COUNTY MONAGHAN HEDGEROW SURVEY REPORT

by N. Foulkes, 2010

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General landscape view near Ardaghey

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EXECUTIVE SUMMARY

Monaghan is an inland county in the province of Ulster, bounded to the north by Tyrone, to the east by Armagh, and the south-east by East Meath and Louth. It comprises an area of 1294 km² (500 miles²). County Monaghan's hedgerow network is an asset to the county, being valuable in terms of agriculture, landscape, wild flora and fauna, water quality, carbon sequestration and employment.

In the summer of 2010 field recording of hedgerows was carried out using a standard methodology in 13 sample 1 km squares distributed evenly around County Monaghan, covering approximately 1% of its total area. The focus of the survey was to record information on the extent, species composition, structure, condition and management of hedgerows.

Results from the County Monaghan survey were compared with those from similar hedgerow surveys conducted in North Kerry in 2009, West Kerry / An Daingean Peninsula, County Donegal and County Sligo 2008, County Mayo in 2007, County Cavan, East Galway, Longford, Kildare and Leitrim in 2006, County Laois and County Offaly in 2005, and Counties Roscommon and Westmeath during 2004.

Based on the results from the sample, the total length of hedgerow in County Monaghan was estimated at 12,845km, and the average figure for hedgerow density as 9.93 kilometres per square kilometre (km/km²).

A total of 35 shrub and tree species, including 27 native species, were recorded in the sampled hedges. Hawthorn (Whitethorn) is the most frequently occurring shrub species found in 95% of hedges. 72% of hedgerows sampled were comprised solely of native species. Ash is the most common tree species, occurring in 68% of hedges in tree form. 25 of 31 herbaceous species identified by the Woodlands of Ireland Hedgerow Appraisal System were recorded during the survey.

The average number of shrub species found in the representative sample (30m) of the selected hedges was 3.62. 37% of hedges recorded were classed as 'species rich' (an average of four or more native tree / shrub species per 30m strip).

Roadside hedges made up 24% of the sample evenly split between classified and unclassified roads; 12% formed part of Townland boundaries.

Just 9% of hedges surveyed were classed as redundant in respect of their agricultural function as field boundaries. Over 60% of hedgerows were associated with improved farmland with 9% of hedgerows surveyed on dairy farms.

The construction of hedges around the study area would suggest that the majority of the resource is of a planted origin, with at least 45% of the hedgerow resource likely to have been established during the period 1840-1910.

In relative terms, the hedges recorded during the County Monaghan survey compare favourably with those from other counties in respect of their average height and width characteristics.

27% of County Monaghan hedgerows have gaps of 10% or more.

Levels of management are relatively high with 59% of hedges showing evidence of some form of management within the last five years or more.

Although 70% of hedgerow samples had no independent additional fencing, over 45% had wire fixed to the hedgerow stems. This is over twice the average (24%) from other County Hedgerow Surveys.

Just 27% of hedges met a series of *Favourable Condition* criteria defined in the Woodland of Ireland Hedgerow Appraisal System (HAS). These criteria are linked to structure, condition, species composition and continuity. Of those that failed to pass the criteria the height, level of gappiness, the basal structure and nutrient enrichment of the hedge base were the main categories responsible. Most of the assessed characteristics can be influenced by appropriate management.

26% of hedgerows sampled were classed as *Highly Significant* under the HAS. Just 25% of these were classed as being in *Favourable* Condition which is 6.5% of the overall resource.

In order to try and establish criteria to aid the identification of hedgerows with significant ecological or historical value additional recordings were made of townland boundary hedges and a number of hedges linking in to areas of woodland that were surveyed as part of the National Survey of Native Woodlands.

In comparison to the baseline survey results both townland boundary hedges and hedges linking in to native woodland showed greater shrub/tree and herbaceous ground flora diversity. In particular, townland boundary hedges that link with native woodland are significantly more diverse. Over 50% of the townland boundary / native woodland hedges were classed as species rich compared with 37% in the baseline survey.

Based on the hedgerow survey results, a series of recommendations were made, applicable at a National and County level. The recommendations promote current best practice with regard to hedgerow conservation. These recommendations have been incorporated in to a draft Hedgerow Habitat Action Plan for County Monaghan (see Appendix 9.5).

1.0 INTRODUCTION

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

For the purposes of this survey hedgerows are defined as

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

This sample study examines the extent, species composition, structure, condition and management of hedgerows in the geographical area of County Monaghan, an area of approximately 1,295km².

This hedgerow survey will provide Monaghan County Council with information on the ecological and the cultural value of the resource, enabling improved decision making and policies for their retention, management and conservation.

2.0 THE NEED FOR A HEDGEROW SURVEY IN COUNTY MONAGHAN

Hedgerows are the most widespread semi-natural habitat in Ireland. Also, they are acknowledged to provide a range of Eco Services from Provisioning Services (Food, Fuel), Regulation Services (Air, Climate, Water, Disease, Pests, Pollination), Cultural Services (Aesthetic, Educational, Recreational), and Support Services (Soil Formation, Photosynthesis, Nutrient Cycling).

Hedgerow conservation in Ireland is embraced through legislation, policy and incentive. Any attempts to promote hedgerow conservation need to be based on an accurate and meaningful assessment of the current resource.

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

- It gives a snapshot of the quantity and character of the hedgerows in the county. This information serves as a benchmark for future surveys.
- Repeat surveys (using the same samples) will provide a useful tool in monitoring environmental change.
- It is possible to identify current and potential future threats facing the resource by assessing the results in light of current best practice in hedgerow conservation.
- The survey identifies plant life local to the county.
- Comparisons can be drawn between hedgerows under different management regimes.
- Detailed information collated as part of the *County Monaghan Hedgerow Survey* can complement data collated from other habitat related studies, e.g. *The Badger and Habitats Survey of Ireland* (Smal 1994)*; The Countryside Bird Survey* (Birdwatch Ireland, ongoing study).
- The *County Monaghan Hedgerow Survey* can be placed in its national context when viewed alongside other surveys based on the same methodology.

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

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

2.1 PROJECT BRIEF

Objective

To gain an overview of hedgerows in County Monaghan in terms of extent and condition from a biodiversity, historical and cultural perspective in order to inform conservation priorities.

Aims

- To carry out a detailed field survey of hedgerows in County Monaghan, quantifying extent, composition, structure, condition and management.
- To identify any rare or vulnerable species that may be present.
- To 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.
- To compare townland boundary hedgerows with non-townland boundary hedgerows.
- To establish criteria to aid the identification of potential ancient hedgerow locations and composition.
- Collate and map the data in accordance with best practice.
- To prepare a Habitat Action Plan for hedgerows in County Monaghan, to include recommendations on conservation and management priorities.
- To raise awareness of the ecological and cultural importance of hedgerows.

3.0 METHODOLOGY AND FIELD SURVEY

The County Monaghan Hedgerow Survey was divided in to two Phases.

Phase 1 – Baseline Sample Survey &

Phase 2 – Sample of Potential High Ecological Value Hedgerows

DEFINING HEDGEROWS

For the purpose of this survey hedges are defined as

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

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

3.1 PHASE 1 – BASELINE SAMPLE SURVEY

The baseline County Monaghan Hedgerow Survey was carried out to the methodology described in "*A Methodology for the recording of hedgerow extent, species composition, structure, and condition in Ireland*" (Foulkes and Murray, 2006). A number of enhancements to the basic methodology were included as a result of Methodology Reviews conducted as part of Hedgerow Surveys conducted in 2007, 2008 and 2009 (Foulkes, 2007, 2008a, 2008b and 2009).

Hedgerows recorded for extent purposes are a minimum of 20m in length. Sampled hedgerows are a minimum of 60m in length.

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

3.1.1 SELECTING THE SAMPLE

The study area comprises land in Co. Monaghan contained within the Ordinance Survey 10km National Grid squares H52, H62, H63, H64, H65, H71, H72, H73, H74, H80, H81, H82, H91 The total approximate area of the sample area is 12.07km²

The south-western (or "bottom left hand") 1 km square of each of the Ordnance Survey squares of the study area was chosen as the sample area for the Hedgerow Survey, consistent with the sampling procedure used for the *Badger and Habitats Survey of Ireland* (Smal, 1995) and subsequently the *Countryside Bird Survey* (Birdwatch Ireland, ongoing study). This sampling method gives the potential for some joint assessment of these data sets in the future.

