

County Louth Hedgerow Survey

For the Heritage Office
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The Heritage Council



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Executive Summary

During the summer of 2014 a hedgerow survey was carried out in County Louth. It used the newly developed national Hedgerow Appraisal System, 2013, to ensure comparability with other counties' surveys.

In accordance with the HAS, the south-western (or bottom left hand corner) one kilometre square of each of the Ordnance Survey ten kilometre National Grid squares of the county was chosen for the Hedgerow Survey, giving a one-percent sample of each square. Eight one kilometre square were surveyed (the area of Louth is 820 km²). In total, 72 hedgerows were surveyed.

The average density of hedgerows per km² is 11.02 km/km². The highest density of hedgerow recorded was 13.64km/km².

Hawthorn was the most frequently occurring woody species in the hedgerows surveyed. Ash is the most common tree recorded in surveyed hedgerows. Bramble is the most frequently occurring climber.

The average species richness for Louth hedgerows was found to be 2.94 species. This figure includes all small tree and shrub species.

A total of 24 tree, woody shrub and woody climber species was recorded in the hedgerows surveyed. Of these, 19 were recorded as shrubs or small trees, one was only recorded as a mature tree (birch) and four were recorded as climbers.

Ash was the commonest tree present in Louth hedgerows and was recorded in nearly half (48%) of the hedgerows surveyed.

Hedgerows in County Louth are generally associated with tillage and cattle farming.

The majority of hedgerows in Louth are active boundaries that tend to be planted on soil banks with no associated drains.

The structure of Louth hedgerows tend to display good vigour with few gaps and good dense bases (i.e. shrub growth and horizontal meshing of branches in the bottom metre of the hedgerow are sufficiently dense to contain livestock). Under the hedgerow appraisal system (HAS), 25% of Louth's hedgerows were classed as Heritage Hedgerows. Many of these were townland hedgerows.

Under the hedgerow appraisal system (HAS) 93% of surveyed hedgerows were found to be in 'unfavourable condition'. The main reason was because of degraded hedgerow margins.

Results were compared to other counties where similar surveys have been conducted.

Recommendations are made on how best to conserve Louth's hedgerows.

1. Introduction

1.0 General Introduction

In Ireland, hedgerows form a significant part of our countryside. County Louth is no different and any aerial photograph of the county shows a patchwork of fields divided by hedgerows. The only area devoid of hedgerows in the county is the Cooley Mountains.

Hedgerows cover approximately 1.5% of the land area of Ireland (Smal, 1995), which is roughly the same percentage as deciduous woodland (Cabot, 1999). This is equivalent to approximately 400,000 linear kilometres of hedgerow. In the 1700's legislation was passed requiring landowners to enclose their lands (Foulkes, Fuller, Little, McCourt and Murphy, 2013), so it is from this time that most of the country's hedgerows date. In many cases, the construction of hedgerows involved the building of earth banks which were planted most commonly with hawthorn and later with other trees such as ash, hazel and holly (Cabot, 1999). However, older hedgerows also exist and some of these may once have been ancient woodland (Viney, 2003). Others may date to the 8th century when hedgerows were used to demarcate townland boundaries (Joyce, 1898). These older hedgerows are often referred to as 'heritage hedgerows' and are often more diverse and support more species than the other hedgerows, (see Conserving Hedgerow leaflet - (www.heritagecouncil.ie/fileadmin/user_upload/Publications/Wildlife/hedge.pdf)).

Hedgerows containing up to 60 species have been recorded (Cabot, 1999) but such biodiverse hedgerows are not common (*pers. ob.*).

To date (2014), fifteen county and sub-county hedgerow surveys have been completed in Ireland. The hedgerow surveys have each followed similar methodologies. In 2013, the Hedgerow Appraisal System (HAS) (Foulkes, *et al.*, 2013) was published. The aim of the publication is to provide a standardised methodology for recording and appraising hedgerows. The information collected can then be stored on a central database held by the Heritage Council.

Hedgerows are an important ecological and biodiversity resource in Ireland. As one of the least wooded countries of Europe, 9% cover (Coillte) compared to EU average of 37% (Atkinson & Townsend, 2011), hedgerows provide an important habitat for many typical woodland species. Woodland flowers, for example, Herb Robert, Wood avens, Wood anemone, and Wood sorrel grow in many of our hedgerows (Barr, 2005 and Blamey, Fitter & Fitter, 2003). Hedgerows are important nesting sites for many bird species. Of the 110 bird species regularly recorded in the Countryside Bird Survey in Ireland, half (55) use hedgerows to nest in. Hedgerows with soil banks are often used by badgers for sett sites (Viney, 2003). Hedgerows provide wildlife corridors, sometimes referred to as 'Green Infrastructure', linking other habitats such as woodlands and allowing species to move to and from them (Bennett, 1999). These corridors are particularly important for some species of bats. For example, the Lesser Horseshoe Bat, though not found in Louth, will use hedgerows to navigate between feeding areas of woodland and scrub (Anonymous, 2012). Hundreds of insect species have been recorded using hedgerows (Corbett & Mole, 2005, Lewis, 1969 and Maudsley, 2000). For example, many butterfly species will use native hedgerows not only for finding food but also roosting, basking, mating and egg laying (Dover & Sparks, 2000).

Hedgerows are very important in Ireland agricultural landscape. They provide stock proof barriers and shelter. Acting as wind breaks, hedgerows can lower wind speeds in fields by 30 - 50% (Forman & Baudry, 1984). Livestock, crops, and pasture all benefit from the extra shelter. The root systems of hedgerows regulate water movement and help prevent flooding (Ghazavi, Thomas, Hamon, Marie, Corson & Merot, 2008). Drainage can be further influenced if the hedgerows are associated with ditches (Pilcher & Hall, 2001). Ground water quality is also better in areas where hedgerows are present because the roots can effectively filter the water of silt and soil particles (see www.hedgelinek.org.uk/importance-hedges-and-hedgerows.htm).

There is potential for hedgerows to play a significant role in carbon storage, an essential element for reducing the rate of climate change. A new hedgerow may store up to 600 - 800 kg of CO₂ equivalent per year per kilometre, and for up to twenty years (www.hedgelinek.org.uk/importance-hedges-and-hedgerows.htm). In addition, through careful management, hedgerows could provide firewood, a renewable fuel, on a farm-scale (Wolton, 2012).

From a cultural prospective, hedgerows are important as landscape features. They create a network of enclosed fields, which is typical of an Irish landscape. Though minor, changes in hedgerow composition or structural features can indicate important local variation, which adds to the cultural value of these field boundaries. Many mature trees in the landscape are part of the hedgerow structure. In England, it is estimated that between 20 and 50 million hedgerow and field trees are to be found in the landscape (www.hedgelinek.org.uk/importance-hedges-and-hedgerows.htm). Hedgerows can link us to our hunter-gatherer ancestry, by providing a place for gathering wild food. Many people have enjoyed an afternoon blackberry picking. Many folk cures are also connected to species collected from hedgerows, for example elderberries (MacCoitir, 2006).

Many of the species occurring in hedgerows are steeped in folklore. Hawthorn, the most common plant in Irish hedgerows has many folk beliefs and customs associated with it. For example, there is a widespread belief in Ireland that the blossom of hawthorn is unlucky. This may be partly due to the belief that Christ's crown of thorns was made from the hawthorn tree (MacCoitir, 2003). While it may be feared, the tree is also thought to have connections with magic, in particular fairies. A lone bush in a field is often known as a fairy tree and will not be touched for fear it would offend the fairies (MacCoitir, 2003).

Ash, again common in many Irish hedgerows, is steeped in superstition. The wood was burned to banish the devil and a staff of ash was thought to protect from evil. Ash was also associated with cures (MacCoitir, 2003). The wood was used for making spears as well as hurleys. It was also popular for building, and for boat and furniture making (MacCoitir, 2003). According to the 1958 national folklore survey, gorse was most popularly known as furze and it had a range of local uses from fencing, fodder, harrowing fields, cleaning chimneys and heating baker's ovens (Viney, 2003).

Wild animals connected to hedgerows have their customs too. For examples, wrens use hedgerows for nesting and figure prominently in Irish folklore, mostly notably on St. Stephen's day when the bird was supposed to be captured and brought from house to house (Viney, 2003).

Many climbers found in hedgerows are associated with folk customs. The dog rose, is seen as a symbol of love and beauty. Rosehips were known as 'itchy-backs' because of a prank school children would play, whereby they would put the seed of the hip down the back of an unsuspecting victim. The seeds are hairy and cause great irritation (MacCoitir, 2006). Blackberries, the fruit of the bramble, are a valuable food source and have been picked by humans since earliest times (MacCoitir, 2003). However, in Ireland there was a belief that the berries should not be eaten on the feast of Samhain (31 October) because a fairy called the *púca* or pooka would have spat or urinated on them (MacCoitir, 2006).

The main threats to hedgerows remain clearance for agricultural purposes or development; and inappropriate or non-existent management (Viney, 2003 and Conserving Hedgerows, Heritage Council). In recent years, schemes such as REPS have come to the rescue of many hedgerows and new hedgerows have been planted under such schemes (Fitzgerald, 2009). However, there is a lack of awareness of many of the skills needed for good management practices, including the skills of hedgerow laying and / or coppicing (Foulkes *et al.*, 2013). In Ireland, there is still a lack of detailed research on hedgerows and much of our knowledge comes from the UK (Barr, Britt, Sparks & Churchward, 2005).

1.1 History of hedgerows

In Ireland, field boundaries include hedgerows, stonewalls, ditches, drains, banks or the more modern sheep wire and electric fencing. Today, many hedgerow and wall boundaries are supplemented with some form of fencing. Fencing is seen as a cheap and quick way of maintaining the boundary. However, it can lead to the neglect and decline of the original boundary (Foulkes, 2010).

The field boundary or enclosure is an element of our earliest settlements in Ireland, with Neolithic (5000 years old) field walls a feature of the Céide Fields in North Mayo. Rathes or hill forts were often found surrounded by small fields and enclosures. In the 7th and 8th century there is evidence of enclosures made from stonewalls, trench-and-bank ditches and wattle fences topped with blackthorn branches (Viney, 2003). Over time, these ditches and banks may have become vegetated with hawthorn, blackthorn, gorse and willow. It is not clear if these ancient hedgerows have survived to the present day.

The majority of Irish hedgerows are thought to date from the Enclosure Acts of the eighteenth and nineteenth centuries when many hedgerows were planted (Cabot, 1999 and Viney, 2003). During the seventeenth century much of Ireland was divided up into large estates for English and Scottish Landlords (see: downsurvey.tcd.ie/history.html). Initially, these estates were managed as open landscape where farmers used temporary fences made from cut bushes during the summer. With the enactment of the Enclosure Acts, in the larger estates of the east, rectangular fields were made by enclosing them with new stone and sod banks (Viney, 2003), including a type specifically referred to as 'Louth Banks'. These banks were then planted with hawthorn cuttings, known as 'quicks'.

1.2 Areas covered during this survey

The study area comprises the whole of County Louth, an area of 82,100 hectares. There is one upland area, the Cooley Mountains and this is only area without hedgerows. The lowland area of the county is characterised by agricultural fields of tillage, horticulture and livestock. In total, 61,308 hectares of the county is farmed. Almost half (47%) of the farms in the county are less than 20 hectares (Louth Development Plan 2009-15). Some 36% of farms specialise in beef production and a further 15% are classified as tillage farms (CSO). Hedgerows dominate as field boundaries throughout these areas.

1.3 County Louth Hedgerow Survey Summary

The aim of the survey was to determine the extent, structure, composition, condition, and management status of hedgerows in County Louth. The methodology was based on guidelines set out in the Hedgerow Appraisal System - Best Practice Guidance on Hedgerow Survey, Data Collation and Appraisal. Woodlands of Ireland, Dublin. (Foulkes, Fuller, Little, McCourt, and Murphy, 2013) and was funded by the Heritage Council.



Photograph showing tortoiseshell butterfly feeding on bramble in hedgerow

2. Background

2.1 The Value of Hedgerows in the Irish Landscape

Heritage

Hedgerows often form parish and townland boundaries (McCullin, 2002). They define land ownership. They are a semi-natural habitat (McColin, 2000). Hedgerows gave their name to hedge schools, though the hedgerow itself may not have always been used as the location of the school (www.irish-society.org/home/hedgemaster-archives-2/groups-organizations/the-hedge-schools). Ancient hedgerows may be a remnant of old woodland (Rackham, 1976). There are also many cultural links including folklore (MacCoitir, 2003).

Landscape

Hedgerows form an integral part of Ireland's distinctive landscape character. It is one that is immediately noticeable to visitors coming to land in a plane (Viney, 2003). Landscapes can take on their own unique characteristics, which are often the result of local variation in hedgerow species, for example, hedgerows composed solely of gorse (whins/furze). Seasonal changes add another element to the visual aspects of hedgerows, as for example, hawthorn in bloom in May.

Flora and Fauna

Hedgerows are an important habitat providing food and shelter for animals and plants (McCullin, 2002). Half of Ireland's bird species will use hedgerows for nesting in (www.crann.ie/Crann_Hedgerow_Project-objectid-1061-recordid-23-z-display.htm). As woodland is scarce in Ireland, hedgerows provide important areas for mammals, for example, badgers often locate their setts in hedgerows (Smal, 1995 and Hayden & Harrington, 2001). Hedgerows also provide foraging areas for bats (Anonymous, 2012). Hedgerows act as wildlife corridors along which many species travel (McCullin, 2000).

Agriculture

Hedgerows provide cost-effective livestock boundaries and shelter for livestock and crops (Forman & Baudry, 1984). They have also been shown to protect against soil erosion (McColin, 2000). Hedgerows can help prevent the spread of diseases (Mathews, Lovett, Rushton & Macdonald, 2006).

Hydrology

Root systems of hedgerows help regulate water movement, particularly during flood conditions. They also trap soil and silt particles, which would otherwise run off into water systems. Drains and ditches associated with hedgerows (www.noticenature.ie/files/hedgerows.pdf) also help drainage of roads and fields.

Carbon Sequestration

As the effects of global climate change increase, hedgerows have an important role to play in trapping carbon. A single tree is estimated to absorb 21kg of carbon dioxide a year (www.arborenelvironmentalalliance.com/carbon-tree-facts.asp).

Employment

A small number of people are seasonally employed in hedgerow maintenance.

3. Survey Rationale and Objectives

Hedgerow surveys provide baseline information on the extent, type, location and conservation status of county hedgerows. Surveys are also important in terms of understanding cultural and historical changes. Information gathered during the survey can be used to develop recommendations for the conservation and management of hedgerows.

The objective of the County Louth hedgerow survey is to gain an overview of hedgerows in County Louth in terms of extent and condition from a biodiversity, historical and cultural perspective, in order to inform conservation priorities.

3.1 Aims of the hedgerow survey:

- Carry out a detailed, sample field survey of hedgerows in County Louth, quantifying:
 1. Extent
 2. Composition
 3. Structure
 4. Condition
 5. Management
 6. Ecological connectivity (to semi-natural woodlands, commercial forests, aquatic corridors, other semi-natural habitats, etc.)
- Identify any rare or vulnerable species that may be present
- Compile a species list, including ground flora
- Identify areas of the county which may have ancient hedgerows, or hedgerows which are remnants of old woodlands and survey these areas to determine if any ancient hedgerows are present (by using historic mapping and other information such as townland names). Also recording if they are located adjacent to pNHA and/or SAC woodlands
- Compare townland boundary hedgerows with non-townland boundary hedgerows
- Establish criteria to aid the identification of potential ancient hedgerow locations and composition. These might include a predominance of native tree, shrub and ground flora indicative of the prevailing soil type
- Collate and map the data in accordance with best practice (HAS)
- Prepare a Habitat Action Plan for hedgerows in County Louth, which will include recommendations on conservation and management priorities
- Raise awareness of the ecological and cultural importance of hedgerows
- The survey will act as a baseline survey for future monitoring

3.2 Legislation

3.2.1 NATIONAL LEGISLATION AND POLICY

Actions for Biodiversity 2011-2016 (Ireland's National Biodiversity Plan)

The national biodiversity plan sets out 102 actions under a series of seven strategic objectives to protect Ireland's biodiversity. Many of these are relevant to hedgerows. **Objective 4** of the plan is *to conserve and restore biodiversity and ecosystem services in the wider countryside*. Under this objective TARGET 9 states that effective hedgerow and scrub management should be ensured by 2016. The specific actions set out in the plan include:

- Review options on regulation of removal and/or management of hedgerows and scrub
- Production of guidance documents on scrub and hedgerow
- Hedgerow surveys will be conducted by local authorities

Wildlife (Amendment) Act, 2000

Section 46 of the Act updates Section 40 of the 1976 Act to provide an increased protection period for hedgerows. It reads: "It shall be an offence for a person to cut, grub, burn or otherwise destroy, during the period beginning on the 1st day of March and ending on the 31st day of August in any year, any vegetation growing on any land not then cultivated". "It shall be an offence for a person to cut, grub, burn or otherwise destroy any vegetation growing in any hedge or ditch during the period mentioned [above]".

The National Climate Change Strategy 2007 - 2012

This strategy includes references to planting new hedgerows to reduce carbon emissions.

Environmental Impact Assessment (Agriculture) Regulations 2011

These Regulations were published in 2011. This regulation state that where up to five hectares of land will be affected or over 500m of field boundary (including hedgerows) is to be removed, then screening by Department of Agriculture, Food and Marine is required before work can commence. The regulations also state that screening must also take place in relation to any designated site or if hedgerows are known to be important commuting routes for bats. Further information can be found at the following: (www.agriculture.gov.ie/media/migration/ruralenvironment/environment/environmentalimpactassessment/EIAGuideforFarmers200212.pdf)

3.2.2 EUROPEAN LEGISLATION

In Ireland, the European Communities (Birds and Natural Habitats) Regulations 2011 consolidate the European Communities (Natural Habitats) Regulations 1997 to 2005 and the European Communities (Birds and Natural Habitats) (Control of Recreational Activities) Regulations 2010,

EU Habitats Directive (1992):

Under Article 10 of the EC Habitats Directive member states are required to encourage the management of hedges (and other linear features) in their land use planning and development policies and, in particular, with a view to improving the ecological coherence of the Natura 2000 network.

EU Birds Directive (1979)

Article 3 states that “Member states shall take the requisite measures to preserve, maintain, or re-establish a sufficient diversity or area of habitats” for all species of naturally occurring birds in the wild state.

EC Council Regulations

- 2078/1992 Agri-Environmental schemes
- 1257/1999 Good Farming Practice

EU Nitrates Directive (1991)

Hedgerows act as a ‘buffer’ along watercourses thereby limiting the loss of nitrates into the water systems (Viaud & Merot, 2002).



Photograph showing managed hedgerows along track

4. Methodology and Field Survey

The methodology used for this survey was based on the “Hedgerow Appraisal System - Best Practice Guidance on Hedgerow Survey, Data Collation and Appraisal.” (Foulkes *et al.*, 2013) The guidance sets out detailed methodology for recording the extent (*i.e.* quantitative survey) and floristic composition, context, physical structure, condition, and management of hedgerows (*i.e.* qualitative survey) in any given locality.

4.1 Definition of hedgerows

For the purpose of this survey, and as outlined in the HAS guidance, hedgerows are defined as:

“Linear strips (4m wide or less) of woody plants with a shrubby growth form that cover more than 25% of the length of a field or property boundary that have been deliberately established or managed. They often have associated banks, walls, ditches (drains), or trees”.

As originally outlined by Murray & Foulkes (2006).

However, hedgerows that have developed into lines of trees, which no longer display a shrubby growth form (remnant hedgerows), are also considered for recording purposes. And in order to maintain consistency with other habitat surveys in Ireland, it is proposed that hedgerows meeting the following (abbreviated) definition of Fossitt (2000) are also recorded.

Hedgerows WL1: *Linear strips of shrubs, often with occasional trees, that typically form field or property boundaries. Dimensions of hedgerows are taken here as being mainly less than 5m high and 4m wide. When wider or taller than this, or dominated by trees, the habitat should be considered as a narrow strip of scrub or woodland, or as a **treeline - WL2.** Some hedgerows may be overgrown or fragmented if management has been neglected, but they should still be considered in this category unless they have changed beyond recognition. Linear strips of low scrub are included in this category if they occur as field boundaries.*

4.2 Selecting the sample

The south-western (or bottom left hand corner) one kilometre square of each of the Ordnance Survey ten kilometre National Grid squares of the county was chosen for the Hedgerow Survey. This is the same as the sampling procedure used for the Badger and Habitats Survey of Ireland (Smal, 1995), the ‘Status of hares in Ireland’ report (2006-7), and the Countryside Bird Survey (BirdWatch Ireland, ongoing study).

A total of eight squares were selected, all of which contained hedgerows. The grid references and townland details for each square surveyed in County Louth are listed in Table 1. Following the survey guidance up to 10 hedgerows are selected within each sample square for detailed survey.

