 + roadside x2 + stream</p> <p>C ADJACENT LAND USE & D LINKS WITH OTHER HABITATS</p> <p>a arable (BC) b improved grassland (GA) c semi-natural grassland (GS) d non-native woodland (WD) e semi-natural woodland / scrub (WN) f scrub/transitional woodland (WS) g curtilage/built land (BL) h peatlands (P) i lake/pond (FL) j watercourse (FW) k other (target note) l. none m. hedge,treeline (WL1,2)</p> <p>E BOUNDARY FUNCTION</p> <p>1 hedge redundant 2 active boundary</p> | <p>Construction</p> <p>F OUTLINE</p> <p>a linear /regular b non-linear/irregular</p> <p>G BOUNDARY TYPE</p> <p>1x Single Line Hedge 2x Double Line Hedge 3x Random Line</p> <p>x1 + Bank x2 + Wall x3 + Shelf</p> <p>xa + External Drain xb + Internal Drain xc + Internal Path, Track-way, etc.</p> <p>x0 None of the above features</p> <p>G1 Fossitt Class</p> <p>1 WL1- Hedgerow 2 WL2 - Treeline</p> <p>H BANK/WALL/SHELF SIZE</p> <p>a < 0.5m b 0.5 – 1 m c > 1m d not applicable</p> <p>I DRAIN SIZE</p> <p>1 not present 2 small (<0.5m) 3 medium (0.5 – 1m) 4 large (>1m)</p> | <p>Structure/Condition</p> <p>J PROFILE</p> <p>a remnant b relict (derelict) c losing structure d boxed / A shape e overgrown f overgrown + outgrowth at base g top heavy / undercut h straight sided</p> <p>K HEIGHT</p> <p>1 <1.5m 2 1.5 – 2.5m 3 2.5 – 4m 4 >4m</p> <p>L WIDTH</p> <p>a < 1m b 1– 2m c 2– 3m d 3 m+</p> <p>M GAPPINESS</p> <p>1 complete 2 < 5 % gaps 3 5 – 10 % gaps 4 10 – 25 % 5 25 – 50 % 6 > 50 %</p> <p>N BASE</p> <p>a open c scrawny d dense e. very dense xa plus vegetation</p> | <p>Structure/Condition</p> <p>O BANK /WALL/SHELF DEGRADATION</p> <p>1 severely eroded 2 eroded in parts 3 bank intact 4 not applicable</p> <p>P TREES</p> <p>a none b few c scattered d abundant e line</p> <p>Q TREE AGE COMPOSITION</p> <p>1 all mature 2 young trees present 3 no trees</p> <p>R VERGE</p> <p>a < 1m b 1 – 2 m c 2 – 4 m d 4m + e none</p> <p>S FRUITING</p> <p>1 none 2 sparse flowers and fruit 3 average fruiting 4 heavy fruiting</p> <p>T OVERALL VIGOUR</p> <p>a poor b average c good</p> | <p>Management</p> <p>U MANAGEMENT</p> <p>a cut box profile b cut 'A' shape c cut on one side d cut on both sides e topped f excavator g fully laid h laid in part i coppiced j short term unmanaged k long term unmanaged l infill planting</p> <p>V MANAGEMENT METHOD</p> <p>1 flail 2 circular saw 3 bar cutter 4 hand tools 5 excavator 6 other 7 unsure 8 not applicable</p> <p>W EVIDENCE OF LAYING</p> <p>a no evidence b past evidence c recent evidence</p> <p>X FENCING</p> <p>1 none 2 fixed to stems 3 electric 4 post & wire 5 sheep wire 6 timber fence</p> |
|---|--|---|---|---|

| | A | B | C | D | E | F | G | G1 | H | I | J | K | L | M | N | O | P | Q | R | S | T | U | V | W | X |
|----|---|---|---|---|---|---|---|----|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 01 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 02 | | | | | | | | | | | | | | | | | | | | | | | | | |
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| 10 | | | | | | | | | | | | | | | | | | | | | | | | | |

12.6 DOMIN SCALE

The Domin scale is used to record the percentage cover of each woody shrub species in sample hedges. Total percentage cover may add up to more than 100% because of layering of the vegetation.

| Domin scale | % cover |
|-------------|---------|
| 10 | 91-100 |
| 9 | 76-90 |
| 8 | 51-75 |
| 7 | 34-50 |
| 6 | 26-33 |
| 5 | 11-25 |
| 4 | 4-10 |
| 3 | <4 |

12.7 DAFOR SCALE

The DAFOR scale was used to record a subjective assessment of the frequency of occurrence of certain shrub and climber species in sample hedges.

| Code | Description | Meaning |
|------|-------------|--|
| D | Dominant | Comprises most of the sample |
| A | Abundant | Very frequent in the sample but not dominant |
| F | Frequent | Frequently seen in the sample |
| O | Occasional | Seen but not frequently occurring |
| R | Rare | Hardly ever found |
| x | Absent | Not present in the sample |