Samples are 1 km square. A total of 13 sample areas were selected in this way - eleven full squares and two part squares on the county boundary.

The total sample area is approximately 1% of the total study area. Figure 3.1.1 shows the position of the sample squares in the study area. More details of the sample squares are included in Appendix 9.1.

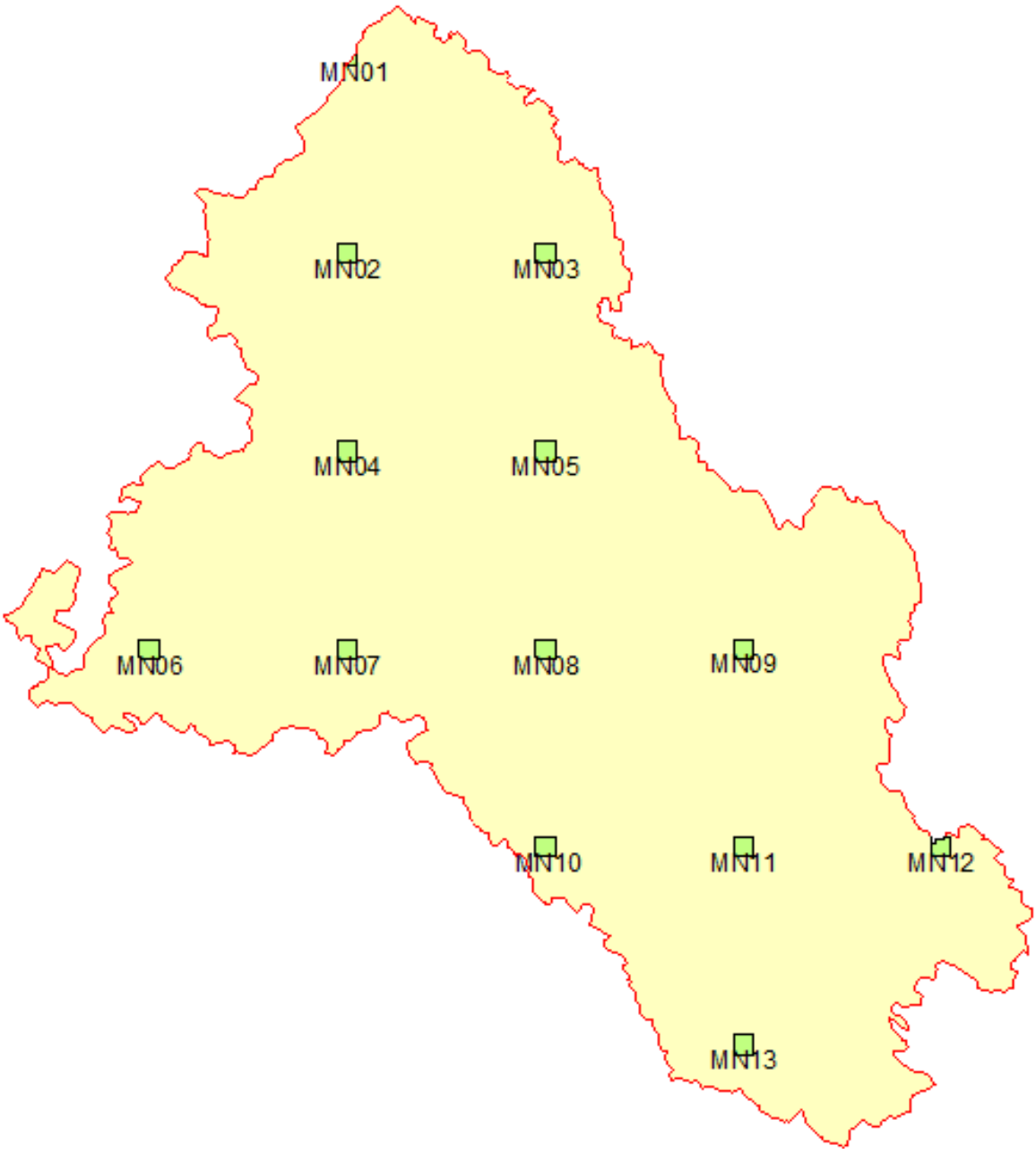


Figure 3.1.1 Map of County Monaghan showing location of the 1 km² samples

Within each sample square a maximum of 10 hedges were selected for detailed study using randomly generated points on a transparent overlay. The points on the overlay were selected at random using a random number generator and an appropriately scaled, numbered grid marked by subdividing the square; the randomly chosen numbers were then matched with points on this grid. The overlay was then placed on top of the relevant aerial photograph of each square, and the hedge nearest to each point on the overlay was chosen for detailed investigation. If there was no hedge within a fixed radius (equating to approximately 175m) of the randomly selected point, the number of sampled hedges was reduced by one. This was to ensure that the sample would not be skewed by a higher sampling density in certain areas. Where the '*hedge*' chosen on the aerial photograph was discovered on the ground to be something other than a hedge (e.g. a tree line, a colonised drain, a vegetated bank, or a wall covered in vegetation), the next hedge nearest to the relevant point on the overlay sheet was recorded instead, provided that it fell within the specified radius of the random point.

Each hedge chosen for detailed investigation by the random selection process was clearly marked and labelled with a number on a copy of the relevant vector map, with beginning and end points also marked. A length of hedge was generally taken as one side of a field or enclosure. End points were identified as the junction between adjacent sides of a field, or where three or more hedge lengths meet. In a few instances end points were marked where the construction, management, or character of a hedge changed suddenly and conspicuously along its length, or where a clear and obvious difference in the origin of the hedge was apparent, but where no junction was evident. This was normally a result of boundary removal, where the two portions of a linear hedge once bounded separate fields.

3.1.2 STRUCTURAL RECORDINGS OF HEDGES

For each hedge selected (a maximum of 10 hedges per sample square, as described above), two end points were marked on the map. End points were generally identified as field corners or by junctions with other hedges or boundary features (i.e. one side of a field). Each selected hedge was subjected to a detailed investigation along its whole length.
Recordings were made in 25 categories grouped under the following headings: Context, Construction, Structure/Condition, and Management. Each category field has a corresponding code that is entered into the appropriate box on the data recording grid (see Appendix 9.2).

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

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

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

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

3.1.3 FLORISTIC RECORDINGS OF HEDGES

The length of each hedge was derived from the relevant GIS vector. For hedges up to 100m in length a single 30m strip was randomly selected along its length. For hedges over 100m two non-concurrent 30m strips were randomly selected. Each 30m strip was paced out and marked. A GPS reading was taken at the most northerly end point of each sample 30m strip using a Garmin GPS60 hand held unit.
Based on hedgerow survey work in Britain (Bickmore, 2002), a 30m strip is generally accepted as an adequately representative sample size for recording woody species in a hedge. By recording woody species along a standardised length, statistical comparison of hedges of different lengths is made possible. Irish hedges tend to show high degrees of variation in species composition from one end of a hedge to the other. For this reason, two 30m strips were recorded for sample hedges greater

than 100m in length in this survey with the data averaged to give a single figure per hedge. The increased sampling intensity gives a more accurate picture of the overall species composition of each hedge.

Each woody shrub species present within the length of each strip was allocated an appropriate Domin Scale value. Where possible, identification was made at a species level. Identification and nomenclature followed Stace's New Flora of the British Isles (2010). The Domin Scale was used to record the percentage cover of each woody shrub species detected. The presence of other species within the hedge but which did not fall within 30m sample strips was recorded separately. The presence of Ivy *(Hedera helix)* at canopy level was recorded according to the Domin scale. The extent of cover of climbers and woody non-hedge-forming shrub species, from the list below, was also noted in accordance with the DAFOR scale.