Hedgerows to be surveyed were identified prior to the fieldwork as outlined in the HAS Guidance using a transparent overlay marked with a grid square and random numbers. The nearest hedgerow (of at least 60m in length) to each random point was identified and numbered (1-10). If there was doubt that the feature was a hedgerow or not, a second (and occasionally third or fourth) potential sample hedgerow was also noted (e.g. 1a, 1b, etc.). Where there was no hedgerow within a fixed radius of 175m of the random point, no hedgerow was recorded and the total number of sample hedgerows was reduced by one. This was to ensure that the survey would not be skewed by a higher sampling density in certain areas. Selected hedgerows were checked against the aerial photographs. Where the hedgerow chosen on the map was found not to be a hedgerow (e.g. a tree line, a colonised drain, a vegetated bank, or a wall covered in vegetation), the next hedgerow nearest to the relevant random point was surveyed instead.

Each hedgerow was clearly labelled and a grid reference taken using a GPS. A length of hedgerow was generally taken as one side of a field. End points were identified as outlined in HAS Guidance. End points are identified as field corners and by nodal intersections with other hedgerows or boundary features (*i.e.* one side of a field) or gaps greater than 20m.

4.3 Maps and Aerial Photographs

Discovery Series Ordnance Survey maps (scale 1: 50,000) were used to locate the sample squares in the county. The GIS Department of Louth County Council supplied vector maps, aerial photographs and second series Ordnance Survey maps.

Aerial photographs (as supplied, but also using Google map and OSI map viewer) were used prior to fieldwork to examine randomly selected hedgerows. Aerial photographs also enabled the square to be assessed in terms of its general character. The vector maps were used to locate sample hedgerows during fieldwork and to record hedgerow extent in each sample square. The second series Ordnance Survey maps were used for the identification of townland boundaries and to examine the extent of hedgerow loss.

4.4 Period of Fieldwork

Fieldwork commenced in early July and was concluded by early August 2014.

4.5 Access and Permission

Prior to commencing fieldwork efforts were made to contact all landowners within the sample square by visiting houses and farmyards in the area. Farmers met during fieldwork were also approached and spoken to.

A sign indicating that a Louth Hedgerow Survey was taking place was placed in the windscreen of the car so that people passing would not be suspicious of an unattended vehicle. The general co-operation and assistance of landowners was much appreciated. Fieldworkers had full public liability insurance cover for their work.

4.6 Data recordings of hedgerows

The bulk of the recordings for the survey were carried out in the field but prior to the fieldwork desk studies were conducted to establish details relating to the historical significance and landscape designation of each sampled hedgerow.

The length of each sample hedgerow was determined online using the Google Map Pedometer (www.mappedometer.com/) and the relevant aerial photographs.

Each selected hedgerow was subjected to a detailed survey along its whole length. This involved a qualitative survey recording: context, composition, structure, condition, management and floristic data and ecological connectivity, as outlined in the HAS Guidelines.

Context

Within this section the following data were recorded for each sampled hedgerow:

- aspect
- type of farm
- adjacent land classification
- links with other habitats

Construction

The basic construction of the hedgerows was recorded in terms of:

- linearity of the woody shrubs,
- presence or absence of features such as drains, banks, walls or 'shelves'

Structure and Condition

The structure refers to the physical characteristics of the hedgerow and the following were recorded:

- height
- width
- cross sectional profile
- quantity and age profile of trees

Condition was determined by looking at:

- percentage of gaps
- density of basal growth
- bank erosion
- overall vigour

Management

The type and method of hedgerow management was also recorded:

- flailing, laying, coppice management
- short - and long-term absence of management
- evidence of past management

Species recorded in hedgerows

For all surveyed hedgerows, two randomly placed 30 metre strips were surveyed in detail as per methodology outlined in the HAS Guidelines. Hedgerows can be considered to be composed of three floristic layers: (a) tree layer, (b) shrub layer and (c) ground flora.

Tree layer

All tree species present in the entire length of the hedgerow were recorded. If both tree and shrub form of a species was present they were recorded in both layers.

Shrub layer

All shrub species present within each strip were recorded on a survey sheet and given an appropriate 'Domin Scale' value (See appendix 1). The Domin Scale records the percentage cover of each woody shrub species detected. Where a species was present in tree form in the 30m sample strips it was given a Domin value of 1. Gaps in the hedgerow and Ivy (*Hedera helix*) were given a Domin value. The presence of climbers such as bramble (*Rubus fruticosus agg.*) and Dog rose (*Rosa canina*) were recorded according to the DAFOR scale (See appendix 2).

Where other species were present in the hedgerow but did not fall within either sample strip, species were recorded as present separately.

Ground Flora

The presence of ground flora species was recorded as recommended in the HAS Guidelines.

4.8 Recording the extent of hedgerows in samples

The extent of hedgerows within a sample square was recorded by means of a visual inspection on site of all the 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. Other linear features were marked with a solid blue line. These included: drains, walls, fence lines and narrow woodland strips. Gaps in hedgerows were also marked.

4.9 Target Notes

Notes were made of special features or notable characteristics of specific hedgerows or within the sample squares.

4.10 Photography

Digital photographs were taken of the majority of the hedgerows surveyed. Photographs were also taken to record specific features such as significant trees or general landscape.

4.11 Data Recording

All of the data recorded during the field survey were transferred into a Microsoft Excel data file for subsequent analysis.

The standardised Excel spreadsheet downloaded from the Heritage Council website (www.heritagecouncil.ie/wildlife/our-initiatives/hedgerow-appraisal-system-and-national-hedgerow-database/) was used. This was to allow for data to be submitted to the NBDC for inclusion in the National Hedgerow Database.

4.12 Appraising Hedgerows

The new hedgerow appraisal system (HAS, 2013) sets out to identify hedgerows of particular historical, ecological and/or landscape significance. However, it is also important to remember that all hedgerows provide valuable habitats, wildlife corridor and other functions.

The appraisal system is based on ranking the significance of hedgerows on a scale of 0-4 (0 being lowest, 4 indicating a hedgerow of high significance) in five categories:

1. Historical significance
2. Species diversity significance
3. Structure, construction and associated features
4. Habitat connectivity significance
5. Landscape significance.

Hedgerows can also be considered of high significance (*Heritage Hedgerows*) if they record a cumulative score of 6 or greater in the Historical, Species diversity or Structural categories. In addition if hedgerows have a cumulative score of 16 or more over the five categories, they should also be considered *Heritage Hedgerows*. *Heritage hedgerows* should be considered high priority in terms of retention, management action, and protection. Hedgerows with lower scores are still of great value and the potential to improve their rankings through, for example, improved management, should also be recognised.

In order to determine a qualitative assessment of hedgerow condition, each hedgerow is ranked from 0 to 3 (0 = unfavourable to 3 = highly favourable) in three categories. These are:

1. Structural variables
2. Continuity
3. Negative indicators.

The higher the ranking the more favourable the condition of the hedgerow. A score of 0 in a category represents a hedgerow in *unfavourable condition*.

There are a number of factors that may flag a hedgerow as being in potentially unfavourable condition. These include:

- Obvious signs of poor condition, which includes weak growth, basal decay and effects of spray drift
- Risk of infection/management safety issues, for example where wire is fixed to stems or hedgerow has been managed using excavator type machinery
- Impact on biodiversity, for example where hedgerow has been managed out of season
- Hedgerow tree sustainability – where only mature trees are present

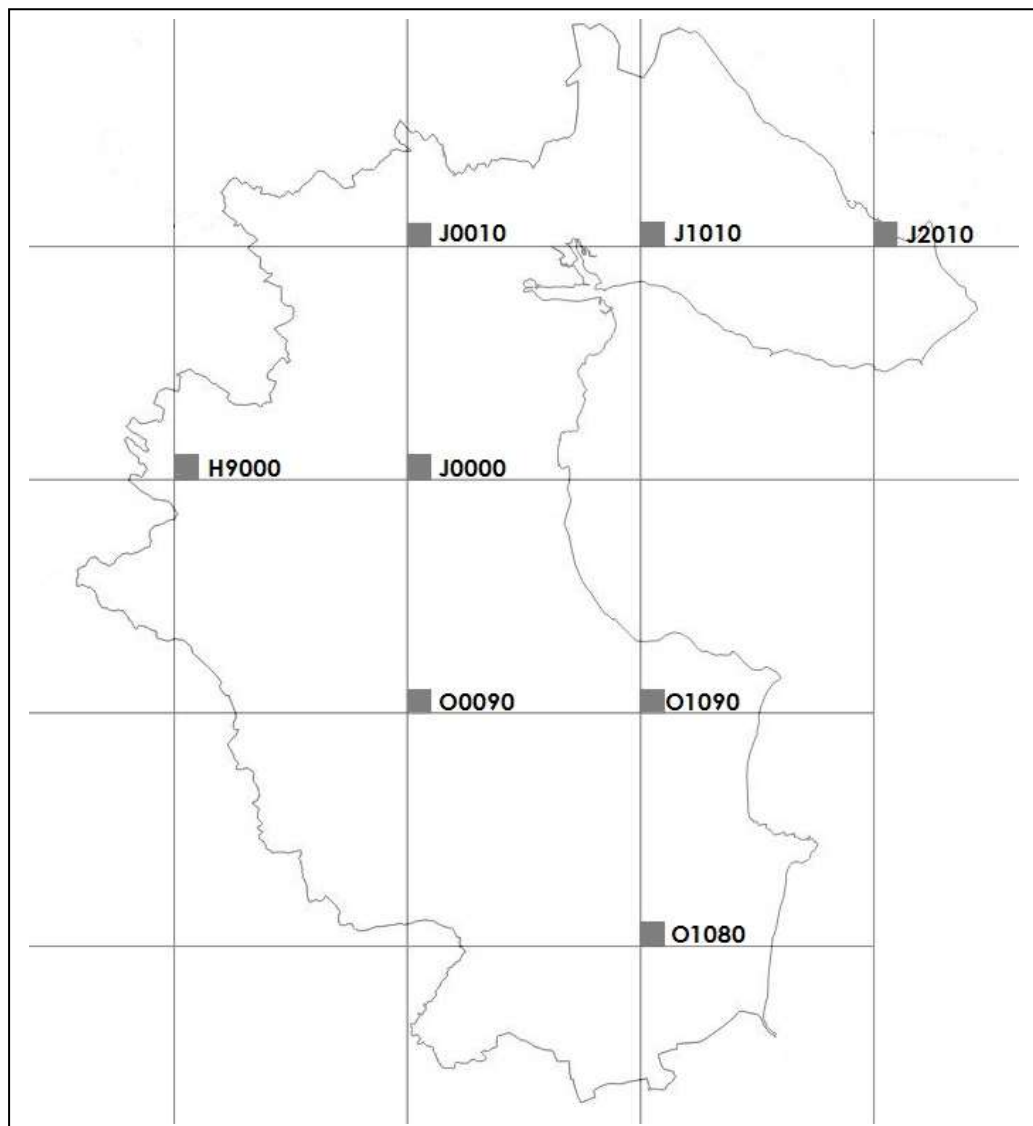
5. Results

All the data were subjected to standard statistical analyses using Microsoft Excel.

5.1 Extent of Hedgerows in County Louth

Results are based on the survey of a sample of eight one kilometre squares. All squares had hedgerows present. In total 72 hedgerows were surveyed. The maximum number of hedgerows surveyed in the majority of squares was 10 (Figure 1) and the minimum seven.

Figure 1: Study area: Map of County Louth showing eight 1 x 1 km squares surveyed



The average length of hedgerows for County Louth is estimated to be just under 10km of hedgerow per kilometre square. The length of hedgerows varies from square to square with 7.18km recorded as the lowest length and 14.51km estimated as the longest length of hedgerow per samples square (Table 1).

Table 1: Areas surveyed with length and density of hedgerows

Square reference	Townland	Number of hedgerows surveyed	Area surveyed (Km ²)	Total length of hedgerow (Km)	Density (Km/Km ²)
H9000	Tullygowan, Tully	8	1	7.18	7.18
J0000	Killincoole	10	1	13.28	13.28
J0010	Stumpa	10	1	13.64	13.64
J1010	Drumenagh hill, Ballymakellet	8	0.59	8.56	14.51
J2010	Mullatee	7	0.79	8.38	10.61
O0090	Richardstown, Harristown	9	1	7.57	7.57
O1080	Carstown	10	1	10.99	10.99
O1090	Ardballen, Mountdoyle	10	1	10.36	10.36
Total		72	7.38	79.95	

It is estimated that County Louth has a total length of 8,948.3km of hedgerow. This figure is calculated using the known length of hedgerow per area surveyed and calculating the length based on the total area of County Louth (826 km²).

Hedgerow density varies from 7.18 km/km² to a maximum of 14.51 km/km². The average density of hedgerows per Km² is 11.02 km/km²

Hedgerow loss was also examined. When the original ordnance survey began it did not include field boundaries but this policy was reverse in 1838 (www.ucd.ie/t4cms/Support4.pdf). The 25" Historic Ordnance survey maps (completed between 1896-1913) did include field boundaries and these were compared with present day maps. The 25" Louth maps were completed between 1907 and 1908. It should be noted that the figures should be treated with caution as no differentiation can be made between the different types of field boundaries as they are shown on Ordnance Survey maps. Therefore, field boundaries, as they appear on Ordnance Survey maps, could be hedgerows, fences, banks or stonewalls. During the survey field boundary stonewalls

were not seen in survey squares and are therefore thought to be uncommon in County Louth. Therefore the assumption has been made that all the boundaries are hedgerows.

Table 2: Areas surveyed showing length of hedgerow loss since Third Edition Ordnance Survey Map (Historic 25") (1907-1909)

Square reference	Townland	Total Length of hedgerow Historic 25" maps (km)	Current length of hedgerow (km)	Hedgerow loss (km) since 1907-09	% loss of hedgerow length
H9000	Tullygowan, Tully	10.703	7.18	3.523	32.92
J0000	Killincoole	16.002	13.28	2.722	17.01
J0010	Stumpa	14.286	13.64	0.646	4.52
J1010	Drumenagh hill, Ballymakellet	9.666	8.56	1.106	11.44
J1090	Ardballen, Mountdoyle	14.689	10.36	4.329	29.47
J2010	Mullatee	8.727	8.38	0.347	3.98
O0090	Richardstown, Harristown	9.868	7.57	2.298	23.29
O1080	Carstown	13.261	10.99	2.271	17.13
<i>Totals</i>		<i>97.192</i>	<i>79.95</i>	<i>17.242</i>	<i>17.74</i>

All survey squares recorded some hedgerow loss. Square H9000 recorded the largest percentage loss of hedgerows (32.9%), though square J1090 recorded the longest length of hedgerow loss (at just over 4 km). This is because square J1090 had the greatest density of hedgerows and, though a greater length has been lost from this square it represents a lower percentage of the original total. Square J2010 recorded the lowest percentage loss of hedgerow at just under 4% (or 0.35km). A total of 17km of hedgerow was recorded as having been lost in the whole county since the publication of the historic 25" Ordnance surveyed maps between 1907 and 1909.

5.2 Species Composition of Hedgerows in County Louth

Hedgerows are considered to be made up of three layers:

- 1). tree layer
- 2). shrub layer
- 3). ground flora

All three were surveyed as set out in the HAS guidelines.

5.2.1 Frequency Occurrence of species in hedgerows surveyed

Table 3 lists all species recorded in hedgerows surveyed. Percentage frequency occurrence shows how frequently the species occurs in surveyed hedgerows. Hawthorn is the most commonly occurring woody species, occurring in nearly 88% of all hedgerows surveyed. Hawthorn is also the species with the highest Domin value. The Domin scale is used to describe the cover of vegetation within the 30m sample strip. A Domin value of 7 represents cover of 34 - 50% (see appendix 1). Ash, elder and blackthorn occur in between 45-54% of the hedgerows surveyed. Many species have Domin values of only 1 or 2. These species are very scattered, for example, spindle and maple only occurred in one hedgerow each.

Table 3: Percentage frequency occurrence and mean Domin value of small trees and shrubs in surveyed County Louth Hedgerows

Small trees and Shrubs	Percentage frequency	Mean Domin Value
<i>Crataegus monogyna</i> HAWTHORN	87.50	7
<i>Fraxinus excelsior</i> ASH	54.17	5
<i>Sambucus nigra</i> ELDER	52.78	4
<i>Prunus spinosa</i> BLACKTHORN	45.83	4
<i>Ulex europaeus</i> GORSE (WHIN, FURZE)	29.17	5
<i>Acer pseudoplatanus</i> SYCAMORE	12.50	4
<i>Corylus avellana</i> HAZEL	11.11	5
<i>Salix</i> spp. WILLOW	8.33	5
<i>Prunus avium</i> WILD CHERRY	5.56	2
<i>Quercus</i> spp. OAK SPECIES	4.17	4
<i>Ligustrum vulgare</i> WILD PRIVET	4.17	3
<i>Fagus sylvatica</i> BEECH	4.17	2
<i>Ulmus</i> spp. ELM	2.78	3
<i>Salix fragilis</i> CRACK WILLOW	2.78	4
<i>Ilex aquifolium</i> HOLLY	2.78	2
<i>Cytisus scoparius</i> BROOM	2.78	2
<i>Sorbus aucuparia</i> ROWAN	1.39	3
<i>Euonymus europaeus</i> SPINDLE	1.39	1
<i>Acer</i> spp. (excluding Sycamore) MAPLE	1.39	1

Blackberry/bramble was the most frequently occurring climber found in Louth hedgerows, occurring in over 90% of hedgerows surveyed (see Table 4). Dog rose occurred regularly and was recorded in nearly 46% of surveyed hedgerows.

Table 4: Percentage frequency occurrence of climbers in surveyed County Louth Hedgerows

Climbers	Percentage frequency
<i>Rubus fruticosus</i> spp BLACKBERRY	93.06
<i>Hedera helix</i> IVY	61.11
<i>Rosa canina</i> agg. DOG ROSE	45.83
<i>Lonicera periclymenum</i> HONEYSUCKLE	12.50

Hawthorn, ash, elder, blackthorn and gorse make up the structure of the hedgerows with blackberry / bramble being the most common climber.

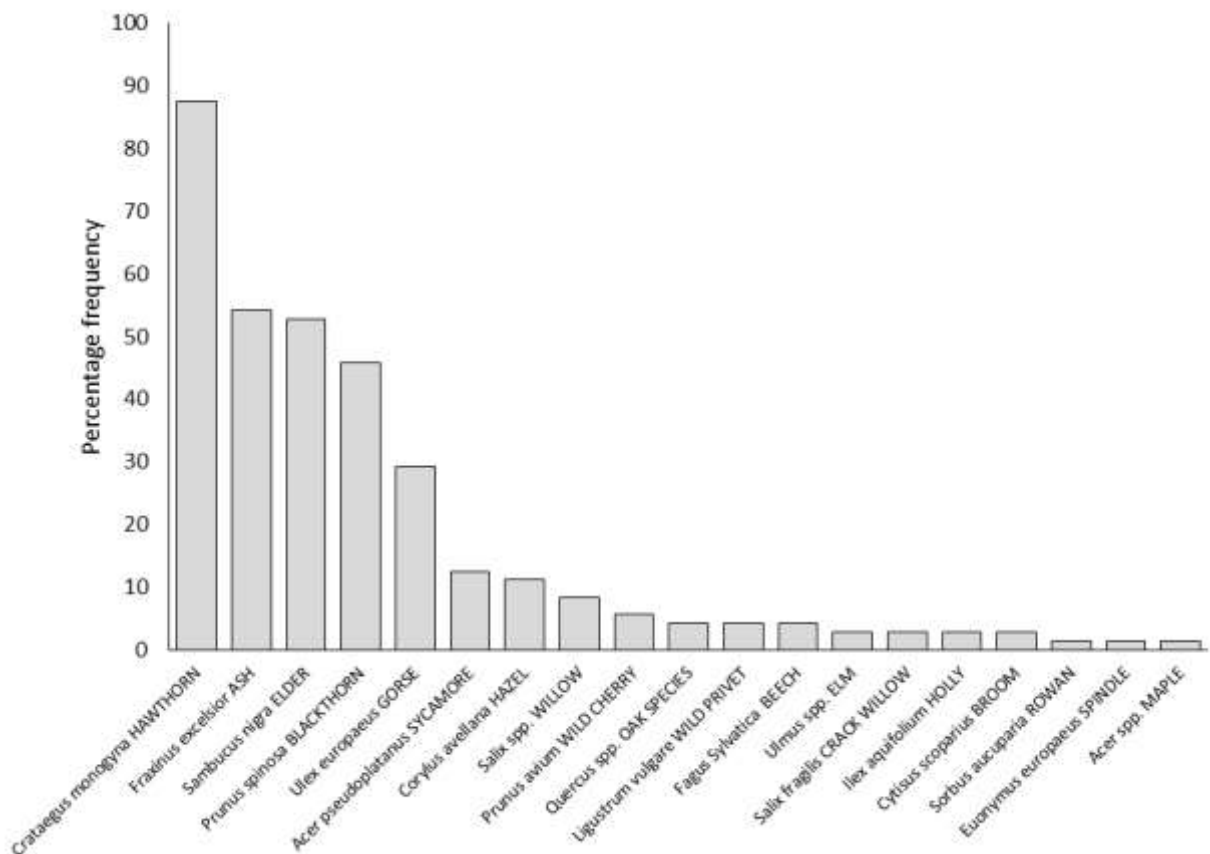


Figure 2: Percentage frequency occurrence of trees and small shrubs in hedgerows surveyed

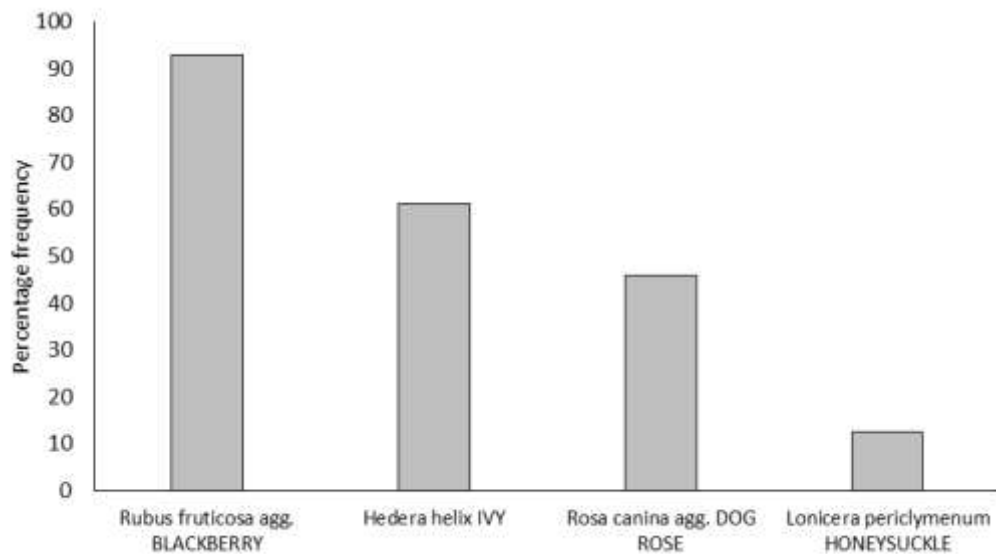


Figure 3: Percentage frequency occurrence of climbers in hedgerows surveyed

5.2.2 Diversity of hedgerow shrub layer

In this survey, the species diversity of an individual hedgerow is defined as the average number of species found in the two 30m sample strips.

Figure 4 below shows that the majority of hedgerows in County Louth had three species in their shrub layers. These figures are based on the average of the two 30 metre sample strips (hence the half values). Only one hedgerow was very 'species diverse' recording seven species. This was hedgerow seven in square J0000. Two hedgerows recorded average species richness of 5.5 (these were hedgerow two in J1090 and hedgerow four in J1010). Two hedgerows were composed only of hawthorn in their shrub layer. These were hedgerow six in J2010 and hedgerow two in J0000.

The average number of shrub species per 30m strip is 2.94 species.

5.2.3 Species Diversity of hedgerows including climbers

An alternative way to look at species diversity is to include all shrubs recorded in the two 30m strips and all climbers. Climbers are an important element of all hedgerows, providing valuable food and cover for many species of wildlife.

Including all shrubs and climbers shows the more diverse nature of the hedgerows (Figure 5). Only one hedgerow now is recorded as being composed of only hawthorn (J2010, hedgerow 6). 21 hedgerows have five species. 25 hedgerows have seven or more species, with one hedgerow having 11 species J0000, hedgerow 7.

The average number of shrubs and climbers per hedgerow is 5.83 species.

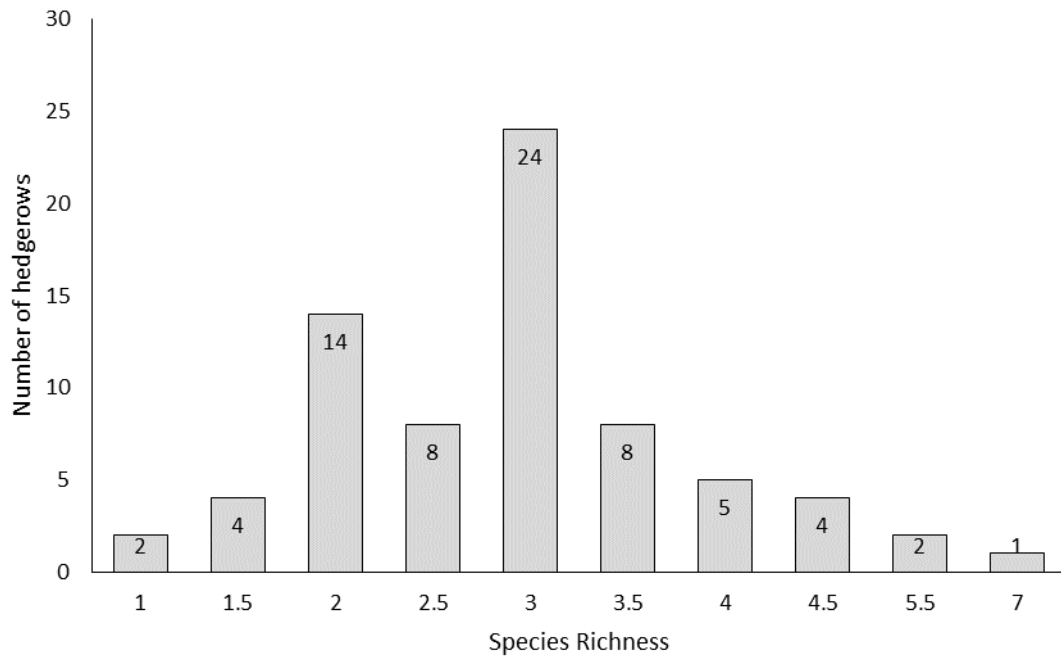


Figure 4: Showing species richness based on shrub layer of surveyed hedgerows

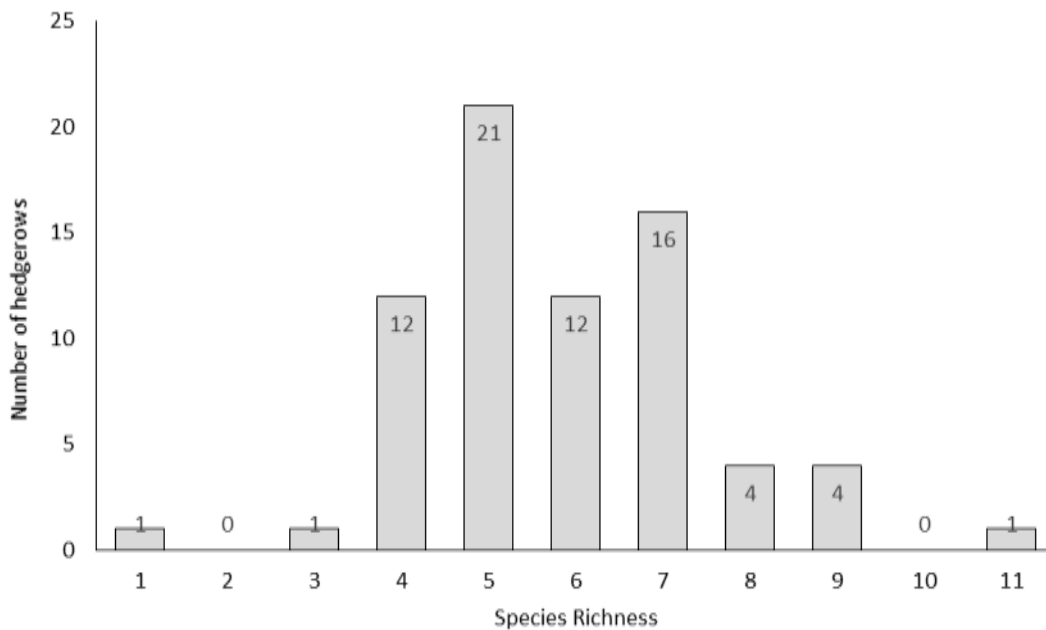


Figure 5: Histogram showing species richness based on shrub layer and climbers (including ivy)

5.2.4 Tree species found in surveyed hedgerows

In the HAS hedgerow trees are defined as any trees within the hedge that have been deliberately or incidentally allowed to grow, as distinct from the shrub layer of the hedge. Ash was the commonest tree present in Louth hedgerows and was recorded in nearly 48% of the hedgerows surveyed. Hawthorn occurred in just under 20% of surveyed hedgerows. Spindle, maple, rowan and holly only occurred in one hedgerow each.

Table 5: Percentage frequency occurrence of mature trees in surveyed County Louth hedgerows

Mature Trees	Percentage frequency
<i>Fraxinus excelsior</i> ASH	47.89
<i>Crataegus monogyna</i> HAWTHORN	19.72
<i>Salix</i> spp. WILLOW	10.22
<i>Acer pseudoplatanus</i> SYCAMORE	7.04
<i>Prunus avium</i> WILD CHERRY	4.23
<i>Quercus</i> spp. OAK	4.23
<i>Betula</i> spp. BIRCH	1.41
<i>Fagus sylvatica</i> BEECH	1.41
<i>Ulmus</i> spp. ELM	1.41
<i>Ilex aquifolium</i> HOLLY	0.70
<i>Acer</i> spp. MAPLE	0.70
<i>Sorbus aucuparia</i> ROWAN	0.70
<i>Euonymus europaeus</i> SPINDLE	0.70

5.2.5 Species diversity of hedgerow trees

Twenty four of the surveyed hedgerows did not have any trees present along their length. A further 26 had just one tree species. Fifteen had two tree species present. The highest number of tree species recorded per hedgerow was four and this occurred in just four of hedgerows surveyed.

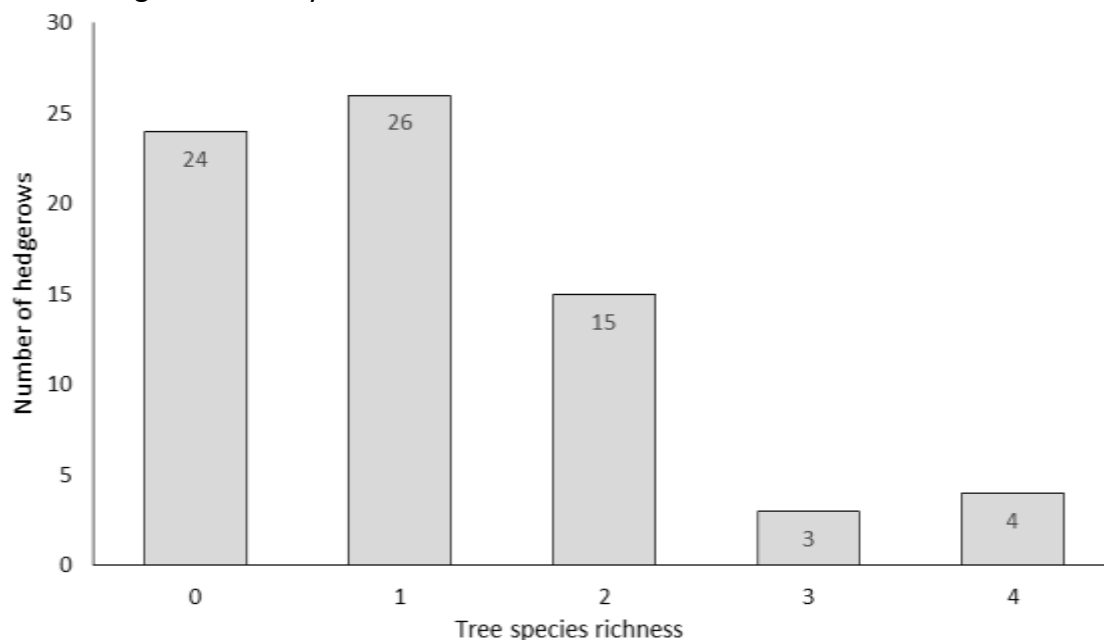


Figure 6: Histogram showing species richness in relation to tree species recorded in surveyed hedgerows

5.2.6 Ground Flora

Ground flora, in the form of herbaceous plants, were recorded as per the list in the HAS guidance. Ground flora was relatively poor, with Cow parsley the most commonly recorded species, followed by Herb Robert (see Table 6).

Table 6: Ground flora recorded in surveyed County Louth hedgerows

Species	Percentage Frequency Occurrence
<i>Anthriscus sylvestris</i> COW PARSLEY	18.1
<i>Geranium robertianum</i> HERB ROBERT	9.0
<i>Arum maculatum</i> LORDS AND LADIES	4.9
<i>Digitalis purpurea</i> FOXGLOVE	2.8
<i>Geum urbanum</i> WOOD AVENS	2.1
<i>Glechoma hederacea</i> GROUND IVY	0.7
<i>Anemone nemorosa</i> WOOD ANEMONE	0.7

5.3 Context of hedgerows in County Louth

Corine Land Cover

Corine Land Cover (CLC) is a map of the European environmental landscape based on interpretation of satellite images. It provides comparable digital maps of land cover for each country for much of Europe. Corine stands for *Coordination of Information on the Environment*. Land cover is the observed physical cover, as seen from the ground or through remote sensing, including natural or planted vegetation and human constructions (buildings, roads, etc.) which cover the earth's surface. Water, ice, bare rock or sand surfaces count as land cover.

The majority of the hedgerows in the Louth survey fell into the classes of Non-irrigated land and Pastures.

Table 7: Frequency occurrence of hedgerows in Corine landclass

CORINE	Corine Land Cover	Number of Hedgerows	Percentage Frequency Occurrence
211	Non-irrigated Land	30	41.67
231	Pastures	36	50
242	Complex cultivation	6	8.33



Photograph showing hedgerow of arable field.

Soil

The type of soil on which each sample hedgerow occurred was determined from the soils database on the EPA geoportal (<http://gis.epa.ie/Envision>). Over 61% of hedgerows surveyed occurred on Acid Brown Earths / Brown Podzolics soils. A further 27.8% occurred on Surface water Gleys / Ground water Gleys Acidic soils.

Table 8: Soil types of surveyed hedgerows

Soil Types	Number of Hedgerows	Percentage Frequency Occurrence
Acid Brown Earths / Brown Podzolics	44	61.11
Surface water Gleys / Ground water Gleys Acidic	20	27.78
Peaty Gleys Acidic	2	2.78
Lithosols / Regosols	3	4.17
Grey Brown Podzolics / Brown Earths Basic	2	2.78
Raised Bog cutaway/cutover	1	1.39

Adjacent Land Use

For the bulk of the hedgerows surveyed, cattle farming and tillage make up the majority of adjacent land use categories.

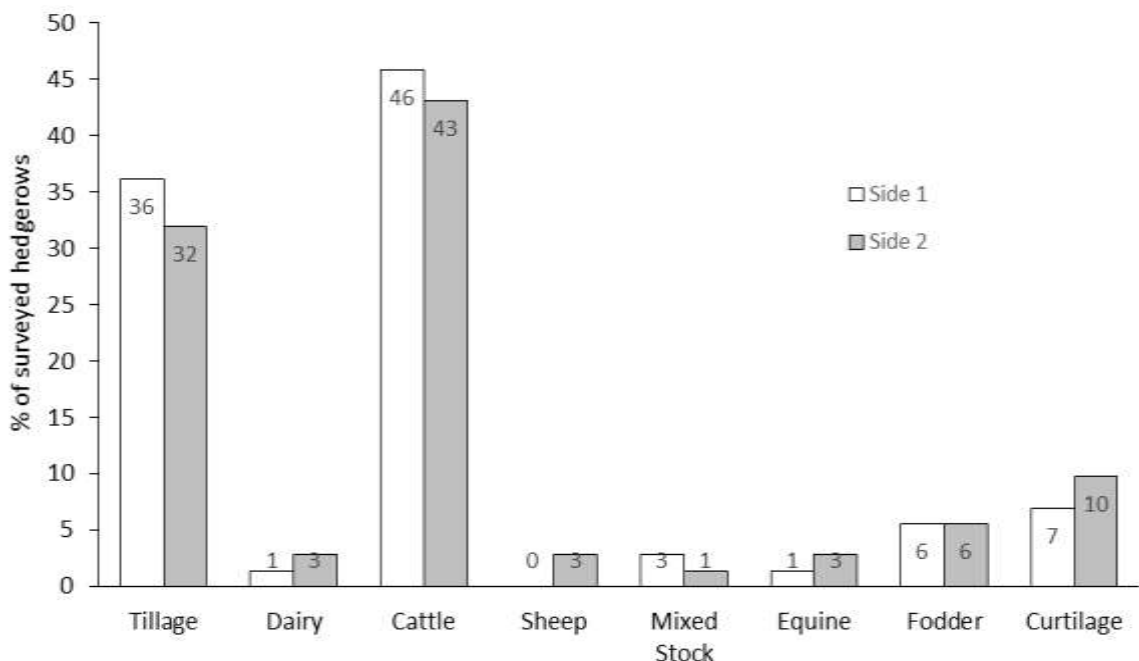


Figure 7: Adjacent land use of surveyed hedgerows (Side 1 and Side 2)

Hedgerow History

The majority of surveyed hedgerows (53%) were internal farmland boundaries (infill), while a further 31% were boundaries between different farms. An eighth (13%) of surveyed hedgerows were classed as townland boundaries (see Figure 8).

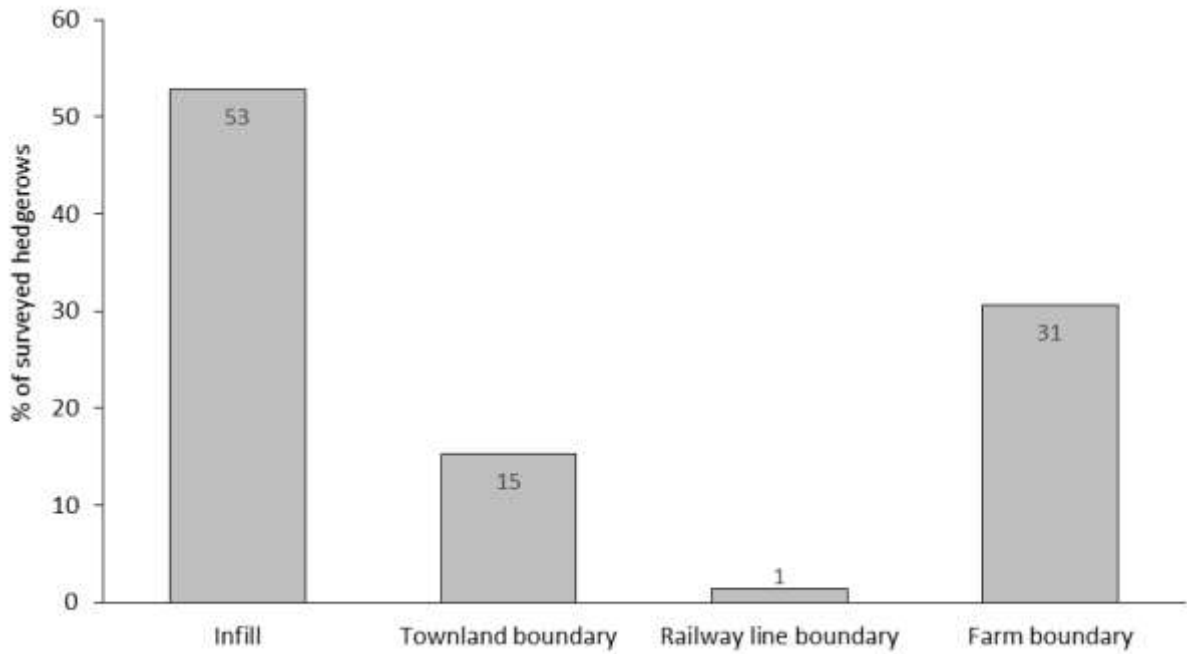


Figure 8: Boundary History of Hedgerows

None of the hedgerows surveyed were associated with streams, but 15 were roadside hedgerows and the remainder were field hedgerows. Nearly half (47%) of these roads were local roads, a third were farm roads or tracks, and one each from regional, second class and unclassified (Figure 9). No hedgerow was associated with ancient sites or monuments or had old woodland links.