Table 3.1.2 List of climbers and woody non-hedge-forming shrub species recorded

Common Name	Botanical Name
Brambles	*Rubus fruticosa agg.*
Wild Rose	*Rosa spp*
Honeysuckle	*Lonicera periclymenum*
Clematis	*Clematis vitalba*
Bindweed	*Calystegia sepium, Convolvulus arvensis*
Bilberry	*Vaccinium myrtillus*
Heather	*Calluna vulgaris*

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

3.1.4 RECORDING THE EXTENT OF HEDGEROWS IN SAMPLE SQUARES

For the purposes of this survey the extent of hedgerows within a sample square were recorded by visual inspection of all linear features apparent on the relevant aerial photograph or vector map. The presence of hedgerows (minimum length of 20m) was marked with a solid red line on a black and white photocopy of the vector map. Any other linear feature that was apparent on the aerial photograph/vector map was investigated and non-hedgerows were noted with a solid green line to prevent duplication of investigation. These included *vegetated banks, vegetated drains, walls* (with or without shrubs), *fence lines, mini woodland strips.* Where clear and extensive gaps occurred within hedges a green line was used to mark the gap section. This was practiced to minimize the over estimation of hedgerow length due to the inclusion of significant gaps.

3.2 PHASE 2 – SAMPLE OF POTENTIAL HIGH ECOLOGICAL VALUE HEDGEROWS

In order to try and identify areas which may have hedgerows of high ecological value, recording of hedgerows was made in connection with Townland Boundaries and Native Woodlands.

3.2.1 SELECTING THE SAMPLE

Townland Boundary Hedges

The aerial photographs of all of the samples squares were compared with details of townland boundaries in the area. A sample length of hedgerow was identified from any townland boundary

that contained hedgerow and that were not already sampled by the Baseline survey. This resulted in the recording of an additional 22 hedgerows.

Hedgerows linking to Native Woodland

Hedgerows linking in to a number of woodland sites recorded as part of the National Survey of Native Woodlands 2003-2008 (Perrin, 2008) were sampled. The sample was selected by visual inspection of aerial photographs of all 40 Native Woodland Sites recorded during the survey. Those with no hedgerow links were eliminated. From the remainder, 13 sites were selected on the basis of woodland type, period of origin (pre- or post 1st Edition Ordnance survey) and geographic spread. Of the sites selected there is a concentration in the North West and South East of the county, this reflects the distribution of appropriate sites rather than the exclusion of certain areas of the county from the study. 31 additional hedgerows were recorded. Table 3.2.1 contains a list of the Native Woodland sites at which recordings were made.

Table 3.2.1 List of Native Woodland Sites

Native Woodland Number	Name	Woodland Type	Pre 1st Edition Ordnance Survey
401	Lough Fea Demense	Mixed Broadleaf	Yes
410	Derrynashallog	Ash / Hazel	Yes
412	Hollywood Lake Wood	Birch / Alder	Yes
840	Hazel Wood	Ash / Hazel	Yes
849	Corrybrackan	Wet Woodland	No
854	Kilmore West	Bog Woodland	No
860	Reduff	Hazel / Ash / Birch	Yes
862	Annahaia	Hazel / Ash	No
864	Back Wood	Ash / Beech	Yes
1037	Comertagh	Wet Woodland	No
1063	The Glen	Wet Woodland	Yes
1162	Mullaghmacateer	Hazel / Ash	No
1176	The Downs Wood	Ash / Birch	Yes

The location of the native woodlands in shown in Figure 3.2.1 and more details on the samples is included in Appendix 9.1.

Figure 3.2.1 Map of County Monaghan showing location of Native Woodlands sampled

Structural and Floristic Recording of hedges was as for the Baseline survey with the exception that for Native Woodland Hedges only one 30m strip (directly adjacent to the woodland) was recorded irrespective of the hedgerow length.

3.3 MAPS AND AERIAL PHOTOGRAPHS

Comprehensive GIS mapping information was supplied by the GIS section of Monaghan County Council. This included the following layers – Aerial Photographs (2000), First Edition Ordnance Survey (6" to 1 mile), Second Edition Ordnance Survey (6" to 1 mile), Townland Boundaries and Vector maps (regularly updated). Additional GIS mapping for Native Woodlands was supplied by the National Parks and Wildlife Service.

The vector maps were used to identify features in the field and to record hedgerow extent. Aerial photographs enabled the square to be assessed in terms of its general character and the presence of

hedges. This made the identification of the randomly selected hedge samples more efficient and aided orientation and navigation within and around the square. The second edition six inch Ordnance Survey maps were used primarily for the identification of townland boundaries.

On completion of the fieldwork digital maps of the hedgerows within the sample areas were produced using MapMaker Pro3 using the aerial photographs (from year 2000), townland boundary maps and the vector maps as a base. From these digital maps it was possible to calculate the length of each sample hedgerow and the linear extent within each sample square.

3.4 PERIOD OF FIELDWORK

Fieldwork commenced on 25th May 2010 and was concluded by 23rd July 2009.

3.5 TARGET NOTES

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

3.6 PHOTOGRAPHY

A Nikon Coolpix 3700 digital camera was used to photograph all sample hedges plus other notable hedges, specific characteristics, wildlife, etc. All digital images were recorded at a minimum of 3.2 mega pixels

3.7 DATA RECORDING

Structural field data was recorded directly in to an Excel spreadsheet using the Documents To Go application on an iPod Touch. This was then uploaded to a laptop. Floristic data was recorded manually on to specially designed field recording sheets. At the end of each recording session this data was transferred to an Excel spreadsheet. All data was backed up on a daily basis.
Target Notes were referenced to the data in the spreadsheet.
Digital photographs were downloaded, referenced, and stored in electronic folders relating to each sample square. Grid references were obtained in the field using a Garmin GPS60 and verified using the GIS mapping system.

4.0 RESULTS OF THE COUNTY MONAGHAN HEDGEROW SURVEY

The results from the Phase 1 survey are presented in sections 4.1 to 4.7, with the results from Phase 2 in section 4.8. Further analysis of the data and comments on its significance are discussed in section 5.0. All the data were subjected to standard statistical analyses (frequencies of species occurrence, mean species richness, frequency of structural characteristics, etc.) and graphed using a Microsoft Excel spreadsheet.

PHASE 1 – BASELINE SAMPLE SURVEY

The average length of recorded hedgerows was 117m.

4.1 THE EXTENT OF HEDGEROWS IN MONAGHAN

Table 4.1.1 shows the extent of hedgerows and remnant hedgerows in the individual sample squares in the study area. The total area surveyed was 12.06 km² which is approximately 1% of the total of the study area.

Table 4.1.1 Measurement of Hedgerow Extent in Sample Squares in County Monaghan

OS Grid Reference	Square Reference	Location	Area km²	Hedgerow Length (km)	Density (km/km²)	No. of sample hedges recorded
H65	MN01	Clonkeen, Carrickroe	0.19	2.678	14.10	4
H64	MN02	Derrywassell, Scotstown	1.00	14.662	14.66	10
H74	MN03	Donagh, Glaslough	1.00	9.219	9.22	10
H63	MN04	Skervan, Three Mile House	1.00	12.928	12.93	10
H73	MN05	Greaghglass, Ardaghey	1.00	15.984	15.98	10
H52	MN06	Deerpark, Scotshouse	1.00	2.213	2.21	6
H62	MN07	Annaghyduff, Newbliss	1.00	9.757	9.76	8
H72	MN08	Derryvalley, Ballybay	1.00	11.993	11.99	9
H82	MN09	Corrinshigo, Castleblaney	1.00	12.205	12.20	10
H71	MN10	Cortober, Bawn	1.00	10.101	10.10	9
H81	MN11	Dunaree, Laragh	1.00	4.616	4.62	7
H91	MN12	Keenogue, Inishkeen	0.87	1.901	2.19	5
H80	MN13	Knocknacran West, Maghercloone	1.00	11.454	11.45	10
			12.06	119.711	9.93	108

Hedgerow Length
It can be estimated that County Monaghan has a hedgerow length of 12,845 km assuming that the squares surveyed are a representative sample of the study area as a whole.

All of the sample squares contained some hedgerows. The highest recorded value was in square MN05 (Ardaghey) with a length of almost 16 km.

Hedgerow Density
Hedgerow density in the squares varied between 2.19 km/km² (MN12) and 15.98 km/km² (MN05). The average figure for hedgerow density in Monaghan is 9.93 km/km².

4.2 SPECIES COMPOSITION OF HEDGEROWS IN COUNTY MONAGHAN

The 'species composition' of hedgerows was individually examined in respect of *i*) the shrub layer, *ii*) the tree layer and *iii*) the ground flora or herb layer.
The shrub layer included shrubs such as thorns, woody climbers and tree species that had a shrubby growth form. The tree layer included any trees that had been deliberately or incidentally allowed to grow distinct from the shrub layer of the hedge. The ground flora layer was investigated for the presence of 31 herbaceous ground flora species and eight species of ferns (and allies) listed in the Woodlands of Ireland Hedgerow Appraisal System (see Appendix 9.3).