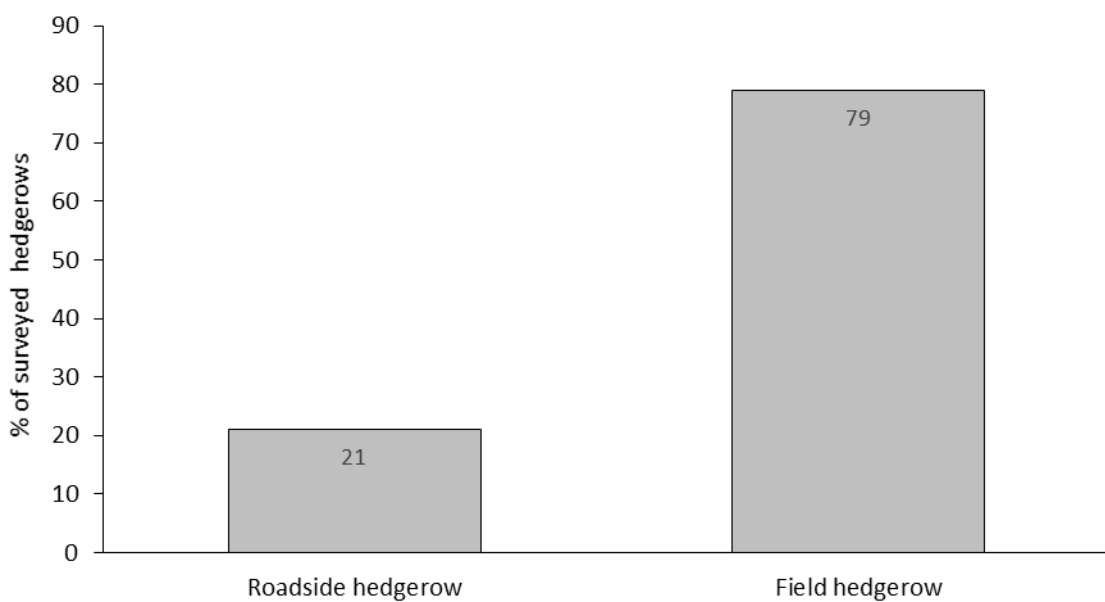


Figure 9: Boundary History of Hedgerows

More than six out of ten (61%) of the surveyed hedgerows were found to be shown on the first edition OS, six inch map (1834-36). Very few (3%) of these had links to woodland and 7% were present as treeline (a line of trees as opposed to a hedgerow). A further 36% of the hedgerows were mapped for the first time on the historic 25" maps (1907-1909). Only 3% of the hedgerows were not recorded on either the 6" or 25" historic maps (see Figure 10) and are obviously more recent in origin.

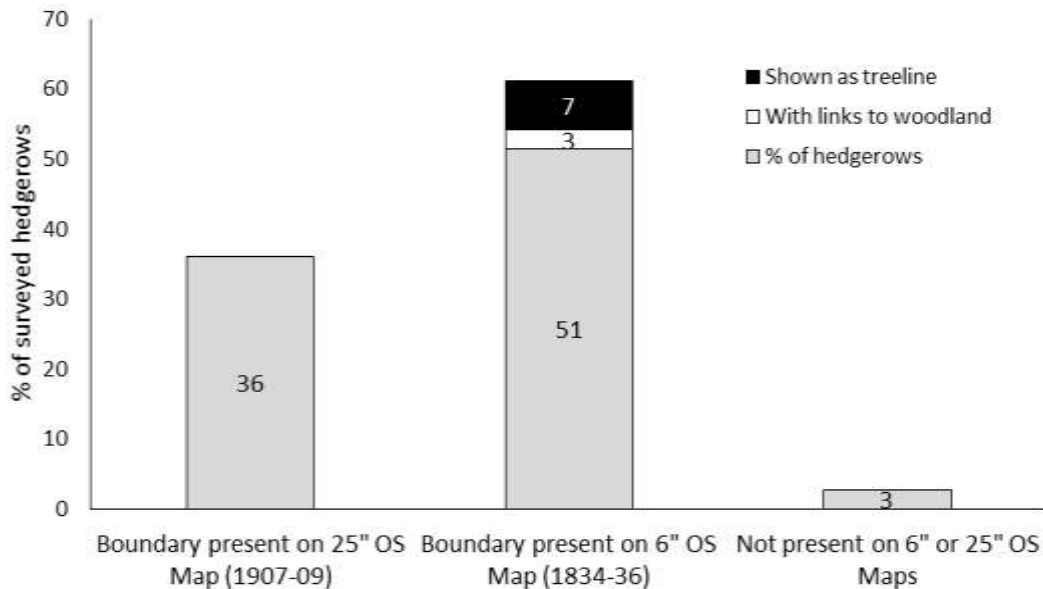


Figure 10: Historical context relating to presence of hedgerows on historic 6" and 25" ordnance survey maps



Photograph showing relatively newly planted hedgerow

Habitat of surveyed hedgerows

The majority of surveyed hedgerows are associated with improved grassland and arable habitats. These habitat classifications are based on Fossitt (2000) habitat classifications.

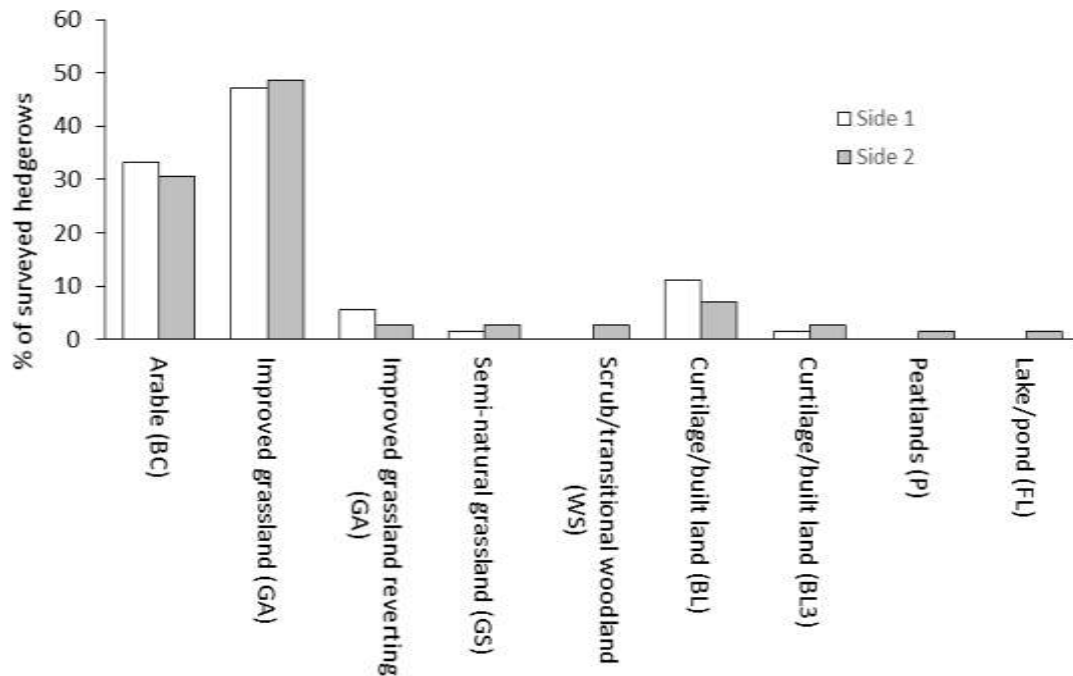


Figure 11: Adjacent land class

Habitat links to the end of hedgerows were also recorded. These are the same habitat classifications as used for recording adjacent land class (see Figure 11 above). The majority of hedgerows were linked to other hedgerows (see Figure 12).

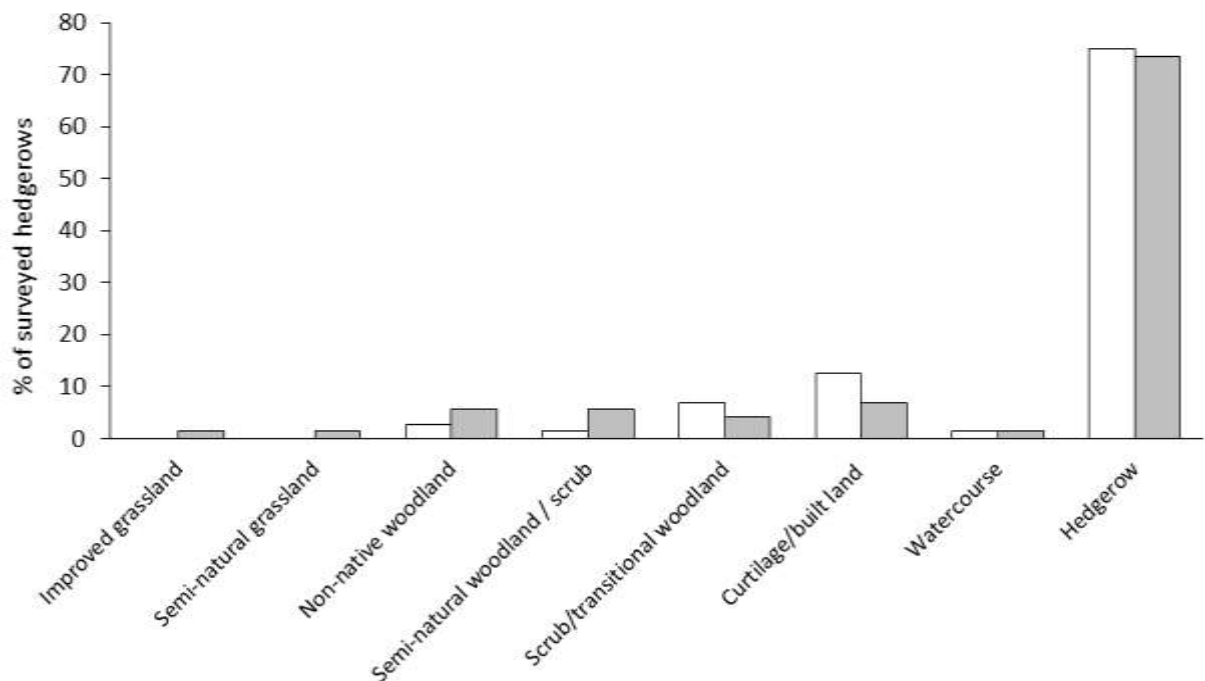


Figure 12: Habitat links to end of hedgerow

The majority of hedgerows were functioning as active boundaries (Figure 13).

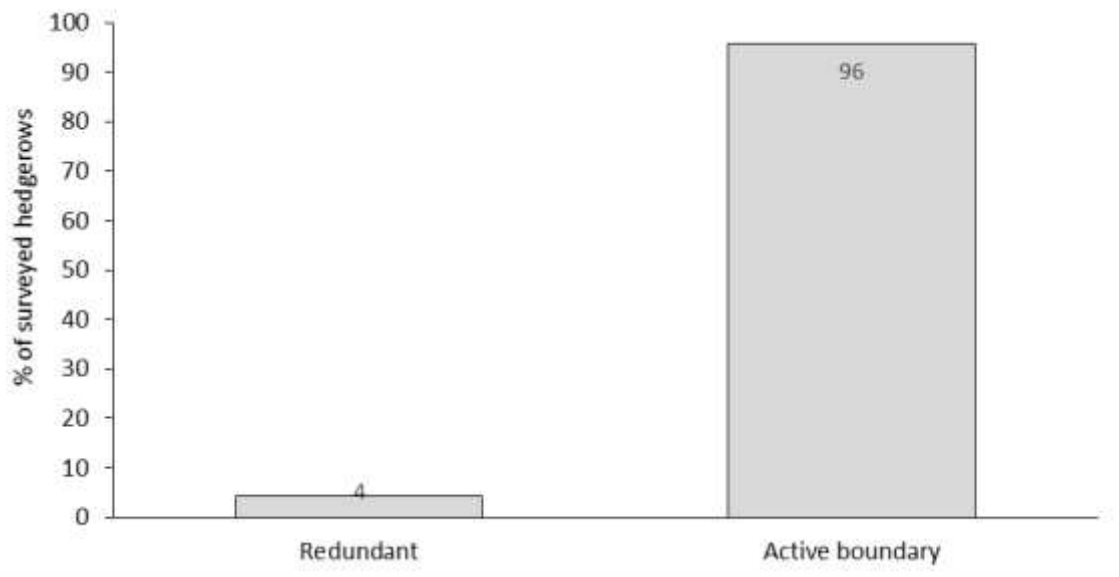


Figure 13: Boundary Function

5.4 Construction of surveyed Hedgerows

All hedgerows were single line hedgerows except one which was a random line (Figure 14). No double line hedgerows were recorded. All of the single line hedgerows were planted in linear rows. The single hedgerow that was recorded as a random line, the shrubs were non-linear as they follow the line of a stream.

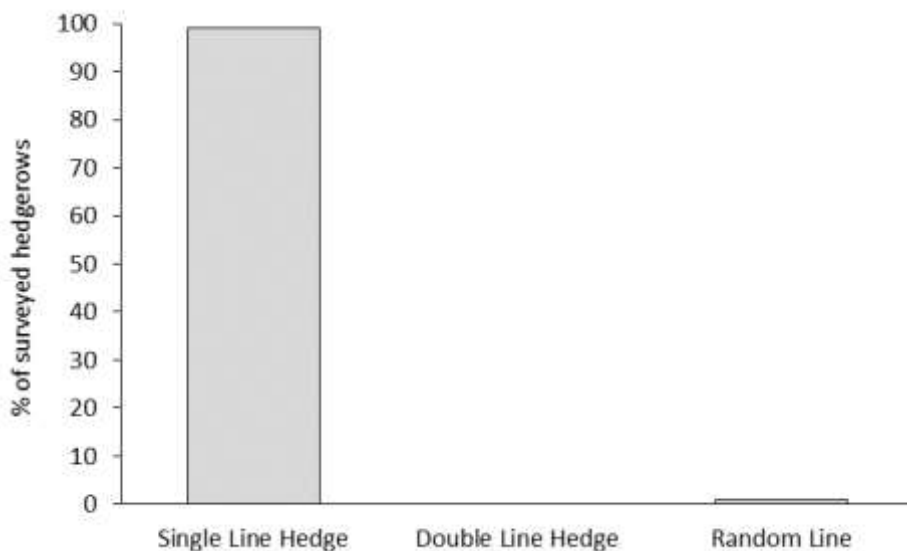


Figure 14: Outlined of surveyed hedgerows

65% of surveyed hedgerows had an associated bank (see Figure 15).

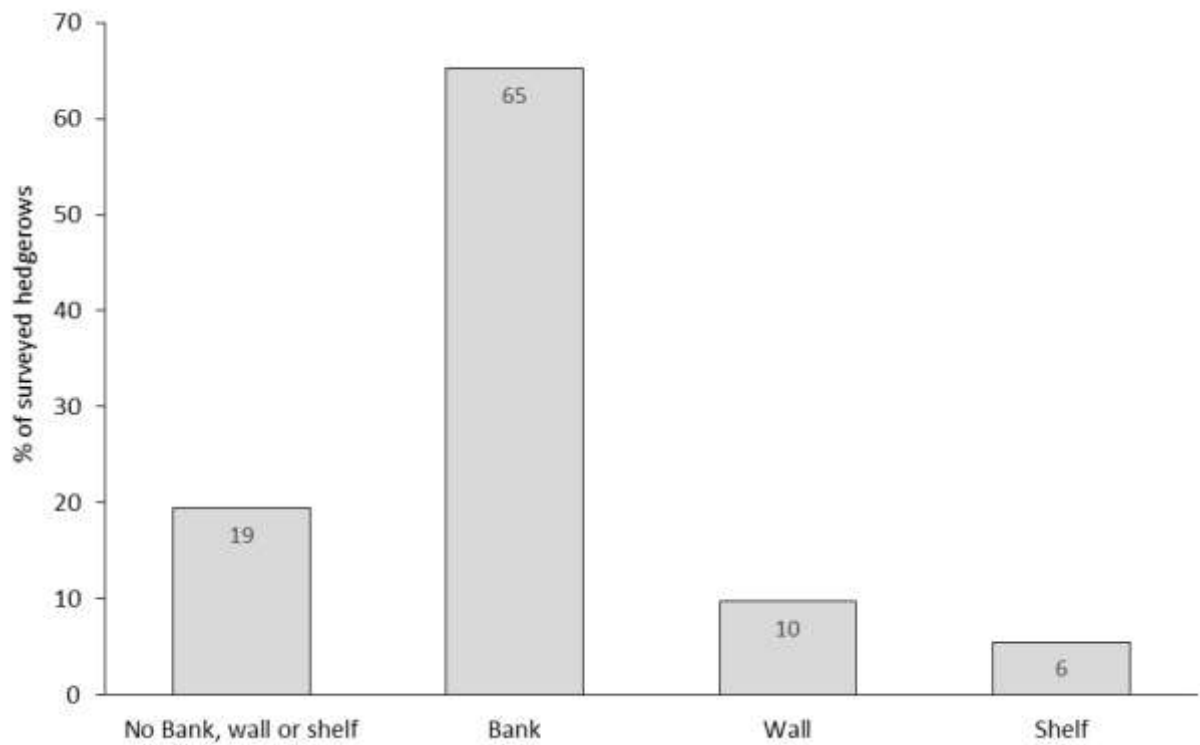


Figure 15: Boundary Type – bank, walls or shelf

Thirty-nine percent of the banks associated with surveyed hedgerows were less than half a metre high, while 32% were between 0.5-1.0m and only 7% were over 1m. Some 22% of hedgerows did not have an associated bank, wall or shelf (Figure 16).

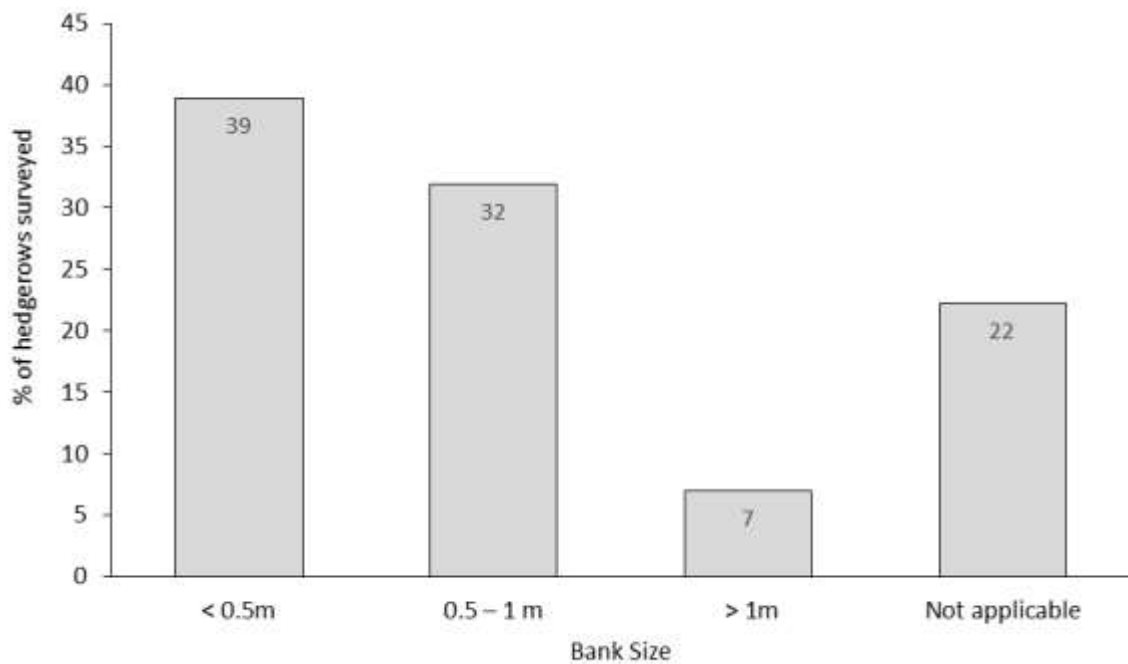


Figure 16: Bank or wall size

Most (88%) hedgerows surveyed had no drains adjacent to them (Figure 17). Two thirds of external drains were large in size (>1m wide), while small and medium drains accounted for a third each. Two thirds of the internal drains were small (<0.5m) and the other third was classed as medium (0.5-1.0m). At the time of the survey only two of the drains were recorded as wet (July 2014)

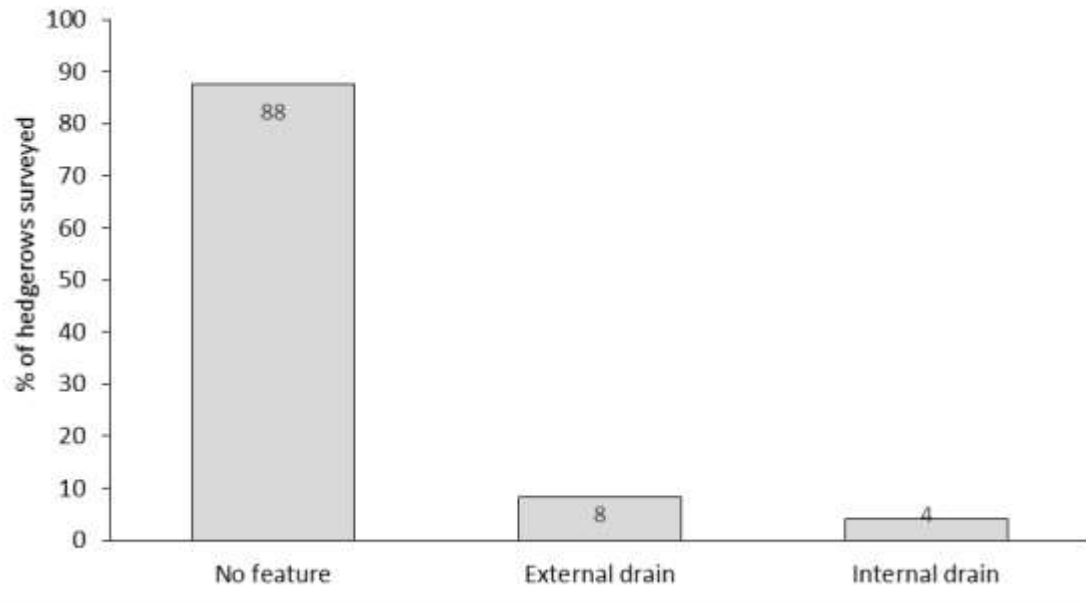


Figure 17: Drains associated with surveyed hedgerows

5.5 Structure and condition of surveyed hedgerows

Shape and Structure

The profile of the hedgerows was recorded from both sides. Just over half of surveyed hedgerows recorded a profile of overgrown / irregular, followed by boxed / A-shaped hedgerows at up to 38%. In addition, of all the surveyed hedgerows 35% were recorded as losing structure, while 65% were recorded as having outgrowths at the base.

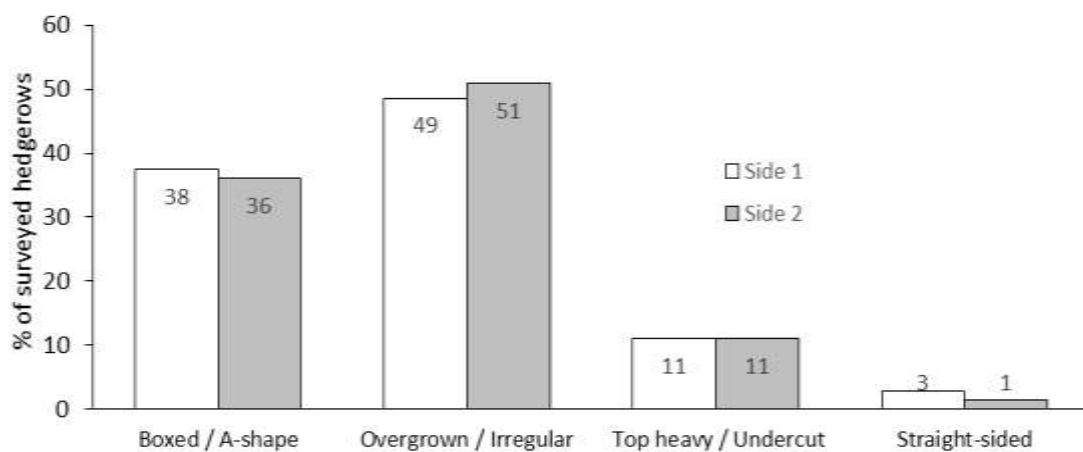


Figure 18: Profile of hedgerows surveyed

Hedgerow height categories

Twenty nine percent of surveyed hedgerows fell into the 2.5-4m high category (Figure 19), while 22% were over 5m high. The smallest height category was 4-5m, which represented just eight percent of the surveyed hedgerows.

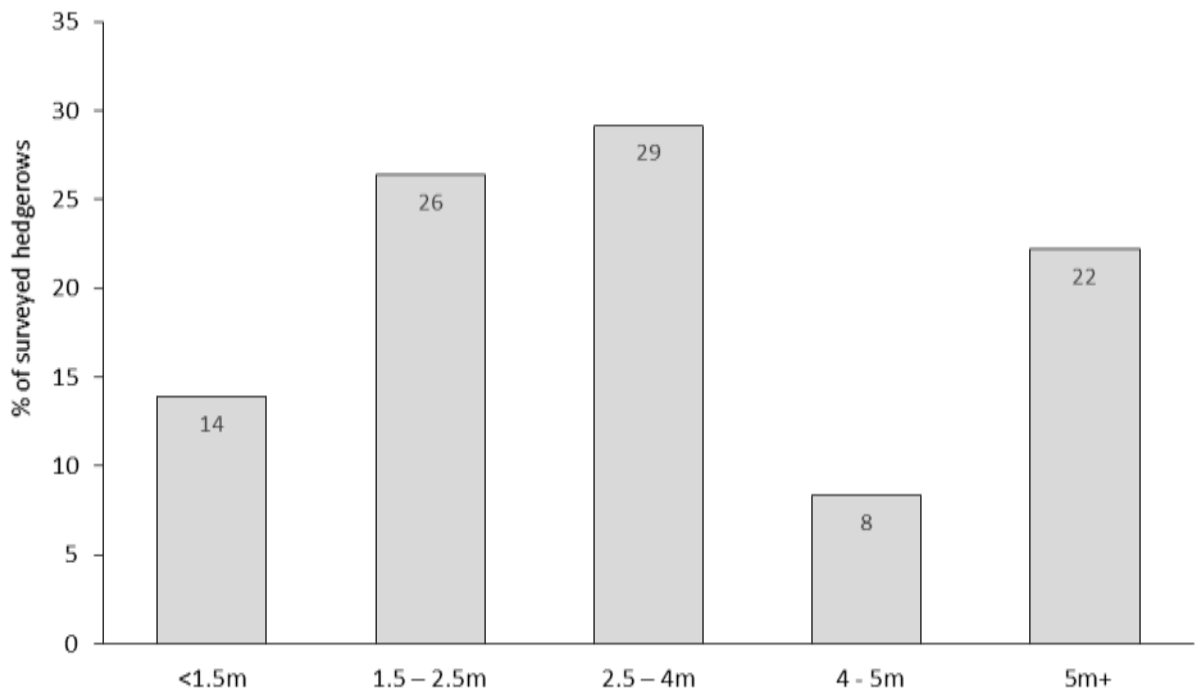


Figure 19: Height of hedgerows surveyed

Hedgerow Width Categories

Forty three percent of hedgerows were found to be between 1-2 metres wide and a further 29% were between 2-3 metres wide (Figure 20). Only one hedgerow was recorded as less than 1m wide.

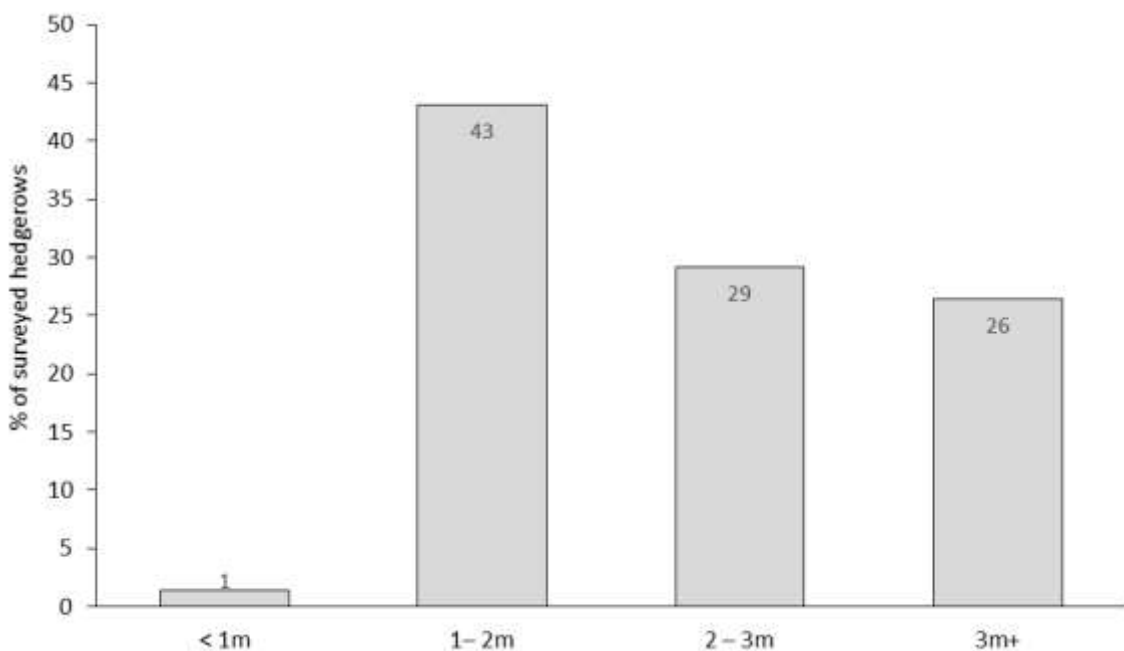


Figure 20: Width of hedgerows surveyed

Gaps in hedgerows

Figure 21 shows that 58% of hedgerows surveyed were complete with no gaps with a further 19% with total gaps amounting to less than five percent gaps of their length.

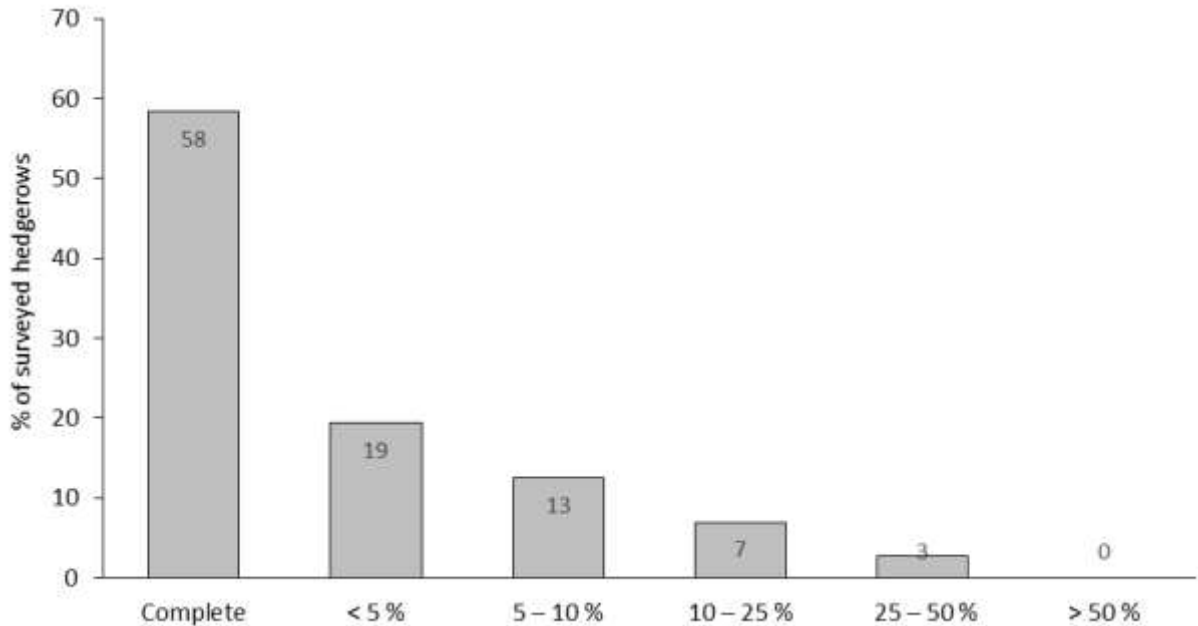


Figure 21: Percentage of gaps recorded in hedgerows surveyed

Base Structure

Thirty eight percent of hedgerows surveyed recorded a semi-opaque base. Just over a third (36%) had a dense or opaque base. Only 4% of hedgerows were found to have open / translucent bases, i.e. without any vegetation (Figure 22).

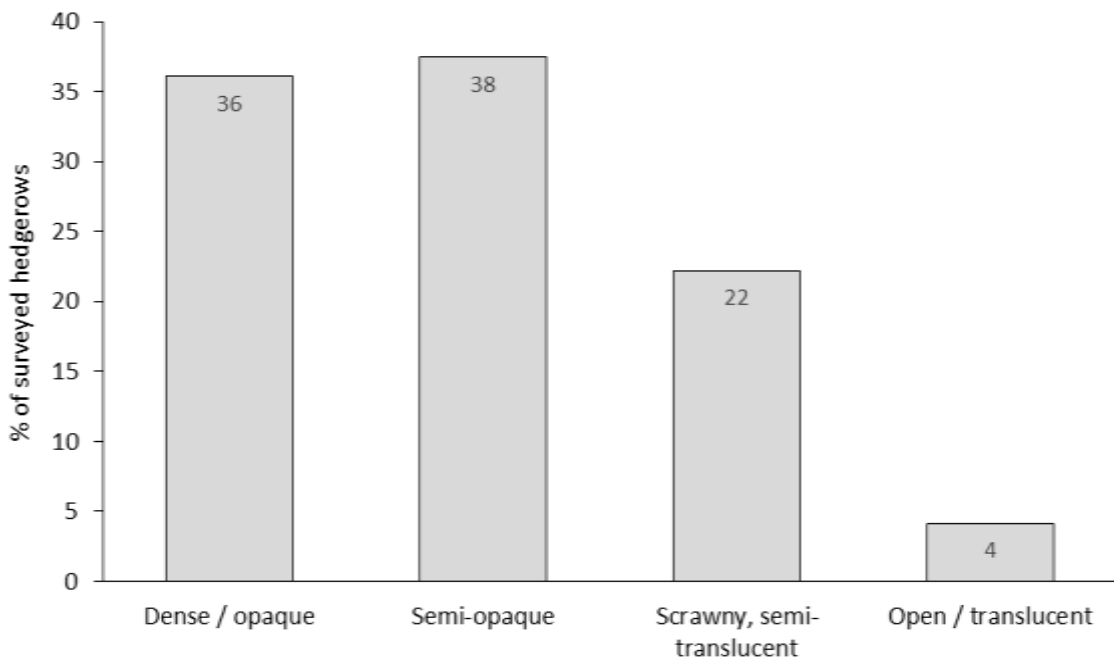


Figure 22: Structure of base of surveyed hedgerows

Hedgerows trees

Hedgerow trees are defined as trees within the hedgerow that have been deliberately or incidentally allowed to grow, as distinct from the shrub layer of the hedge. All tree species present in the entire length of the hedgerow were recorded. If the hedgerow contained species in both tree and shrub form they were recorded in the tree and shrub layer simultaneously. Figure 23 shows that a third of hedgerows surveyed had no trees present. Just under a third (32%) of the surveyed hedgerows had few trees present. Nearly one fifth of hedgerows had abundant trees present.

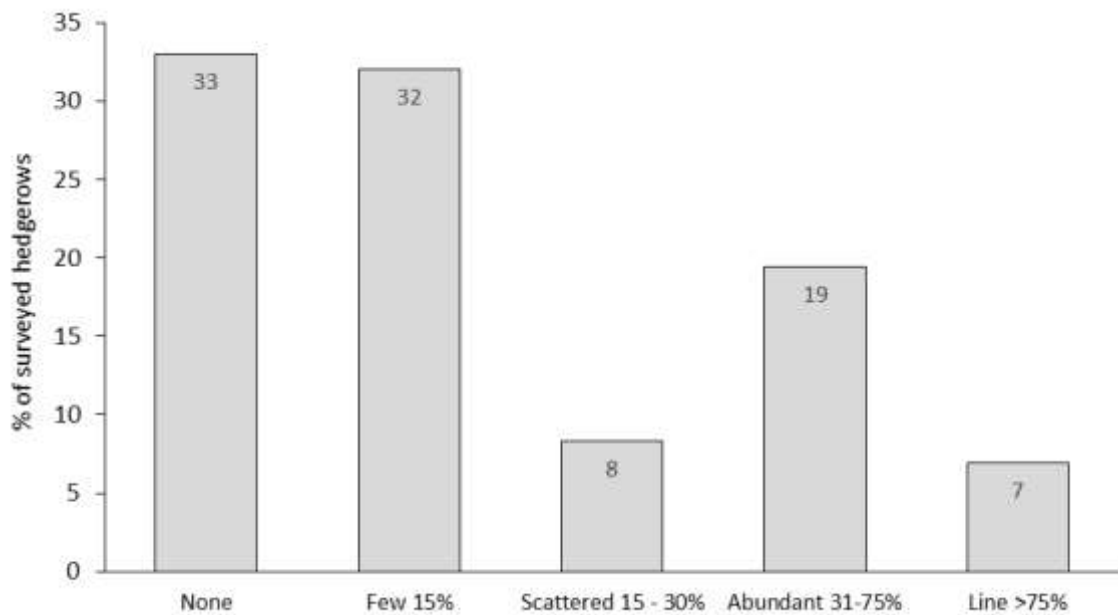


Figure 23: Quantity of trees in survey hedgerows

Nearly forty percent of recorded trees were classed as predominantly mature (Figure 24), while a further 14% were classed as all mature.

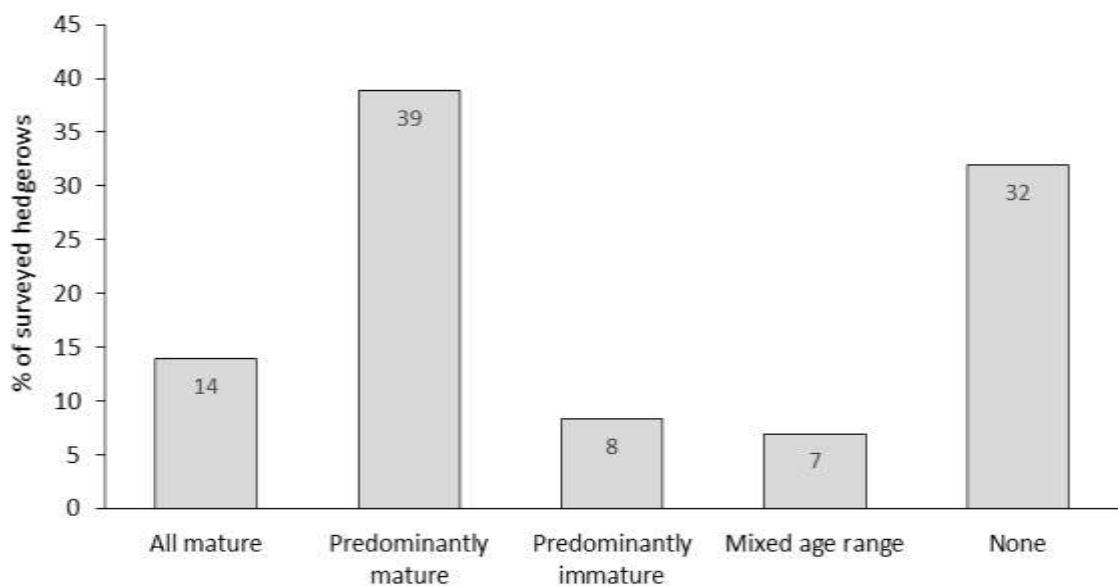


Figure 24: Age of trees in surveyed hedgerows

The maximum and minimum height of the trees along the length of the hedgerow were recorded. Just over forty percent of the trees recorded in the hedgerows were found to be in the height category of 10-20 metres. No trees over 20m or under 3m tall were recorded (Figure 25).