SHRUB LAYER

Shrub species occurring in the hedge layer
35 individual species were recorded in the shrub layer of the sampled hedges. 27 of these are species native to Ireland, including Wild Privet *(Ligustrum vulgaris)*.

Hawthorn (Whitethorn) is by far the most frequently occurring shrub species in County Monaghan hedgerows. It was found in 95% of the sampled hedges and was the dominant species in 54% of them. Blackthorn (*Prunus spinosa*) and, Ash (*Fraxinus excelsior*) were both recorded in over 50% of the sample, with Holly (*Ilex aquifolium*) found in over 40%. Seven other species were recorded in more than 10% of the sample; of these Sycamore (*Acer pseudoplatanus*) is the only non-native species. Yew (*Taxus baccata*) was found in 2.8% of hedgerows sampled.

Yew in Glaslough Hedge (MN03)

With one exception, all hedgerows were dominated by native tree and shrub species; the exception being a wild plum hedge in the Ballybay square (MN08).

The frequency and abundance of each shrub species is presented in Table 4.2.1, including details of where species were additionally found in sample hedges but not within the 30m sample strips.
The '*frequency of occurrence*' is the frequency with which each species is found in one or other of the two sampled 30m strips of each hedge.
The "*mean Domin abundance level*" is a representation of the degree of cover of each species within the 30m sample strips where it is found. Where two sample strips were recorded for a hedge the average is taken of the relevant mid-point Domin percentage figure from each strip.

Table 4.2.1 Frequency of woody shrub species occurrence and mean abundance in sampled County Monaghan hedges

Botanical Name *(*denotes introduced species ** probably introduced)*	Common Name	Frequency of occurrence (%)	Mean Domin abundance level	
Crataegus monogyna	Hawthorn	95.4	7	34–50% cover
Prunus spinosa	Blackthorn	57.4	5	11-25% cover
Fraxinus excelsior	Ash	51.9	4	4-10% cover
Ilex aquifolium	Holly	40.7	4	4-10% cover
Ulex europaeus	Gorse / Furze / Whin	25.9	5	11-25% cover
Salix spp.	Willow species	20.4	5	11-25% cover
Acer pseudoplatanus*	Sycamore	14.8	4	4-10% cover
Sambucus nigra	Elder	13.9	4	4-10% cover
Corylus avellana	Hazel	13.9	4	4-10% cover
Ligustrum vulgare	Wild Privet	12.0	5	11-25% cover
Sorbus aucuparia	Rowan	11.1	4	4-10% cover
Fagus Sylvatica*	Beech	7.4	4	4-10% cover
Alnus glutinosa	Alder	5.6	5	11-25% cover
Prunus domestica*	Wild Plum	4.6	6	26–33% cover
Betula spp.	Birch species	3.7	4	4-10% cover
Ulmus spp.	Elm species	3.7	4	4-10% cover
Non-native Salix spp.*	Non-native Willows	2.8	4	4-10% cover
Prunus avium	Wild Cherry	2.8	4	4-10% cover
Viburnum opulus	Guelder Rose	2.8	4	4-10% cover
Taxus baccata	Yew	2.8	3	< 4% cover
Rubus idaeus	Raspberry	2.8	4	4-10% cover
Cytisus scoparius	Broom	1.9	4	4-10% cover
Ribes uva-crispa	Gooseberry	1.9	3	< 4% cover
Symphoricarpos albus*	Snowberry	1.9	4	4-10% cover
Malus sylvestris	Crab apple	0.9	4	4-10% cover
Spruce spp.*	Spruce species	0.9	3	< 4% cover
Quercus spp.	Oak species	0.9	3	< 4% cover
Ribes nigrum	Blackcurrant	0.9	3	< 4% cover
Prunus laurocerasus*	Laurel	0.9	3	< 4% cover
Lonicera nitida*	Wilson's Honeysuckle	0.9	5	11-25% cover

The following species was noted as present in two sampled hedges but not within the selected 30m strips

Euonymus europaeus	Spindle

Climbers and Woody non-hedge-forming shrub species

Bramble (*Rubus fruticosus agg.)* was recorded as being present in a total of 91% of the sample 30m strips in County Monaghan hedges surveyed. Wild Rose (*Rosa* species) was recorded in 63% and Honeysuckle (*Lonicera periclymenum*) recorded in 43% of the County Monaghan 30m sample strips.

Recordings of Climbers and Woody non-hedge-forming shrub species are presented in Table 4.2.2 below.

Table 4.2.2 Frequency and level of abundance of woody non-shrub species occurrence in sampled hedges

Botanical Name	Common Name	Frequency of occurrence (%)	Level of Abundance (DAFOR) %				
			D	A	F	O	R
Rubus fruticosus agg	Bramble	91.1	1.8	20.1	33.1	27.8	8.3
Rosa spp	Wild Rose	63.3	0.0	1.8	10.7	24.3	26.6
Lonicera periclymenum	Honeysuckle	42.6	0.0	0.0	8.9	18.3	15.4
Calystegia sepium	Bindweed	1.20	0.0	0.6	0.0	0.6	0.0
Solanum dulcamara	Bittersweet	1.20	0.0	0.0	0.0	1/2	0.0

Bramble (*Rubus fruticosus agg.*) was present to *abundant* level or greater in 22% of hedges.

Hedge Species Diversity

The '*species diversity*' of an individual hedge is defined as the number of shrub species found in a representative sample strip (usually 30 metres) of a hedge. In cases where two strips were recorded (hedges over 100m in length), the average number of species from the two strips was considered to be the representative figure for species diversity for these sampled hedges.

Species Diversity Figures

The number (or average number) of shrub species per 30m strip was calculated. The breakdown of percentages for the different levels of species diversity found in the sample hedges is shown in Table 4.2.3.

Table 4.2.3 Average number of shrub species per 30m strip

Average no. of species per 30m strip	All species (% of hedges)	Native species only (% of hedges)
1	2.8	4.6
1.5	3.7	3.7
2	16.7	18.5
2.5	10.2	12.0
3	16.7	19.4
3.5	8.3	4.6
4	13.0	13.0
4.5	6.5	9.3
5	4.6	3.7
5.5	4.6	2.8
6	4.6	4.6
6.5	2.8	1.9
7	2.8	
7.5		
8	0.9	0.9
8.5	0.9	
9	0.9	0.9

78 separate recordings were made in 51 hedges of species that were present in sample hedges but were not present within the 30m strip/s. In terms of native species only this amounted to 67 recordings in 48 hedges. The average number of shrub species per 30m strip was 3.62 (3.32 for native species only).

Species Rich Hedges
In the UK a species rich hedge is defined as one that contains five or more native woody species on average in a 30m strip (UK Biodiversity Action Plan, website). In northern England, upland Wales, or Scotland the presence of four or more native species qualifies as being species rich. As Ireland's native flora overall is less diverse than that of England, Wales and Scotland, four species per 30m length could be considered as species rich here. To maintain consistency with most other County Hedgerow Surveys, Roses (*Rosa spp.*) were omitted from the count.

37% of the sample hedges recorded had an average of four native shrub / tree species or more in the sample 30m strip/s.

Tree Layer
'Hedgerow trees' (tree layer) are any trees within the hedge that have been deliberately or incidentally allowed to grow distinct from the shrub layer of the hedge. Hedgerow trees were recorded as present in 82% of the recorded hedges in Monaghan. A total of 17 tree species were found in sampled hedges in this survey. 12 of the tree species recorded were native species. The most commonly occurring hedgerow tree in County Monaghan is Ash *(Fraxinus excelsior)* which is found in 68% of hedges (81% of hedges that contain trees).

Sycamore (*Acer pseudoplatanus*) was present, in tree form, in a fifth of hedgerows. Table 4.2.4 lists the tree species recorded and their frequency of occurrence.