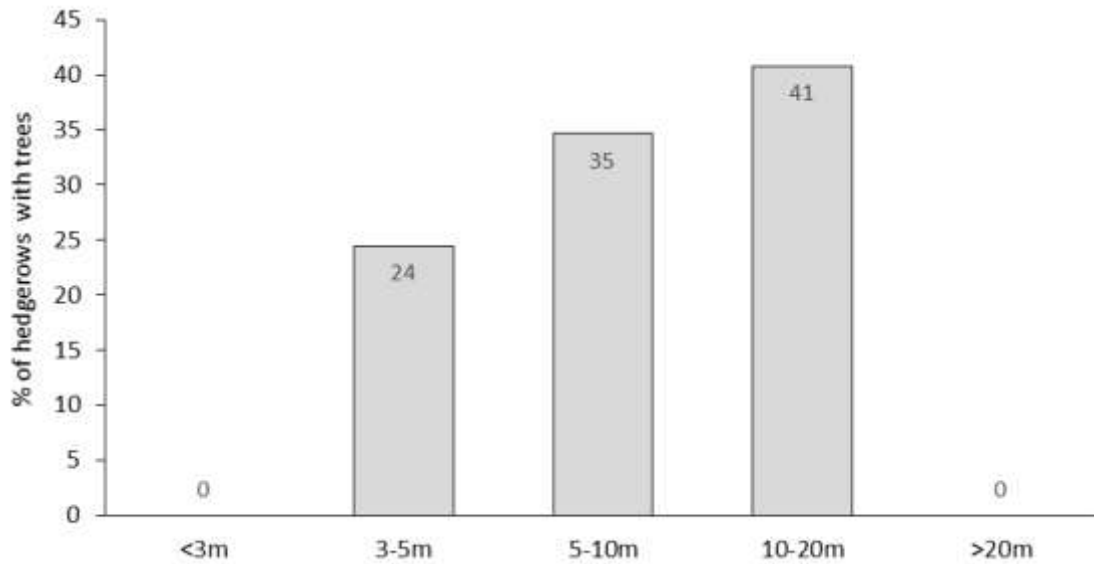


Figure 25: Maximum height of trees in surveyed hedgerows

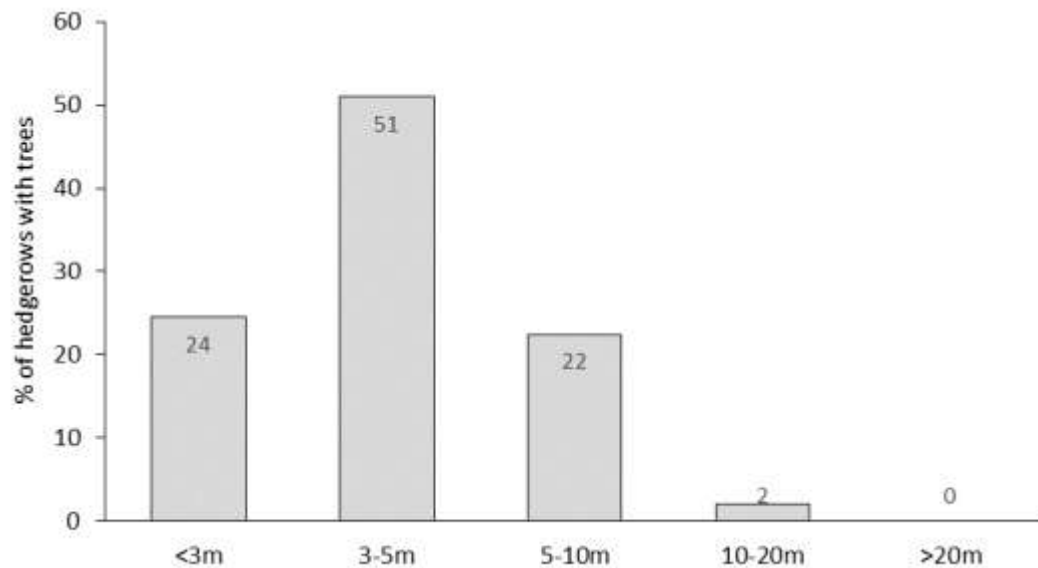


Figure 26: Minimum height of trees in surveyed hedgerows

Verges

The majority of hedgerows had verges of less than 1m (53-69%). Less than 1% (n=1) of hedgerows surveyed had verges of greater than 4 metres (Figure 27).

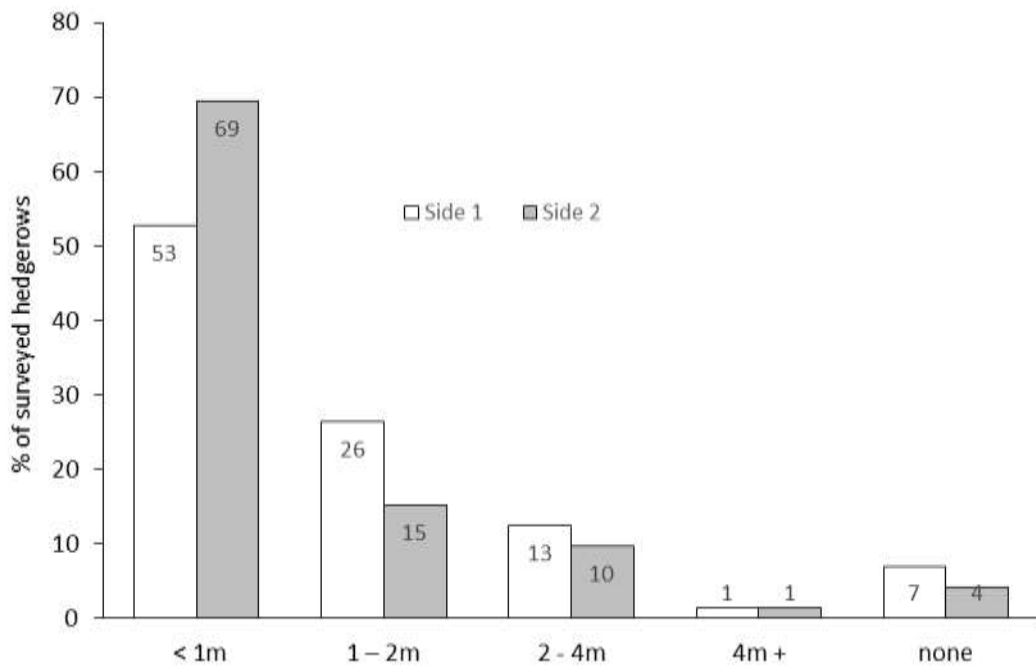


Figure 27: Verge width of hedgerows surveyed

Verge condition

The majority of verges showed no degradation (see Figure 28).

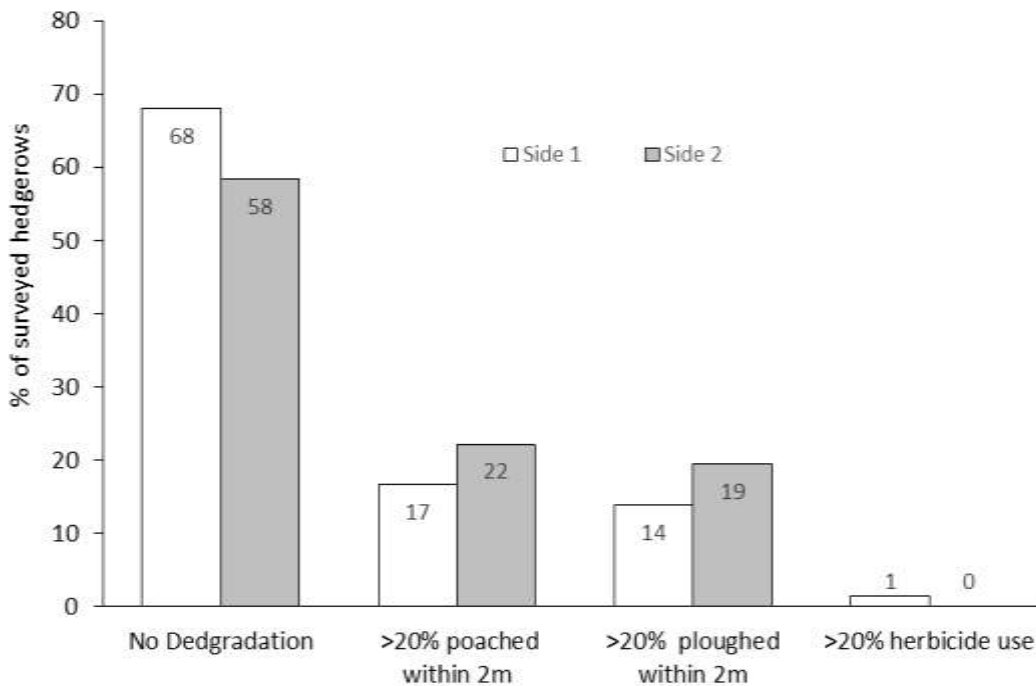


Figure 28: Verge degradation of surveyed hedgerows

General Vigour of Hedgerows

The majority of hedgerows recorded average or good vigour. Only 1% had poor growth or vigour, while a further 6% were poor in parts (Figure 29).

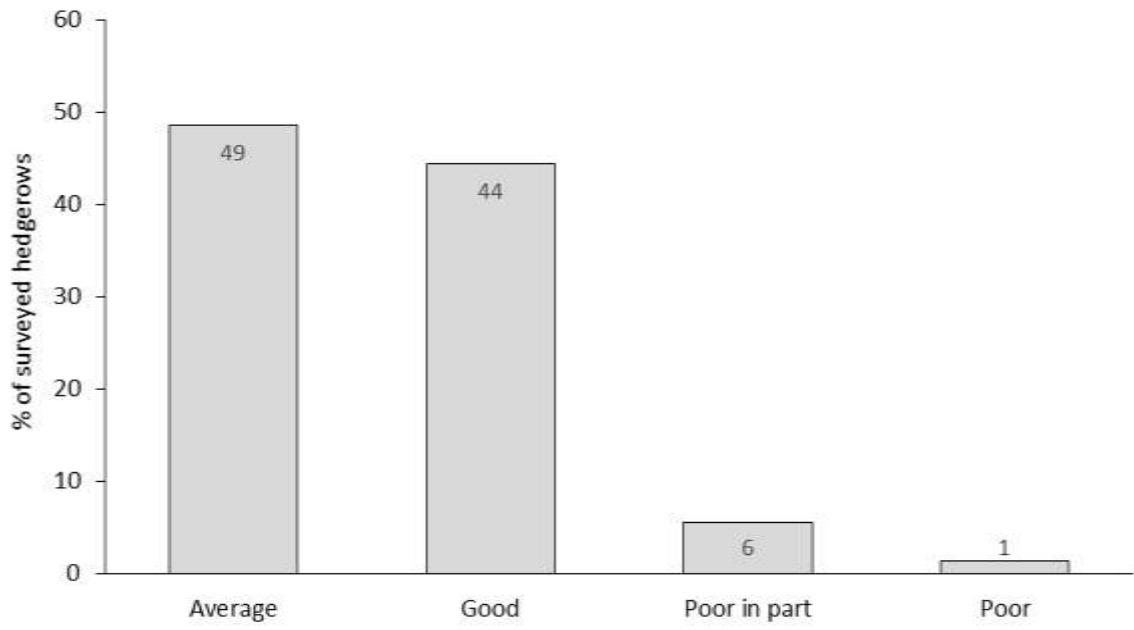


Figure 29: Overall vigour of hedgerows surveyed



Photograph showing well managed hedgerow displaying good vigour

5.6 Management of Hedgerows

Just under half the hedgerows surveyed were unmanaged. The majority were long-term unmanaged (38%) with a further 11% short-term unmanaged. Of the hedgerows managed, a total of 28% were cut box profile and a further 17% were cut on one side only (Figure 30). Just over 11% of hedgerows were recorded as being managed out of season. For the majority of hedgerows it was not possible to identify the management method, though nearly 10% of those hedgerows showing recent management, appeared to have been managed using a flail.

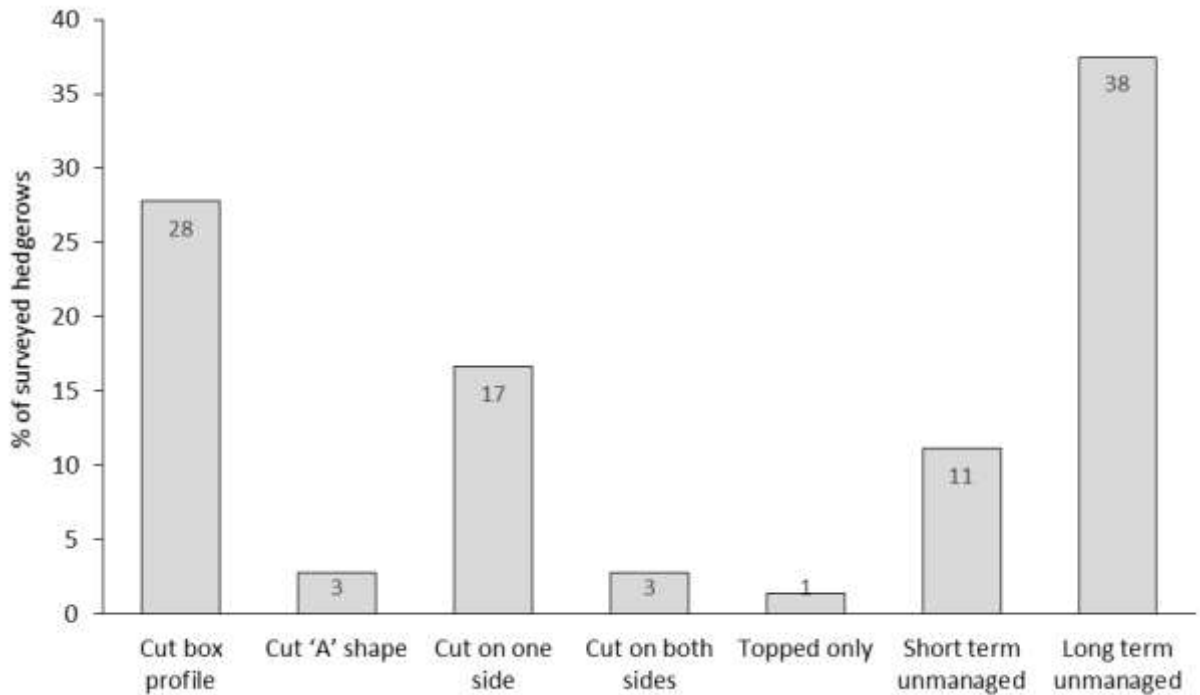


Figure 30: Management of hedgerows surveyed



Photograph showing box profile hedgerow with large holly tree

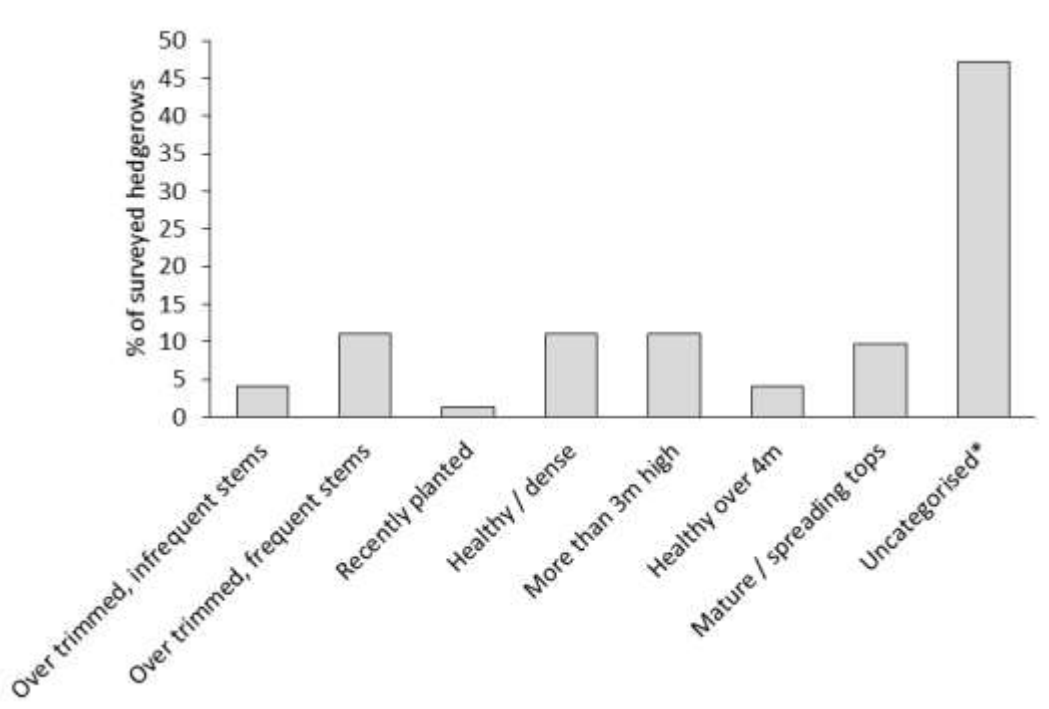


Figure 31: Management stage (*many hedgerows were difficult to fit into one category or another. These have been classed as uncategorised)

Hedgerow rejuvenation (laying and coppicing)

Only eight percent of hedgerows show any evidence of ever having been coppiced or laid. Ninety two percent of hedgerows showed no evidence of past coppicing or laying.

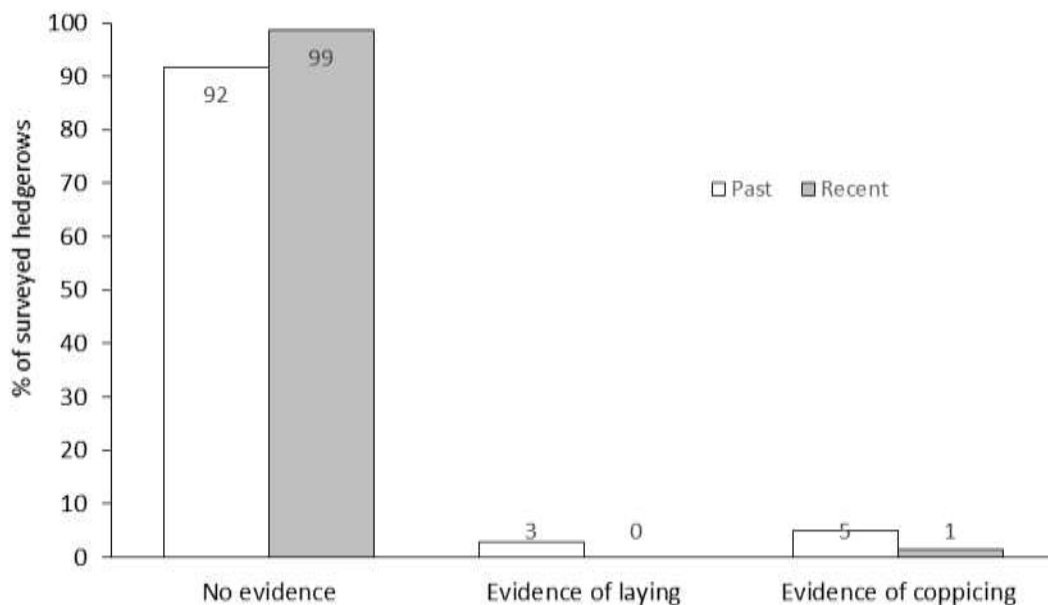


Figure 32: Evidence of hedgerow rejuvenation (past and present)

Fencing

The majority of hedgerows had no associated fencing (between 64-69%) (Figure 33). Post and wire was the dominant fencing type when present. Seventeen percent of wire fencing was found to be attached to stems of hedgerows trees/shrubs.

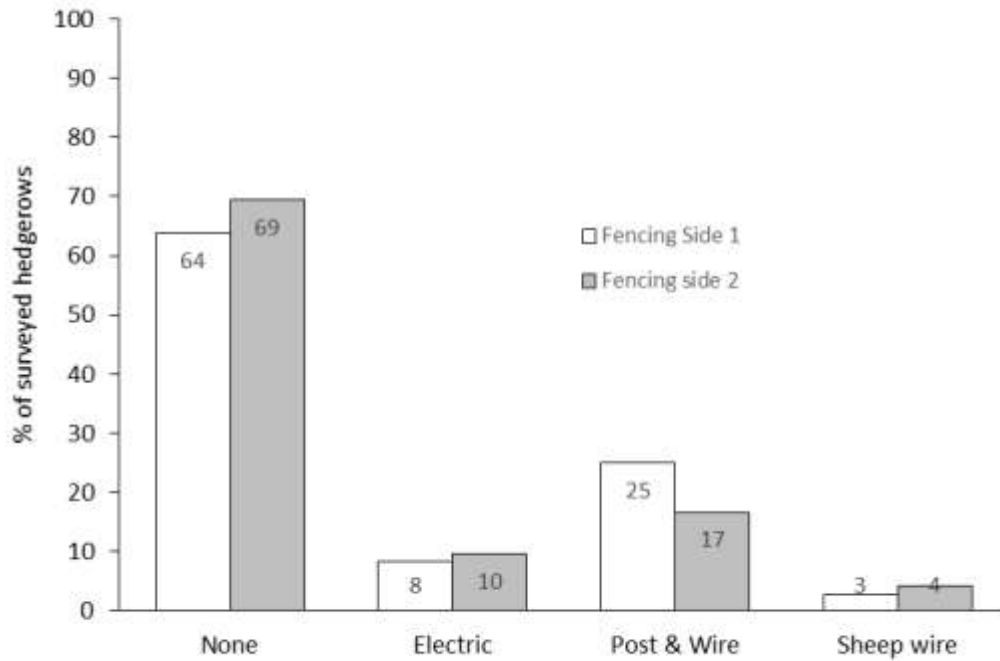


Figure 33: Fencing associate with surveyed hedgerows

Noxious weeds and evidence of nutrient enrichment

Fifty seven percent of surveyed hedgerows showed some evidence of nutrient enrichment. This was indicated by presence of nettle, docks and/or cleavers (Figure 34).