Table 4.2.4 Frequency of tree species occurrence in sampled Monaghan hedges

Botanical Name *(*denotes introduced species ** probably introduced)*	Common Name	Frequency of occurrence (%)
Fraxinus excelsior	Ash	67.6%
*Acer pseudoplatanus**	Sycamore	21.3%
Sorbus aucuparia	Rowan	10.2%
*Fagus sylvatica**	Beech	8.3%
Alnus glutinosa	Alder	6.5%
Salix spp.	Willow species	6.5%
Quercus spp.	Oak species	4.6%
Betula spp.	Birch species	4.6%
Ilex aquifolium	Holly	3.7%
*Picea spp.**	Spruce species	1.9%
Prunus avium	Wild Cherry	1.9%
Ulmus spp.	Elm species	0.9%
Malus sylvestris	Crab Apple	0.9%
*Pinus sylvestris***	Scots Pine	0.9%

Tree Species Diversity
32% of the hedges where trees were recorded had just one tree species. A further 35% contained two tree species, 11% had three species and 4% had four species or more.

Ash trees in Ballybay hedge (MN08)

Ground Flora

The ground flora of each 30m sample strip was investigated for the presence of 31 herbaceous ground flora species and eight species of ferns (and allies) listed in the Woodlands of Ireland Hedgerow Appraisal System. Species counts form part of the Ecological Significance criteria in the Appraisal System.

25 of the 31 herbaceous species were recorded during the survey. The frequency of occurrence of each species recorded is detailed in Table 4.2.5, with the species counts per sample strip detailed in Table 4.2.6.

Table 4.2.5 Frequency of occurrence of target herbaceous and fern (and allies) species in sample 30m strips

Botanical Name	Common Name	Frequency of occurrence (%)
Herbaceous species		
Geranium robertianum	Herb Robert	33.8
Viola spp.	Dog Violet species	32.4
Veronica spp.	Speedwell species	21.3

Primula vulgaris	Primrose	18.5
Digitalis purpurea	Foxglove	17.1
Anthriscus sylvestris	Cow Parsley	16.2
Geum urbanum	Wood Avens	14.8
Fragaria vesca	Wild Strawberry	10.6
Arum maculatum	Lord-and-Ladies	10.2
Ranunculus ficaria	Lesser Celandine	8.8
Chrysoplenium oppositifolium	Opposite-leaved Golden Saxifrage	6.0
Hyacinthoides non-scripta	Bluebell	5.6
Conopodium majus	Pignut	4.6
Stellaria holostea	Greater Stitchwort	4.6
Lapsana communis	Nipplewort	4.2
Oxalis acetosella	Wood Sorrel	4.2
Glechoma hederacea	Ground Ivy	3.7
Potentilla sterilis	Barren Strawberry	3.2
Stachy sylvatica	Hedge Woundwort	2.8
Hypericum androsaemum	Tutsan	0.9
Ajuga reptans	Bugle	0.5
Alliaria petiolata	Garlic Mustard	0.5
Allium ursinum	Ramsons	0.5
Anemone nemorosa	Wood Anemone	0.5
Lysimachia nemorum	Yellow Pimpernel	0.5
Ferns and Allies		
Dryopteris spp.	Buckler Ferns	35.6
Polystichum setiferum	Soft Shield Fern	12.0
Polypodium spp.	Polypody	5.6
Equisetum spp.	Horsetail	4.6
Phyllitis scolopendrium	Hartstongue Fern	2.8

The accurate recording of herbaceous ground flora species can be influenced by the ability to access the base of the hedge. Also, seasonal factors can result in under recording of certain species as they die back. For these reasons, the above results should be considered as minimum figures.

Primrose

Soft Shield Fern

Table 4.2.6 Average number of target ground flora species per 30m strip

Average no. of target species per 30m strip	% of sample 30m strips	
	Herbaceous species	Ferns and Allies
0	6.5	38.0
0.5	2.8	8.3
1	16.7	30.6
1.5	4.6	7.4
2	13.9	10.2
2.5	4.6	0.9
3	15.7	3.7
3.5	6.5	0.0
4	10.2	0.9
4.5	5.6	
5	1.9	
5.5	1.9	
6	0.0	
6.5	1.9	
7	2.8	
7.5	0.9	
8	3.7	

A full list of species noted during the survey is included in Appendix 9.3.

Ivy

The specifications for the REP Scheme permit the control of ivy (*Hedera helix)* where it poses a threat to the stability or long term viability of hedgerows. This is set in the context of the importance of ivy for wildlife and the statement that '*Wherever possible ivy should be retained and allowed to develop'* (Specifications for REPS Planners, 2007).

Table 4.2.7 Levels of ivy at canopy level in sampled County Monaghan hedges

Level of canopy dominated by ivy	% of sampled 30m strips
< 10%	71.3%
10-25%	18.5%
>25%	10.2%

Levels of ivy at less than 10% would be unlikely to be a threat to the long term viability of the hedge. There is more cause for alarm when the level of canopy cover exceeds 25%.
This is the case in over 10% of the hedges surveyed. A further 18% of sample strips had ivy domination between 10 and 25%.

High proportion of ivy in Magheracloone hedge (MN13)

4.3 GENERAL ECOLOGICAL, HISTORICAL, AND AGRICULTURAL CONTEXT OF HEDGEROWS IN COUNTY MONAGHAN

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

CORINE LAND COVER

CORINE Land Cover (CLC) is a map of the European environmental landscape based on interpretation of satellite images. The land cover database divides land in to 44 standard classes. Each of the sample hedges was noted as to which standard class of land cover it occurred in. In County Monaghan sample hedges were found in just three of the land cover classes with the vast majority in a single class (Pastures).

Table 4.3.1 Frequency of occurrence of sampled County Monaghan hedges in CORINE Land Cover Classes

CORINE Land Cover Class	Frequency of occurrence (%)
Pastures	85%
Land principally occupied by agriculture	13%
Peat Bogs	2%

Soil Type

The soil type on which each sample hedge occurred was derived from the soils data on the National Biodiversity Data Centre website. Hedgerows occurred on eight different soil types with over 80%

occurring on just two soil types - *Surface water Gleys / Ground water Gleys Basic* and *Acid Brown Earths / Brown Podzolics.*

Table 4.3.1 Frequency of occurrence and species diversity of sampled County Monaghan hedges on different soil types

Soil Type	Frequency of occurrence (%)	Average species count per hedge			
		Native shrub species	All shrub species	Herbaceous ground flora species	Fern (and Allies) species
Alluviums - Mineral alluvium	2%	2.75	2.75	1	0.5
Alluvium undifferentiated	1%	2	2	1	0
Acid Brown Earths / Brown Podzolics	33%	3.24	3.65	3.79	0.78
Surface Water Gleys / Ground water Gleys	2%	2	2	3	1
Shallow Lithosols / Regosols	6%	2.21	2.29	2.36	0.36
Surface water Gleys / Ground water Gleys Basic	49%	3.7	3.94	2.6	0.99
Lithosols Peats	1%	3	3	1	1
Raised Bog cutaway/cutover	6%	3.33	3.83	1.42	0.5

Over 80% of hedgerows recorded occurred on just two soil types - Acid Brown Earths / Brown Podzolics and Surface water Gleys / Ground water Gleys Basic. Whilst tree and shrub diversity was greater on the latter type, herbaceous ground flora diversity was greater on the Acid Brown Earth soils.

Farm / Land Use

In order to put the sampled hedgerows into their agricultural context the type of farming / property use of the land adjacent to the hedge was noted. Figure 4.3.1 illustrates the results.

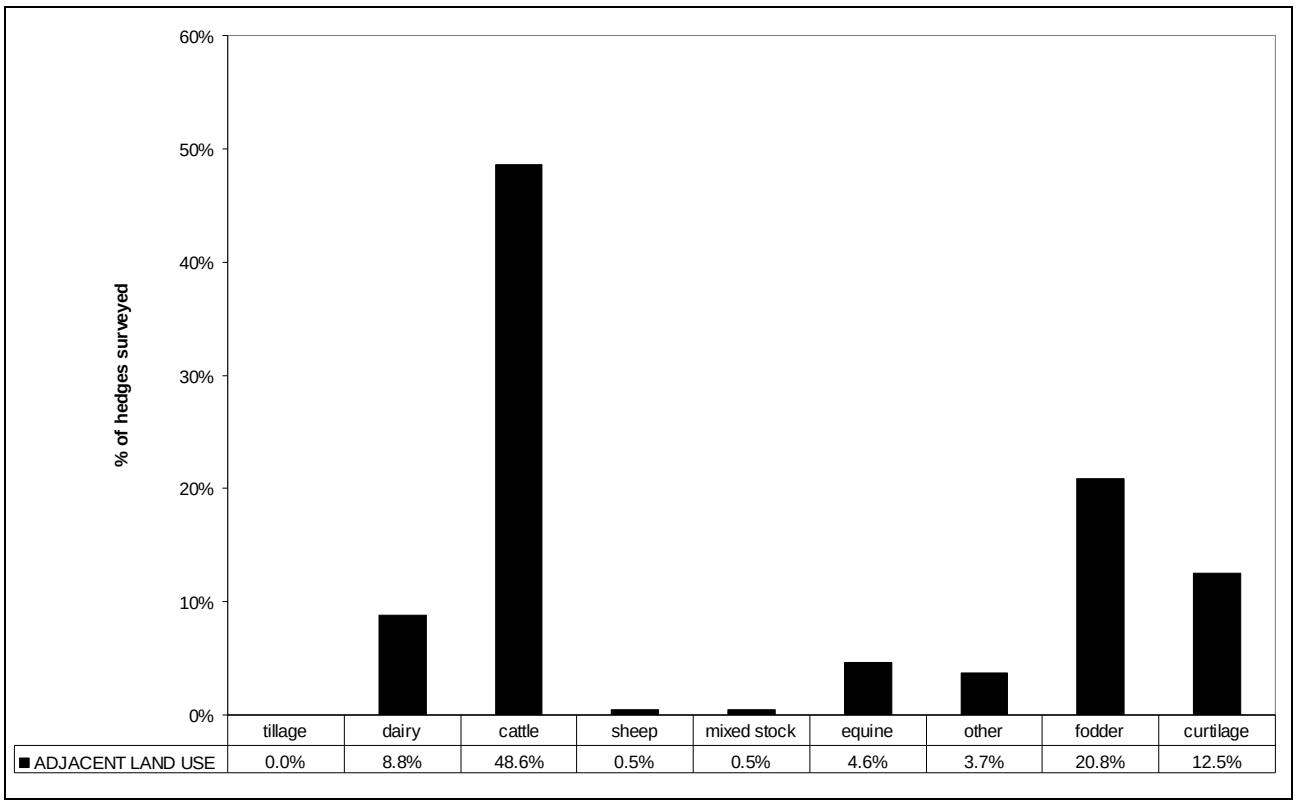


Figure 4.3.1 Farm / Property Use of land adjacent to sampled hedgerows.

All sampled hedges were related to livestock farming whether directly through stock or for the harvesting of fodder (exclusively silage).

Adjacent Land Classification

Figure 4.3.2 shows the breakdown of the habitat classification of the land each side of the sampled hedgerows. Over 60% of land adjacent to hedgerows in Monaghan is classed as improved grassland. A third of land adjacent to hedgerows sampled is of a natural or semi-natural habitat type, with 28% of this figure attributed to semi-natural grassland. 3% of sampled hedgerows were adjacent to a watercourse; this includes drainage ditches which either contain water (flowing or stagnant) or are wet enough to support wetland vegetation. No sampled hedges were adjacent to arable land.

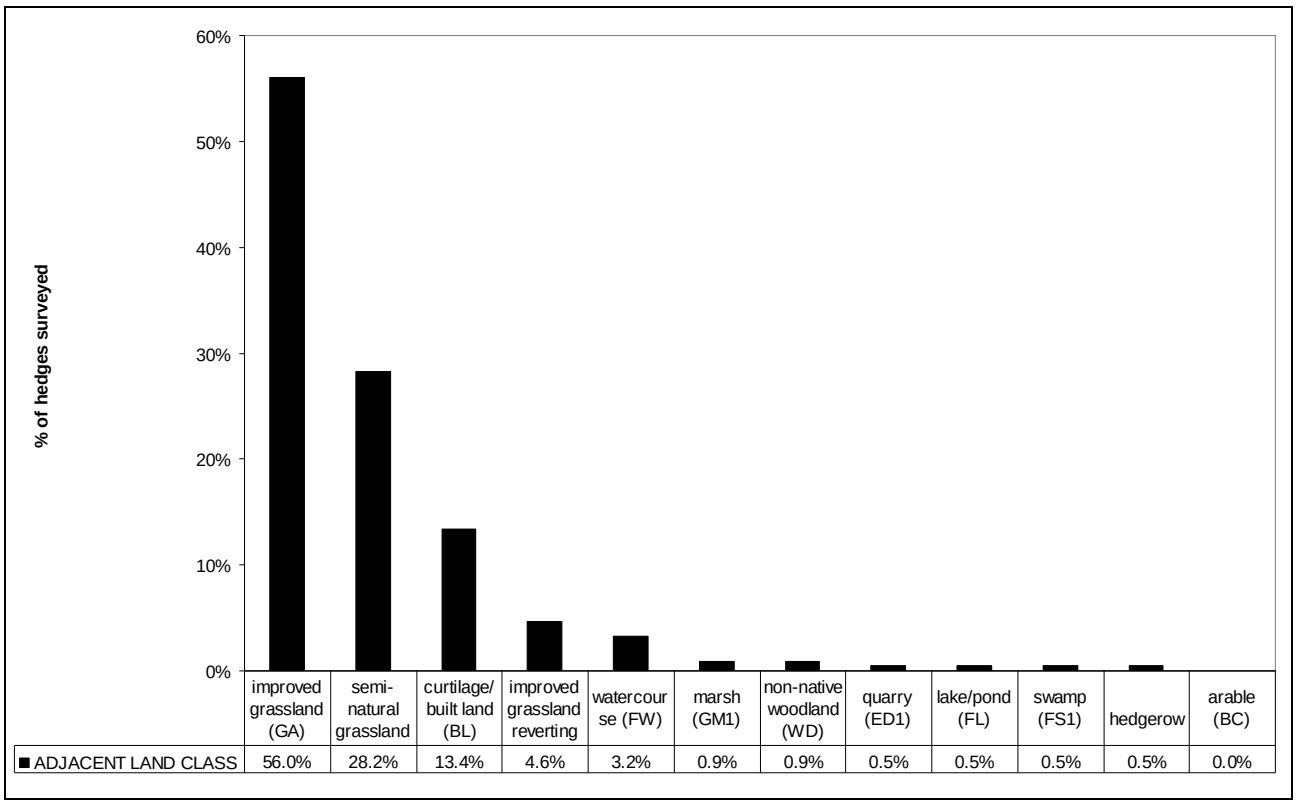


Figure 4.3.2 Habitat classification of land adjacent to sampled hedgerows.

Links with Other Habitat Types

The corridor role of hedgerows in facilitating the movement and distribution of wild flora and fauna through the landscape is believed to be enhanced significantly if hedgerows link into other (natural or semi-natural) habitat features. Figure 4.3.3 shows the breakdown of how the end points of the sampled hedges connected with other hedgerows and other habitat types. Hedgerows sampled in County Monaghan linked to seven different basic natural or semi-natural habitat types, principally other hedgerows or scrub. Although 66% of end links were with other hedgerows, 88% of sample hedges connected with at least one other hedgerow. 97% of the sampled hedges had at least one link with another natural or semi-natural habitat type.