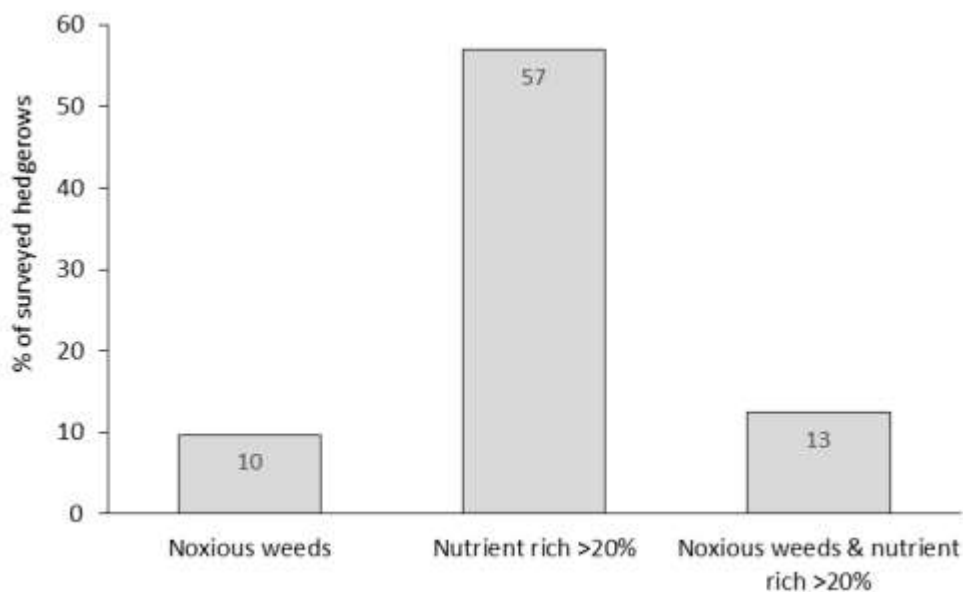


Figure 34: Ground flora – noxious weeds and nutrient enrichment

5.7 Hedgerow Appraisal

The hedgerow appraisal system as set out in the HAS guidance is intended to identify hedgerows of historical, ecological and/or landscape significance. It provides a means of condition assessment for hedgerows based on the data recorded in the survey using a standard methodology outlined in the guidance. See earlier section 4.12 Appraising Hedgerows for details.

Hedgerow Significance (historical, ecological, landscape)

Using the hedgerow significance score it can be seen that 25% of hedgerows surveyed were classed as Heritage Hedgerows (see appendix 3 for list of these hedgerows). However, looking at the individual significance categories the majority of hedgerows do not have any 'highly significant' categories. The historical significance category was the only category in which hedgerows recorded high significance (25%).

Condition assessment

The HAS guidelines set out criteria for desirable and undesirable attributes, which permit a qualitative assessment of hedgerow condition. Hedgerows are ranked from 0-3 (0- unfavourable to 3- highly favourable) in 3 categories representing the *structural variables, Continuity and other Negative Indicators*. The higher the recorded score the more favourable condition. A score of 0 in any category represents a hedgerow in what is called 'Unfavourable Condition'.

The vast majority (90.3%) of all hedgerows surveyed were found to be in 'unfavourable condition'.



Photograph of hedgerow in poor or unfavourable condition

Condition status

Table 9: Percentage of sampled hedgerows in unfavourable condition

Condition Category	Condition Criteria	Unfavourable %
Height	<1.5m	15.4
Width	<1m	1.5
Basal structure	Open	4.6
% Gappiness	>10%	10.8
Specific gaps	Individual gaps>5m	9.2
Bank/Wall	>20% of length degraded	3.1
Ground flora/hedgerow base	> 20% showing evidence of herbicide use	0
Ground flora/hedgerow base	Noxious weeds / >20% nutrient rich species	12.3
Ground flora/hedgerow base	alien invasive species	0
Degraded margin	Ploughing up to base or poaching/erosion	40

It appears that the most significant reason why hedgerows in County Louth are falling into the unfavourable condition category is due to hedgerow margins being ploughed up to the base of the hedgerow shrubs and poaching / erosion. This accounts for 40% of unfavourable hedgerows being classed as such. 21.6% were poached or eroded and the remaining 18.4% were as a result of ploughing very close to hedgerow bases in tillage areas.

The next most important condition category was height, with 15.4% of hedgerows being in 'unfavourable condition' due to their falling into the low height category (<1.5m).

6. Discussion – A comparison with results from other counties

Table ten, below, compares the results of the Louth sample hedgerow survey with results from similar surveys in other counties. Care has to be taken in interpreting these results, particularly in relation to comparisons with other county surveys, as the number of hedgerows surveyed in County Louth is relatively small compared to some larger counties. Differences may appear more important than they are. What appears to be a fairly large percentage difference may only result from the small number of surveys.

6.1 Extent of hedgerows in County Louth

It is estimated that there are 8,948.3km of hedgerow in County Louth. Hedgerow length varied between squares. All squares had hedgerows present (Table 1) but for some squares the presence of sea or woodland habitat meant not all the square had hedgerows present. Looking at hedgerow density we can compare squares. The highest density recorded was 14.5km in square J1010 and the lowest was 7.18km in square H9000. The average density per square was 11.02 km/km².

This average density is the highest recorded for any Irish county hedgerow survey and is comparable with County Cavan, which had very similar density (11.01 km/km²). See Table 9 below for details. However, it is worth noting, that Louth is the smallest county in Ireland and the sample size of just 8 km squares is therefore relatively small.

Table 9 also shows a measure of the variation of hedgerow densities. A high standard deviation figure indicates a wide variation in hedgerow density across the county. Louth has the smallest known standard deviations suggesting that the variation in hedgerow density across the county is low i.e. similar densities of hedgerows in all parts of the county. However, caution must be used in interpreting this result because of the small sample size.



Photograph of trackside hedgerow with ash trees

Table 10: Comparison of average hedgerow density of counties surveyed

County	Year of survey	Density (km/km ²)	Standard deviation
Louth	2014	11.02	2.53
Cavan	2006	11.01	4.76
Monaghan	2010	9.93	4.52
Longford	2006	8.23	6.14
Leitrim	2006	7.31	6.98
Laois	2005	7.28	3.15
Kildare	2006	5.92	3.61
East Galway	2006	5.88	n/a
Westmeath	2004	5.82	3.28
Offaly	2005	5.81	4.32
Roscommon	2005	5.43	4.75
Sligo	2008	5.33	4.76
West Kerry Daingean Peninsula	2008	4.97	4.26
North Kerry	2009	3.7	3.48
Mayo	2007	2.26	2.99
Donegal	2009	1.96	n/a

6.2 Hedgerow Distribution

In terms of Corine Land Cover classifications, 50% of surveyed hedgerows fall within *Pastures* and a further 41.2% fall within non-irrigated land class. A small percentage fall within Complex cultivation.

The association of hedgerow with Corine land cover classification has not been recorded for all hedgerow survey, though it is now part of HAS guidelines. In Monaghan and west Kerry, 85% and 84% of the hedgerows fell within the *Pastures* classification respectively. In County Sligo, this figure was 65% within the *Pastures* and 7% non-irrigated land.

6.3 Hedgerow Loss

No remnant or relict hedgerows were recorded during the survey and no evidence of recent hedgerow loss was recorded during fieldwork. However, 4% of hedgerows are classed as having a redundant boundary function. These hedgerows were all found in small square J1010. The hedgerows backed onto fields that were becoming scrub (with gorse) and without any management the hedgerows and scrub would soon become scrub. Like County Louth, counties Laois, Offaly and Monaghan record less than 9% of hedgerow as being redundant. This figure rises to an average of almost 20% in Counties Leitrim, Longford, Sligo, Roscommon and also in west Kerry.

However for County Louth, the historical loss of hedgerows was assessed by comparing hedgerows shown on historic 25" ordnance survey maps (1907 to 1909) with the hedgerows that were actually present on the ground (during the survey). A total loss of just over 17km of hedgerows was estimated for the eight one kilometre survey squares in County Louth, with the largest loss for one kilometre square being 4.3km.

A similar exercise was carried out for hedgerows in County Cavan where a much greater length of hedgerow loss was recorded (84km). It represented a figure of 26.6% of total hedgerow loss compared to 17.7% for County Louth.

The extent of hedgerow loss in Ireland is poorly recorded. One comparable figure for loss of hedgerows comes from Northern Ireland. Here a figure of 12.5% hedgerow loss was recorded in the late 1990's when similar historic ordnance survey maps were compared with on the ground hedgerow presence (Dingerkus 1997).

The loss of hedgerows since the early 1900s is mainly a result of changes in agriculture in particular the increased use of farm machinery which has led to smaller fields being amalgamated to create larger fields. It is hard to find figures to substantiate this but the number of small farms in County Louth, i.e. those of less than 20 hectares, fell from a total of 1272 in 1991 to 772 in 2010 – a drop in number of nearly 38% (CSO).

6.4 Species composition

A total of 19 species of small tree and shrub was recorded in County Louth hedgerows as well as an additional four species of climbers.

As the database of county hedgerow surveys grows it is becoming apparent that while there are just a few species that dominate Irish hedgerows, there are subtle variations in the species that occur at lower frequencies. It is this variability that makes each county's hedgerow stock unique. As with many Irish hedgerows, hawthorn is the most frequently occurring woody species in Louth's hedgerows, with a percentage frequency occurrence of 87.5. This is similar to East Galway (90% frequency occurrence) and Mayo (89% frequency occurrence) but a little lower than many other counties such as Offaly (99% frequency occurrence counties) and Monaghan (95% frequency occurrence).

Ash was the next most frequently occurring species (54.2). In County Kildare ash was also found to be the next most frequently occurring species (57%). While in neighbouring County Monaghan ash is the third most frequency occurring species after blackthorn.

However it's frequency of occurrence is similar at just under 52%).

In Louth, elder is the third most frequent species. The same is true for Counties Offaly and Kildare. In all three counties, elder occurs in approximately 50% of surveyed hedgerows.

Like hawthorn, bramble occurs widely throughout Irish hedgerows. In County Louth, it is recorded in just over 93% of surveyed hedgerows. This figure is consistent with other county hedgerow surveys. Dog rose was recorded in nearly 46% of surveyed Louth Hedgerows. The frequency occurrence of dog rose is one that varies widely between counties. Its highest frequency occurrence is in Co Offaly at 85%. In counties Kildare and Monaghan it occurs in over 60% of hedgerows, while in Co Sligo it was only recorded in 17% of surveyed hedgerows.

Knowledge of species composition of hedgerows in different counties is important as it allows new hedgerows to be planted using similar species and frequency of occurrence, thereby maintaining the local character and biodiversity of hedgerows throughout the country.

6.5 Native species

The majority of species found in Louth hedgerows are native to Ireland. With climate change likely to alter the growing conditions for vegetation to flourish, non-native species may become important for the long-term viability of the hedgerow. The more diverse the hedgerow the more robust and resilient it is likely to be in surviving the climatic changes that are taking place. Non-native species such as beech are classed as naturalised. Beech has been planted in Ireland since the 16th Century (www.agriculture.gov.ie/media/migration/forestry/publications/Beech_low.pdf). Its natural range is thought to be southern England (southern edge) and southeast Wales (western edge) but is will spread in Ireland though seed dispersal. The same is true for sycamore. Both these species were recorded in Louth hedgerows.

6.6 Hedgerow Trees

Hedgerow trees are any trees within the hedge that have been deliberately or incidentally allowed to grow, as distinct from the shrub layer of the hedge. Hedgerow trees have been recorded as being present in 67% of hedgerows surveyed in County Louth. The percentage of hedgerows with trees varies from County to County. West Galway has the lowest proportion of hedgerows with trees (33%), while Leitrim has the highest at 89%. Ash is by far the most commonly occurring tree in Irish hedgerows. It is recorded in 48% of surveyed Couth Louth hedgerows. This is similar to counties Roscommon (also 50%). Monaghan recorded the highest frequency of ash at 68%.

Table 11: Comparison between tree presence in County Louth and other county hedgerow surveys surveyed.

County	Number of tree species recorded	% of hedgerows with trees	% of hedgerows with Ash trees present
Cavan	10	70	58
Donegal	13	Not stated	28
East Galway	21	66	49
Kildare	33	74	58
Laois	20	79.3	47
Leitrim	14	89	67
Louth	13	67	48
Mayo	23	58	31
Monaghan	14	82	68
North Kerry	18	54	32
Offaly	24	Not stated	59
Roscommon	13	83	50
Sligo	12	68	47
West Galway	6	33	13
West Kerry	10	66	27
Westmeath	13	82	62

Hedgerow trees are important for many bird species using hedgerows (Hinsley and Bellamy 2000). Birds will use trees for roosting sites and for calling posts. Older trees with holes can provide valuable nesting sites. Taller, mature trees can also be important for mammal species such as bats. Bats will use holes in trees for roosting sites and will also feed along hedgerows (Hayden & Harrington 2000).

Due to the wildlife value of trees in hedgerows, land managers should be encouraged to retain mature trees and allow trees to grow to maturity.

6.7 Species Richness

A total of 22 species of trees, woody shrubs and woody climbers was recorded in the hedgerows surveyed. Of these, three were classed as naturalised species (sycamore, wild privet and beech). Only one non-native species was recorded (maple). Compared with other counties (see Table 11) the mean species richness of hedgerows in County Louth is relatively low.

Table 12: Shrub species richness of hedgerows surveyed in Louth compared with other counties. Results are based on two 30m strips combined to give mean species richness of shrub species per hedgerow

County	Mean Species Richness
Cavan	4.6
Laois	4.0
Leitrim	3.9
Offaly	3.8
Monaghan	3.6
Kildare	3.5
Donegal	3.3
Longford	3.3
<i>Louth</i>	2.9
East Galway	2.8
West Kerry / An Daingean Peninsula	2.8
Westmeath	2.8
Roscommon	2.5

Hooper's Rule is a method used to age hedgerows by relating the age of a hedgerow to the number of woody species occurring in it. The method states that for each separate woody species found in a hedgerow is equivalent to 100 years growth +/-100 years. Therefore a hedgerow of 13 species could be 1200-1400 years old. The relevance of Hooper's Rule to Irish hedgerows is debated.

Species richness can be influenced by many elements including soil type, elevation etc. Until more county surveys are completed we may not get a complete picture as to why

certain areas have more species-rich hedgerows than others. It is important that management methods and any new hedgerow planting reflect the species diversity found in County Louth.

Only 16.7% of County Louth hedgerows would be considered to be species rich (four or more shrub or small tree species per hedgerow). Looking at the 30m strips the figure would rise to 22.9%, which is similar to what was recorded in West Kerry and Kildare at 21.2% and 18.85% respectively. County Leitrim recorded the highest proportion of species rich hedgerows at 46.9% and North Kerry the lowest at 4.7% (all these figures are based on the 30m sample strip). The 30m sample strip is based on research in the UK and is generally accepted in the UK as a sufficiently representative sample size for recording woody species in a hedgerow (Bickmore, 2002). According to Foulkes (2010), Irish hedgerows tend to show high degrees of variation in species composition from one end of a hedgerow to the other. For this reason, two 30m strips are recorded for each hedgerow sampled, with the data averaged to give a single figure per hedgerow. Foulkes feels that the increased sampling intensity gives a more accurate picture of the overall species composition of each hedgerow (Foulkes, 2010). However, further research may be required to ensure that averaging the data is statistically robust.

The majority (64%) of townland hedgerows in County Louth were found to be species rich having four or more tree or shrub species per hedgerow. The remaining 36% of townland hedgerows recorded three species of tree or shrub present.

Just over half (58.8%) of roadside hedgerows in County Louth were classed as species-rich having four or more tree or shrub species per hedgerow.

6.8 Quality of hedgerows in County Louth

The new HAS guidelines attempt to quantify the quality of hedgerows. The survey of County Monaghan in 2010 was the first time HAS guidelines had been used to determine if hedgerows were in favourable condition. Previous surveys assessed hedgerows against five of the nine '*favourable condition*' criteria set out in the UK Biodiversity Action Plan.

Only 9.7% of hedgerows in County Louth were classed as in '*favourable condition*'. When compared with the 27% of all hedgerows surveyed in County Monaghan which met all of the *Favourable Condition* criteria of the HAS guidelines, this figure seems low. However, for 40% of the hedgerows that have been classed as being in 'unfavourable condition' this classification is a result of poaching and ploughing. In ploughed fields, it would be easily remedied by encouraging farmers to leave a gap of a minimum of two metres unploughed along the base of the hedgerow. The majority of livestock farming in County Louth is cattle farming. By placing electric fence lines along vulnerable hedgerows, poaching could also be reduced. For County Monaghan poaching and ploughing of hedgerow margins account for 15.7% of hedgerows falling into the unfavourable condition class.

The second factor which led to a further 15.4% of unfavourable hedgerow status was height of hedgerows, with hedgerows being classed in the low height category (<1.5m). Again farmers could also be encouraged to allow hedgerows to grow taller. In County

Monaghan, the figure for hedgerows being classed as unfavourable due to low height was very similar at 15.7%.

In other county hedgerow surveys, prior to the introduction of the HAS guidelines, the level of gappiness and the basal structure are the two main categories responsible for the majority of the hedgerows failing to meet the criteria. In County Monaghan a high level of cover of nutrient rich species (nettles, docks and cleavers) in the margin was responsible for 26% of hedges failing the *Favourable Condition* compared to 12.3% for County Louth.

A quarter (25%) of County Louth hedgerows surveyed were classed as heritage hedgerows. Hedgerows can also be considered of high significance (*Heritage Hedgerows*) if they record a cumulative score of 6 or greater in the Historical, Species Diversity or Structural Categories, or a cumulative score of 16 or greater over the five categories. All of Louth's heritage hedgerows were classed as such because they had a score of 6 or greater in the 'historical' category, i.e. no hedgerows qualified as such due to their species diversity or structure. A list of these hedgerows is provided in appendix 3. All townland boundaries in Louth were classed as heritage hedgerows. County Monaghan is the only other county to date for which the heritage hedgerow assessment has been recorded. Almost the same percentage (25.9%) of hedgerows in County Monaghan were recorded as heritage hedgerows.

The HAS guidelines state that heritage hedgerows should be considered as high priority in terms of retention and management action. However, this should not undermine the status of the remaining hedgerow network. It is important to remember that all hedgerows provide important functions. They provide a range of Ecosystem Services, including Provisioning Services (i.e. food and fuel), Regulation Services (i.e. air quality, climate moderation, water quality, soil erosion control, disease management, pest control and pollination), Cultural Services (i.e. aesthetic value, educational and recreational), and Support Services (i.e. soil formation, photosynthesis and nutrient cycling) (Land Use Consultants, 2009).

6.9 Physical features of County Louth hedgerows

Agriculture in County Louth is predominantly livestock and tillage and this is reflected in the physical characteristics of the hedgerows. Many of the hedgerows associated with tillage areas are well managed in terms of their structure. However, at the same time the base of these hedgerows can be detrimentally affected by farmers ploughing as close to the field edge as possible.

Approximately 80% of all the hedgerows surveyed in County Louth were in areas of tillage and cattle farming.

The majority of hedgerows are active boundaries (86%) of single linear hedgerows. More than half (53%) of the hedgerows were internal farm boundaries, with a further 31% being boundaries between farms. 15% represented townland boundaries. In County Monaghan there was a similar breakdown, with 12% townland boundaries and 61% internal farm boundaries surveyed.

In Louth, 81% of the hedgerows were associated with bank, wall or shelf. The majority of these were banks that were under 1m high. In neighbouring County Monaghan over 92% of hedges were associated with a bank, wall or shelf.

Only 12% of Louth hedgerows surveyed had drains i.e. 88% of hedgerows surveyed had no drains associated with them. This is probably a reflection of the relatively low rainfall in the eastern half of the country compared to other areas of Ireland. This low number of drains is in contrast with County Monaghan where 51% of hedgerows were associated with a drain or watercourse and County Cavan where over 80% of the hedgerows had an associated drain.

Hedgerow height is often determined by management practices or in some case the lack of management (often leading to tall hedgerows). All height classes were represented in Louth hedgerows. Three out of five (60%) of the hedgerows were over 2.5m high, of which 22% were over 5m. In County Monaghan 75% were over 2.5m high and again this included 22% over 5m high. Tall hedgerows, particularly those associated with ditches have been found to support higher numbers of birds (Arnold 1983). A seventh (14%) of surveyed Louth hedgerows fell into the lowest category of less than 1.5m. For some counties, such as Kerry (North) no hedgerows were recorded in this category, but for neighbouring County Monaghan almost 16% of hedgerows were recorded as less than 1.5m high. In County Louth, of the 14% that were in the lowest height category 90% were managed either as boxed profile or A-shaped.

Hedgerow width can be a result of management but it can also be determined by how the hedgerow was originally planted. The majority of Louth hedgerows fall between 1-3m wide (72%) with only 1% being less than a metre wide. Similar width categories have been recorded in Counties Monaghan and Kildare.

The majority of Louth hedgerows were found to be complete or with only few gaps amounting to less than 10% (90% of surveyed hedgerows). This lack of gappiness is a positive feature of Louth hedges. In County Monaghan, no hedgerows were recorded as being complete though 37% of hedgerows recorded gaps of less than 5%, while in County Kildare the equivalent figure was 41%. No hedgerows in County Louth were classed as having gaps of more than 50%.

Along with the lack of gaps in County Louth hedgerows, another positive feature is the base structure. A dense woody base makes hedgerows stock-proof but also benefits wildlife. Just under three quarters (74%) of the surveyed hedgerows were recorded as having either a dense or semi-opaque base, with only 4% recording an open base. In the County Monaghan survey, 50% of hedgerows were described as having scrawny, semi-translucent base. In Kildare and Longford, the figures were 41% and 44% respectively (though remnant hedgerows had already been removed from these calculations). The dense nature of the Louth hedgerow bases is also reflected in the fact that fewer than 3% of the hedgerow banks in the county were classed as being severely degraded.