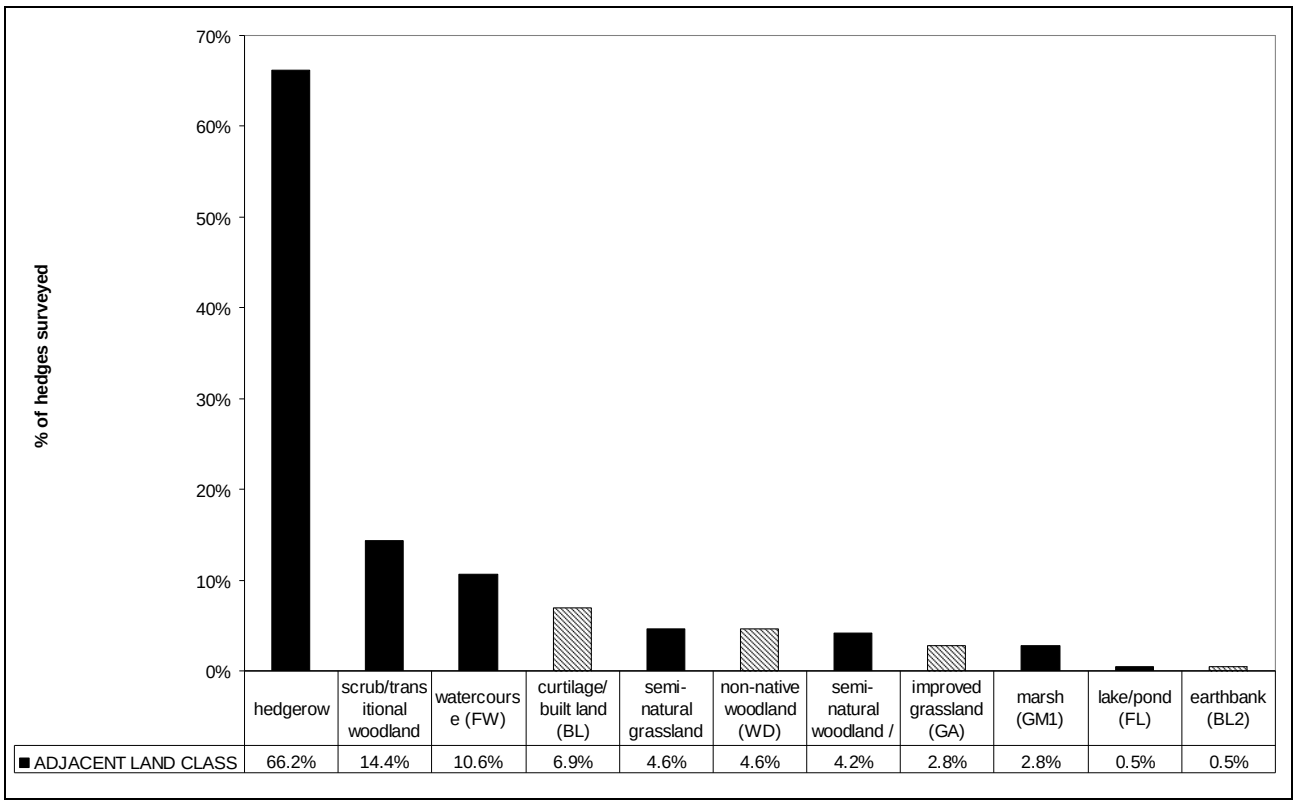


Figure 4.3.3 Habitat links of sampled hedgerows in Monaghan

Hedgerow History

In order to try and assess the period of origin of sampled hedgerows all sample hedges were compared with boundaries marked on the first and second edition Ordnance Survey maps (6" to 1 mile) dating from 1834-35 and 1909-10 respectively. It cannot be known for certain if the boundaries marked on these maps were hedgerows, but the absence of any boundary marking would most likely indicate the absence of a hedgerow at that period. 4.6% of sampled hedgerows were shown as treelines on the first edition Ordnance Survey maps which would suggest that the hedge was most likely present at this period.

Since 46% of the sample hedges were not present on the first edition maps from 1834-35 it can safely be assumed that a significant proportion of the hedgerow network in County Monaghan is less than 200 years old. The second edition O.S. maps (1909-10) show that less than 1% of the sample hedges were, most likely, not present.

1% of hedges linked to features on the Sites and Monuments record. Figure 4.3.4 illustrates the historical context sampled hedgerows.

Scotshouse hedge linking to ringfort (MN06)

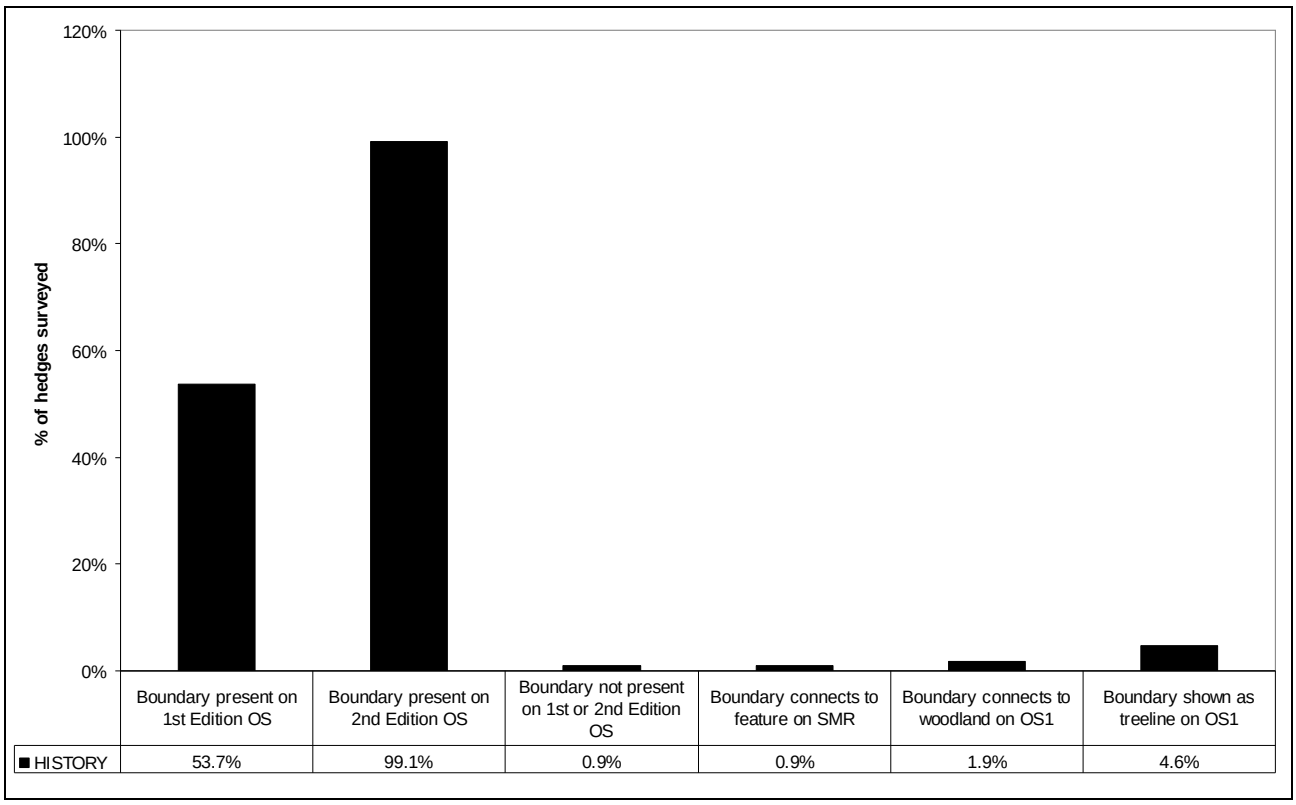


Figure 4.3.4 Historical context of sampled hedgerows

Townland Boundary and Roadside hedges

Since there has been a small degree of realignment of townland boundaries between the first and second editions of the Ordnance Survey, townland boundary hedges were identified using the second edition maps; in County Monaghan they accounted for 12% of the sample. Roadside hedges are at the forefront of the public's perception of hedgerows. In County Monaghan 24% of hedges surveyed were road side; this was evenly split between classified roads and unclassified roads and farm tracks. One hedgerow bounded the old Dundalk – Enniskillen railway line outside of Castleblaney (MN09). The majority of sampled hedges formed part of internal boundaries on farms. The boundary context of sampled hedges is shown in Figure 4.3.5.