Half of Louth hedgerows were classified as being overgrown/irregular while an additional 37% were classed as Boxed/A-shaped. This is similar to County Kildare where just over half (51%) were classified as being overgrown/irregular and 28% as Boxed/A-shaped.

Neighbouring County Monaghan had 61% overgrown in and 26% Boxed/A-shaped which was similar to County Longford with 57% overgrown and 23% Boxed/A-shaped. In contrast to many counties, with the exception of County Monaghan, no hedgerows in County Louth were classified as remnant or derelict.

Just under half (49%) of Louth hedgerows showed 'average' vigour. Only 7% showed 'poor' or 'poor in part' vigour.

6.10 Management of Louth hedgerows

In terms of management, 38% of hedgerows in County Louth were classed as being long-term unmanaged, with a further 11% short-term unmanaged. Where hedgerows were managed the majority were cut in box profile (28%). These figures are relatively similar to County Monaghan where 41% were classed as long-term unmanaged, and considerably lower than counties such as Kerry and Roscommon where long-term unmanaged hedgerows account for 60% and 61% of surveyed hedgerows respectively.

There is little evidence of recent laying or coppicing, with only one hedgerow in County Louth being recorded as being recently coppiced. In County Monaghan, only two hedgerows were recorded as being recently laid and in Counties Kildare and Longford 1% of the surveyed hedgerows were recorded as having been recently laid/coppiced. Counties Offaly and Westmeath record the highest percentages of hedge-laying at 24% and 26% respectively.

Just over two thirds (67%) of County Louth hedgerows recorded no associated fencing. This is likely to be a reflection of both the extensive tillage in the county, but also the good basal structure of the hedgerows means that they do not require additional fencing. The lack of fencing also means that management of hedgerows by machinery is easier. The majority (80%) of hedgerows associated with tillage farming had no fences associated with them.

One twelfth (8%) of hedgerows were deemed to have been managed outside the cutting season as outlined in the Wildlife Amendment Act (2000). According to this act hedgerows should not be cut between 1st March and 31st August. The 8% was considerably higher than in County Monaghan, where just 1% of surveyed hedgerows was recorded as having been subject to out of season management.

Only one new hedgerow was recorded as being planted. This may be partly as a result of the relatively low take up of REPS in County Louth. 408 Louth farms were in REPS in 2007 (Louth County Development Plan, 2009 – 2015).

In general terms, the condition of County Louth hedgerows is good. While compared to other counties', Louth's hedgerows may appear species poor they are, in general, well managed and in relatively good condition. While a high percentage are classed as being in 'unfavourable condition', some small changes in management practises could change this significantly. The term 'unfavourable condition' is somewhat subjective. It is important to remember that the condition assessment gives an evaluation based on the current

condition of the hedgerow, but does not indicate the scope for improvement either over the short or long term.

Agricultural practices change all the time. For example, the Agri-Environment Options Scheme (AEOS) was set up in 2010 to replace the rural environmental protection scheme (REPS). Under REPS farmers were given guidelines for appropriate hedgerow management. The AEO Scheme provides payments to farmers who undertake measures to address the key challenges including:

- Contributing to Halting Biodiversity Decline
- Contributing to Maintaining Water Quality
- Contributing to Combating Climate Change.

These include new hedgerow establishment as well as coppicing and laying hedgerows.

Early in 2014, another new agri-environment scheme GLAS (Green, Low carbon, Agri-environmental scheme) was proposed. Under tier 3 of this scheme a landowner can apply for a number of options which include coppicing laying or planting new hedgerows. Details of this scheme are yet to be published but it is likely to have an influence of how hedgerows are managed into the future.

7. Recommendations

Hedgerows form an integral part of the Irish landscape. The importance of the hedgerow network is multi-layered. It is cultural, environmental and an integral part of Ireland's agriculture. Hedgerow conservation and appropriate management should ensure their continued function for local biodiversity, wildlife conservation and their benefits to farmers and their livestock. The vast majority of Irish hedgerows have been planted by man and are over 100 years old. Their future is dependent on appropriate management, which will ensure they survive and thrive into the next century.

7.1 National Policy - Hedgerow Conservation

Various state bodies have published documents and policies on hedgerow conservation, and standards for hedgerow management. These include the National Biodiversity Action Plan, National Heritage Plan, and the Wildlife Act. The Heritage Council has produced a document on hedgerow conservation. Teagasc have produced useful leaflets including some for hedgerow management and planting of new hedgerows. Many County councils have produced information leaflets on hedgerow conservation and management.

It is important that information produced is based on sound management and conservation principles and that all organisations are giving out the same message.

Further incentives should be used to encourage landowners to plant new hedgerows. New agri-environmental schemes (GLAS) are likely to be important in ensuring this happens.

Community groups and schools can also get involved in managing and planting hedgerows.

7.2 Local Policy – Standards for Hedgerow conservation

Local development plan, local biodiversity action plans, local heritage plan

7.2.1 Local Plan

Biodiversity action planning

As part of a biodiversity action plan for the County, the Council could adopt a habitat action plan (HAP) for hedgerows (see appendix xx). This plan would include timetabled actions on how to conserve and maintain the wealth of hedgerows in the county.

Recommendation 1: *Adopt a habitat action plan for hedgerows in County Louth.*

Planning

Where hedgerows are threatened due to the planning process (Single dwellings, housing development, industrial developments or road schemes) ecological surveys of hedgerows should be carried out. Principles of protect, enhance, mitigate or compensate should be taken into consideration. Where possible retain all hedgerows on the development site.

Investigate which hedgerows would benefit from enhancement. For example, it may be possible to fill gaps with native species. If the hedgerow must be removed (for example, to allow road widening) can part of the hedgerow be maintained and / or enhanced? If a hedgerow is to be removed (and this should only be as a final resort), then the loss should be compensated for by the planting of another hedgerow (of native species). Ideally this should be close to the site from which the original hedgerow was removed.

Recommendation 2: *Council should adopt the principle of protect, enhance, mitigate and compensate when dealing with hedgerows that are threatened by any development.*

Recommendation 3: *All new hedgerow plantings (including those associated with road schemes) should use native trees of local origin. Emphasis should be placed on planting species in the same ratios as found in the Louth hedgerow survey.*

Recommendations 4: *Planning conditions relating to hedgerows should be enforced.*

Maintenance of Roadside Hedgerows

Consideration should be given by councils to only employing contractors that have achieved the Teagasc proficiency standard – MT 1302 Mechanical Hedge Trimming, or those that have a record of quality hedgerow maintenance.

Recommendation 5: *Best practice guidelines should be followed when the council is maintaining roadside hedgerows.*

7.3 Education and Awareness

Land managers, schools, plant nurseries, general public, council, contractors

7.3.1 Land managers

Land managers have a vital role to play in the conservation of County Louth's hedgerow resource. Farmers, with their large land holding need to be aware of their responsibilities and must be encouraged to conserve and manage hedgerows in the county. All landowners must also be encouraged to learn and practise good standards in hedgerow conservation.

Recommendation 7: *Work together with local agricultural advisors to produce hedgerow conservation and management guidelines, which have a particular emphasis on local hedgerows and conditions. These guidelines should be based on best conservation practise (for example see Appendix 4) and the local conditions found through this survey. Landowners should be encouraged to not trim hedgerows to below 1.5m. Landowners should be encouraged not to plough within 2m of the base of hedgerows. Livestock farmers should be encouraged to adopt means to prevent poaching of the base of hedgerows, such as fencing vulnerable hedgerows with electric fences.*

Recommendation 8: *Work together with other organisations such as Teagasc to hold local hedgerow seminars, which would include courses of hedgerow management practices including cutting, coppicing and hedge laying. Demonstrations of hedgerow management and planting are also valuable.*

7.3.2 Council

As a landowner, the council and its officers have a vital role to play in the protection and maintenance of hedgerows. In particular, engineers and planners need to be aware of best conservation practice for managing hedgerows. It is also important that they are aware of the value of hedgerows not only in terms of their importance for wildlife but also in terms of their landscape value. In-house training and seminars on hedgerows would be important.

Recommendation 9: *Hold in house training day for council staff on hedgerows and hedgerow management including best practice guidelines and the results of the Louth survey.*

7.3.4 Contractors

Contractors working on roads and building schemes, and agricultural contractors maintaining hedgerows for farmers have a vital role to play in both the management and retention of hedgerows in the county. It is important that contractors are aware of best practice guidelines in terms of hedgerows and their management. Leaflets, seminars and displays (e.g. agricultural shows/events etc.) would all be important means of raising awareness of the issues surrounding hedgerows.

Recommendation 10: *Investigate the production of a leaflet for contractors and engineers describing the benefits of maintaining and conserving hedgerows.*

Recommendation 11: *Produce a display on Louth's Hedgerows that could be used at various seminars, events and local libraries etc.*

7.3.5 Local Plant Nurseries and garden centres

Local plant nurseries should be encouraged to collect local seeds and grow local stock of all the species found in County Louth's hedgerows. Local farmers wishing to diversify may consider setting up a tree nursery for local hedgerow plants. Such a scheme was piloted on an Ulster Wildlife Trust farm in Northern Ireland.

Recommendation 12: *Encourage local plant nurseries or others to grow hedgerow plants of local origin that can be stocked both by themselves and by local garden centres.*

7.3.6 Schools

Under the Green Schools Biodiversity theme many school children are learning about the value of local wildlife. One of the actions in the theme is to increase diversity of species within the school grounds. What better way of doing this than to plant a native hedgerow? In addition, school children can be encouraged to survey their own local hedgerows and compare their results against the hedgerows found in the rest of the county.

Recommendation 13: *Encourage schools to plant hedgerows in their own school grounds and to survey local hedgerows.*

7.3.7 Community Groups and General Public

Find ways to celebrate the uniqueness of Louth's hedgerows. Many people are unaware of the importance of hedgerows and the resource they have on their doorstep. Many people have hedgerows around their own houses and they need to be encouraged to plant species that are native and of local origin. Encourage community groups, including Tidy Towns groups, to survey local hedgerows

***Recommendation 14:** Use leaflets, displays and other methods to raise the profile of hedgerows and the survey results.*

***Recommendation 15:** Consider establishing a Louth 'Golden Mile' competition.*

***Recommendation 16:** Hold a training day on hedgerow survey techniques for community groups and other interested parties. As part of this day encourage community groups to take part in the Golden Mile Competition.*

7.4 Further research and surveys

7.4.1 National Context

It is important that county hedgerow surveys are completed throughout the country. The HAS guidelines should be used so that county surveys are comparable and an overall countrywide picture of the nations hedgerow resource is achieved.

7.4.2 Local Context

In order to ensure that adopted policies on hedgerow conservation are working it would be advisable to re-survey hedgerows in 10-15 years.

***Recommendation 17:** Re-survey county hedgerows within 15 years of this survey.*

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Conserving hedgerows leaflet (Heritage Council)

http://www.heritagecouncil.ie/fileadmin/user_upload/Publications/Wildlife/hedge.pdf

Beech (Forestry Service)

https://www.agriculture.gov.ie/media/migration/forestry/publications/Beech_low.pdf

9.0 Appendices

Appendix 1: Domin Scale

<i>Domin</i>	<i>Percentage cover</i>
10	91-100%
9	76-90%
8	51-75%
7	34-50%
6	26-33%
5	11-25%
4	4-10%
3	<4% (scattered)
2	(v.scattered)
1	(scarce)

Appendix 2: DAFOR Scale

The DAFOR scale works on % cover. The surveyor assigns one of the following categories to the abundance of the species:

D - Dominant
A - Abundant
F - Frequent
O - Occasional
R - Rare

Dominant = >75%
Abundant = 75 - 51%
Frequent = 50 - 26%
Occasional = 25 - 11%
Rare = 10 - 1 %

Appendix 3

Heritage Hedgerows

OS_Square	Hedgerow Number
H9000	3
H9000	7
H9000	10
J0000	1
J0000	4
J0000	6
J0000	7
J0010	5
J0010	7
J0010	9
J1010	4
J1090	2
J1090	5
J1090	6
J1090	10
J2010	5
O0090	4
O0090	8

Appendix 4: Hedgerow Management recommendations from Heritage Council

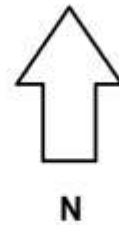
1. Landowners should check every hedge to assess its general condition. Identify desirable species; the most valuable for wildlife include oak, birch, mountain ash, whitethorn, alder, willow, ash, holly, crab, and Scots pine. Where mechanical cutting is required, those saplings identified for retention should have the vegetation around them cleared manually and be clearly marked to alert the machine operator.
2. Hedges should be cut while they are dormant, from the beginning of September to the end of February (Section 46 Wildlife Act 2000).
3. Hedges should be cut to an A-shaped profile, with a bushy top for maximum protection from wind. This will encourage the development of a dense hedge. Square cut hedges will put out a twiggy, lateral growth, encroaching on roads and paths so that summer cutting is requested for reasons of safety and convenience.
4. Overgrown or neglected hedges with sufficient vigour may be restored by coppicing – selective cutting at ground level to promote bushy re-growth.
5. Hedge-laying involves the part cutting through of selected stems, bending them over at an angle of 70-80 degrees, and securing the stems. This can be part of the long-term maintenance cycle of a hedgerow and is recommended as a method of hedge-rejuvenation and stock-proofing.
6. Gaps in hedgerows that cannot be closed by laying should be planted with hawthorn quicks, blackthorn or other suitable native species at not more than 30cm (1ft) spacing in prepared ground. The young plants should be cut back to half their height after planting to promote growth.
7. Do not apply herbicides, pesticides or fertilisers within 1.5m of a hedgerow, as this leads to nutrient enrichment that can adversely affect biodiversity.
8. The preferable method of hedge maintenance is by hand tools. Where this is not practical, particular care should be given to the correct use of machinery. Remember the importance of sharp tools and regular maintenance of equipment.
9. The crushing of hedgerows by heavy machinery must not be permitted.
10. Finger bar cutters with a pair of reciprocating blades are very suitable for trimming young growth.
11. A flail cutter should only be used on soft growth of thorny species, and never on heavy woody growth: the resulting ragged ends are unsightly and invite disease. Smooth wood species such as willow, hazel and cherry are not well suited to flail cutting.
12. A circular saw should only be considered for coppicing and must not be used for general hedgerow maintenance.
13. Fencing wire must not be attached to hedgerow trees and shrubs.

14. Where practicable, hedge trimmings should be piled in a non-intrusive manner to provide habitat. If hedge trimmings are to be removed or burned, this must be done immediately after cutting.

Appendix 5: Example of 1km Square

County Louth Hedgerow Survey 2014

J1010



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Appendix 6: Example of 1km Square – Aerial Photograph



Appendix 7

County Louth Hedgerow Habitat Action Plan Appendix 7

County Louth Hedgerow Habitat Action Plan

HABITAT DEFINATION

Linear strips (4m wide or less) of woody plants with a shrubby growth form that cover more than 25% of the length of a field or property boundary that have been deliberately established or managed. They often have associated banks, walls, ditches (drains), or trees.

CURRENT STATUS IN COUNTY LOUTH

The 2014 county hedgerow survey estimates that County Louth has a total hedgerow length of 8,948.3km. The average density of hedgerows is 11.02 km/km².

The average number of shrub species per 30m strip in County Louth is 2.94 species. Only 16.7% of hedgerows were found to be species rich. Currently a species rich hedgerow is defined as a hedgerow that has an average of four or more native tree / shrub species per 30m strip.

25% of hedgerows surveyed were classed as Heritage Hedgerows. Under the Hedgerow Appraisal System (HAS) hedgerows can be considered of high significance, *Heritage Hedgerows*, if they record a cumulative score of 6 or greater in the historical, species diversity or structural categories, or a cumulative score of 16 or greater over five categories (additional categories are construction and associated features, habitat connectivity significance and landscape significance).

For a qualitative assessment of hedgerow condition criteria have been set for desirable and undesirable attributes. These criteria are set out in the HAS. Hedgerows are ranked from 0-3 (0- unfavourable to 3- highly favourable) in 3 categories representing the *structural variables, Continuity and other Negative Indicators*. The higher the recorded score the more favourable condition. A score of 0 in any category represents a hedgerow in what is called Unfavourable Condition. 90.3% of all hedgerows surveyed were in found to be unfavourable condition.

CURRENT FACTORS AFFECTING THE HABITAT

Poor structure and condition of hedgerows

Results from the Louth Hedgerow Survey carried out in 2014 show that the most significant reason why hedgerows in County Louth are falling into the unfavourable condition category is due to hedgerow margins being ploughed up to the base of the hedgerow shrubs and poaching and erosion. This accounts for 40% of unfavourable hedgerows being classed as such. 21.6% were poached or eroded and the remaining 18.4% were as a result of farmer ploughing very close to hedgerow bases in tillage areas.

The next most important condition category was heights, with 15.4% of hedgerows in unfavourable condition falling into the low height category of <1.5m. This is a result of landowners and/or contractors cutting hedgerows too low.

The presence of noxious weeds and the excessive abundance of nutrient rich species (nettle, cleavers and docks) (>20%) in the ground flora is also a negative factors affecting hedgerows in Louth. Nutrient enrichment can be caused by over use of fertilizer close to base of hedgerow as well as use of pesticides or herbicides.

Inappropriate or no recent management

Nearly 40% of Louth hedgerows were found to be long-term unmanaged, and a further 11% short-term unmanaged. Hedgerows need regular management to ensure healthy growth and long term survival.

There was also evidence of cutting outside the approved hedgerow cutting season which again can have a detrimental effect on the condition of the hedgerow.

Lack of appropriate management

Only 1% of hedgerows in Louth showed any evidence of recent coppicing or laying.

ACTION PLAN OBJECTIVES AND TARGETS

	Objective	Action	Lead organisations and partners	Measurable indicator and Timescale*
1	Increase awareness, understanding and appreciation of hedgerows in County Louth	<ol style="list-style-type: none"> 1. Hold in house training day for council staff on hedgerows and hedgerow management including best practice guidelines and results of the Louth survey. 2. Investigate the production of a leaflet for contractors and engineers describing the benefits of maintaining and conserving hedgerows. 3. Produce a display on Louth's Hedgerows that could be used at various seminars, events and local libraries etc. 4. Hold a training day on hedgerow survey techniques for community groups and other interested parties. 5. Encourage community groups to take part in the Golden Mile Competition. 6. Work together with local agricultural advisors to produce hedgerow conservation and management guidelines, which have a particular emphasis on local hedgerows and conditions. These guidelines should be based on best conservation. 7. Hold local hedgerow seminars, which would include courses on hedgerow management practices including cutting, coppicing and hedge laying. Demonstrations of hedgerow management and planting are also valuable. 8. Encourage schools to plant hedgerows in their own school grounds and to survey local hedgerows. 	<p>LouthCoCo</p> <p>LouthCoCo</p> <p>LouthCoCo</p> <p>LouthCoCo & Community groups</p> <p>LouthCoCo & Community groups</p> <p>LouthCoCo & Teagasc</p> <p>LouthCoCo & Teagasc</p> <p>LouthCoCo & local schools</p>	<p>Training day held by 2016</p> <p>Leaflet produced by 2016</p> <p>Display produced by 2016</p> <p>Training day held in 2015</p> <p>No. community participating in golden mile</p> <p>Guidelines produced by 2016</p> <p>No. of seminars held</p> <p>No. of hedgerows planted</p>

2	Maintain and where possible extend the current extent of hedgerows in County Louth	<p>1. Council should adopt the principle of protect, enhance, mitigate and compensate when dealing with hedgerows that are threatened by any development</p> <p>2. Planning conditions relating to hedgerows should be enforced.</p> <p>3. Encourage landowners to maintain all hedgerows and where possible plant new hedgerows</p> <p>.</p>	<p>LouthCoCo</p> <p>LouthCoCo Teagasc</p>	<p>No. of hedgerow policies adopted in local plan</p> <p>No. of hedgerow conditions enforced</p> <p>Length of new hedgerows planted</p>
3	Increase the number of hedgerows reaching 'favourable condition' status	<p>1. Best practice guidelines should be followed when the council is maintaining roadside hedgerows</p> <p>2. All new hedgerow plantings (including those associated with road schemes) should use native trees of local origin. Emphasis should be placed on planting species in the same ratios as found in the Louth hedgerow survey.</p> <p>3. Encourage local plant nurseries or others to grow hedgerow plants of local origin that can be stocked by themselves and local garden centres.</p> <p>4. Encourage landowners to adopt management practices that would increase favourable condition status of hedgerows. For example; leaving 1m gap between hedgerows and ploughing; allowing hedgerows to grow above 1.5m.</p>	<p>LouthCoCo</p> <p>LouthCoCo & Local plant nurseries</p> <p>Local plant nurseries</p> <p>Teagasc</p>	<p>Use of best practice guidelines</p> <p>No. of native species planted on road schemes</p> <p>No. of nurseries stocking local origin stock</p> <p>No. of hedgerows in favourable condition</p>

*Where no year is indicated, indicator should be measured every five years