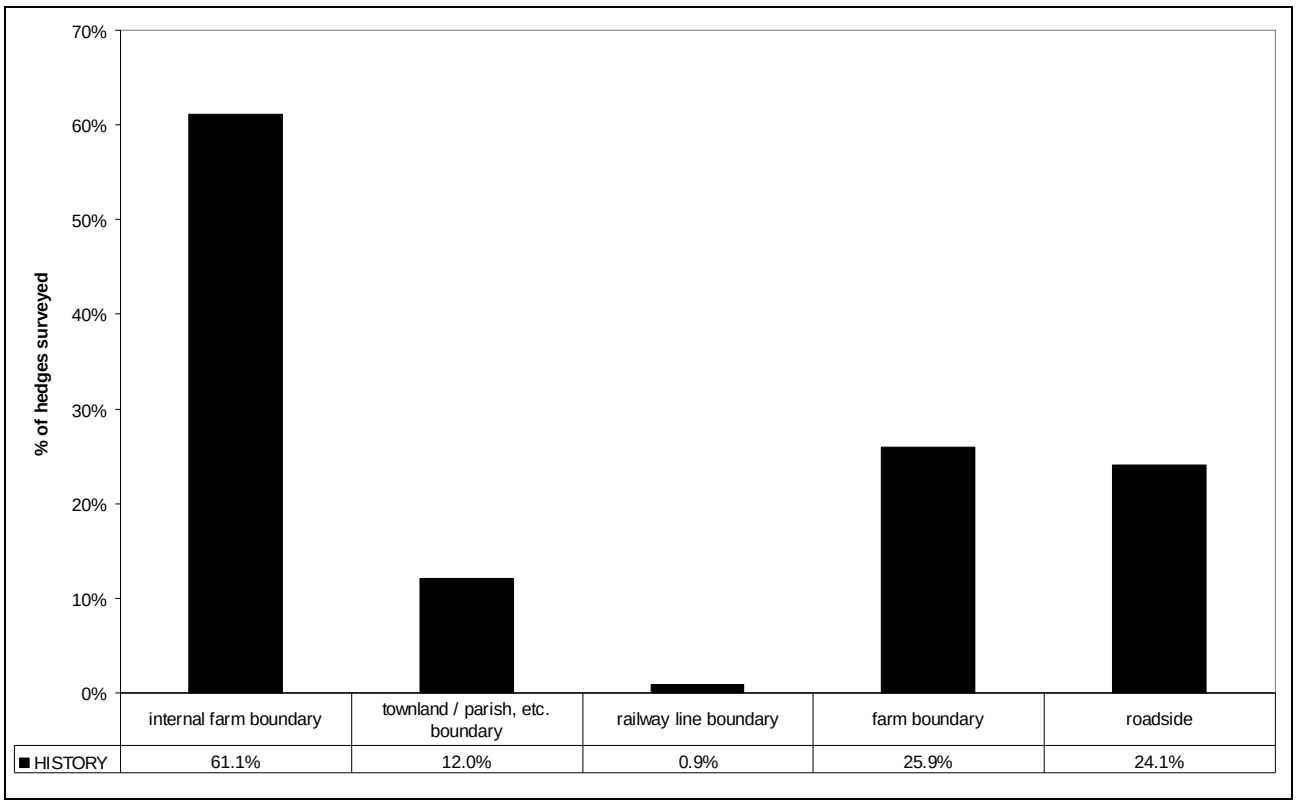


Figure 4.3.5 Boundary context of sampled hedgerows

Boundary Function

To assess the relevance of hedgerow boundaries to modern agriculture, a record was made as to whether the hedgerow formed part of an active farm boundary. A '*redundant boundary*' is one where stock would have uncontrolled simultaneous access to the land either side of the hedge. The boundary function is irrespective of the functionality of the hedge which may or may not be reinforced with other forms of fencing. Hedges along redundant boundaries may not be redundant for shelter or other roles.

91% of hedgerows in County Monaghan are considered still to be part of active divisions or sub-divisions of farms, with 9% adjudged to be redundant.

4.4 CONSTRUCTION OF HEDGEROWS IN COUNTY MONAGHAN

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

In County Monaghan 83% of the hedges surveyed were considered to be linear in outline. Of the 17% having a non-linear outline 44% were associated with either hedges along streams or townland boundary hedges.

The dominant form of hedgerow construction is a single line of shrubs with an associated hedgebank, frequently associated with an external drain.

A single or double line of shrubs is generally an indicator of a planted origin for hedgerows. Almost two thirds of sampled hedges fell in to these two categories with a much greater proportion (65%) being of a single line construction. A similar proportion of sampled hedges have an associated hedge bank. 12% of hedges sampled were associated with a stone wall, although a number of the hedge banks observed had a proportion of stone-facing. Almost a quarter of hedges have an associated shelf which indicates a differential between the levels of the land on either side of the

hedge. This reflects the undulating nature of much of the land in the county. A number of hedges have both bank/wall and shelf. Just over half of the hedges sampled have an associated drain.

Figure 4.4.1 shows a breakdown of the construction type of the County Monaghan hedges surveyed.

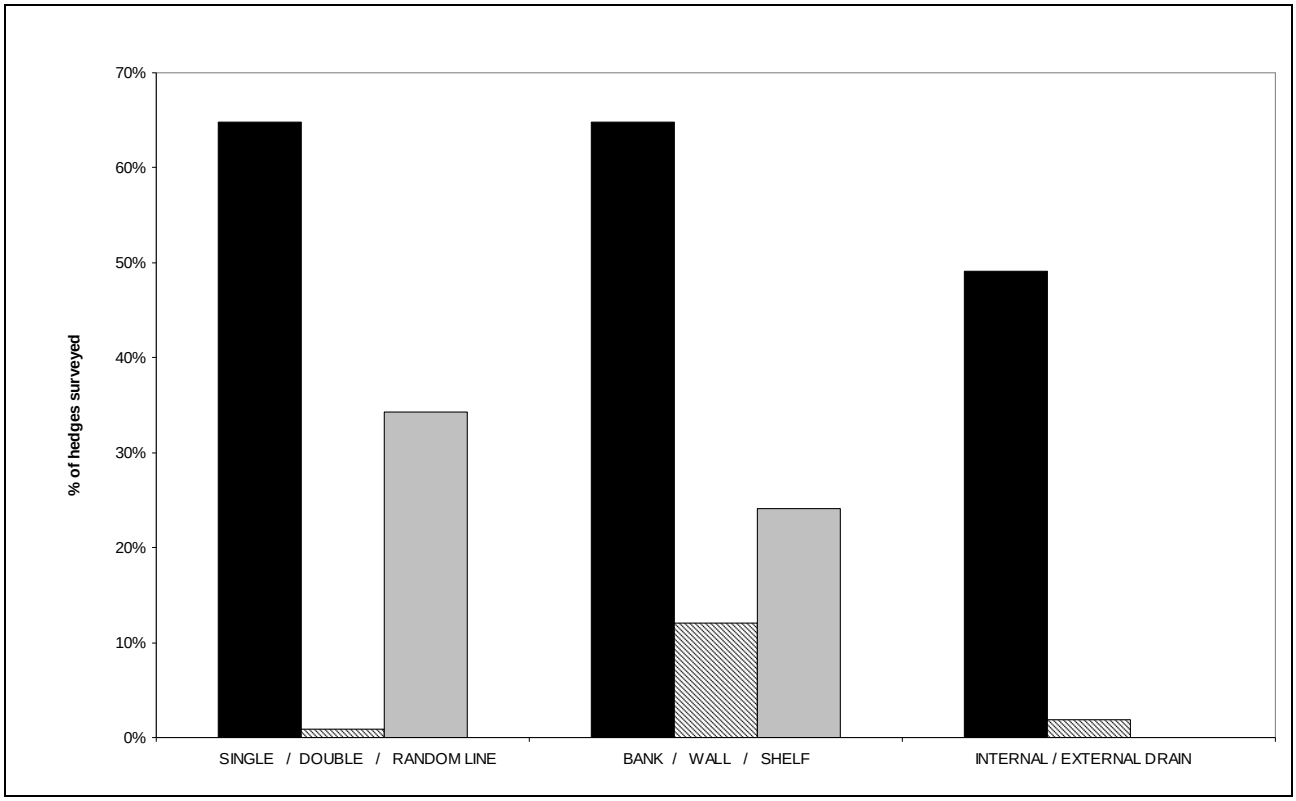


Figure 4.4.1 Boundary construction of samples hedgerows

Over 90% of hedges have some form of bank, wall or shelf as part of their construction. In 20% of hedges the bank / wall or shelf is of the largest size category of greater than 1m in height.

Hedgerows often have an associated function of being part of the drainage scheme of land. Just over half of the sampled hedges in County Monaghan have an associated drain. For 17% of hedges the drain is in the largest size category (>1m).

4.5 STRUCTURE AND CONDITION OF HEDGES IN COUNTY MONAGHAN

Detailing the '*structure'* of the sampled hedgerows involved recording information on the average height, average width, the cross sectional profile, the percentage of gaps, the woody structure of the hedge base, and the presence of hedgerow trees. These features are indicators of the agricultural, ecological and landscape status of the hedge.
Assessing the '*condition'* of the hedge involves qualities such as bank/wall degradation, tree age composition, and overall vigour. These factors can be indicators of the long-term viability or sustainability of the hedge.

Hedge Height
Figure 4.5.1 shows a breakdown of the sample in terms of the hedge height categories.

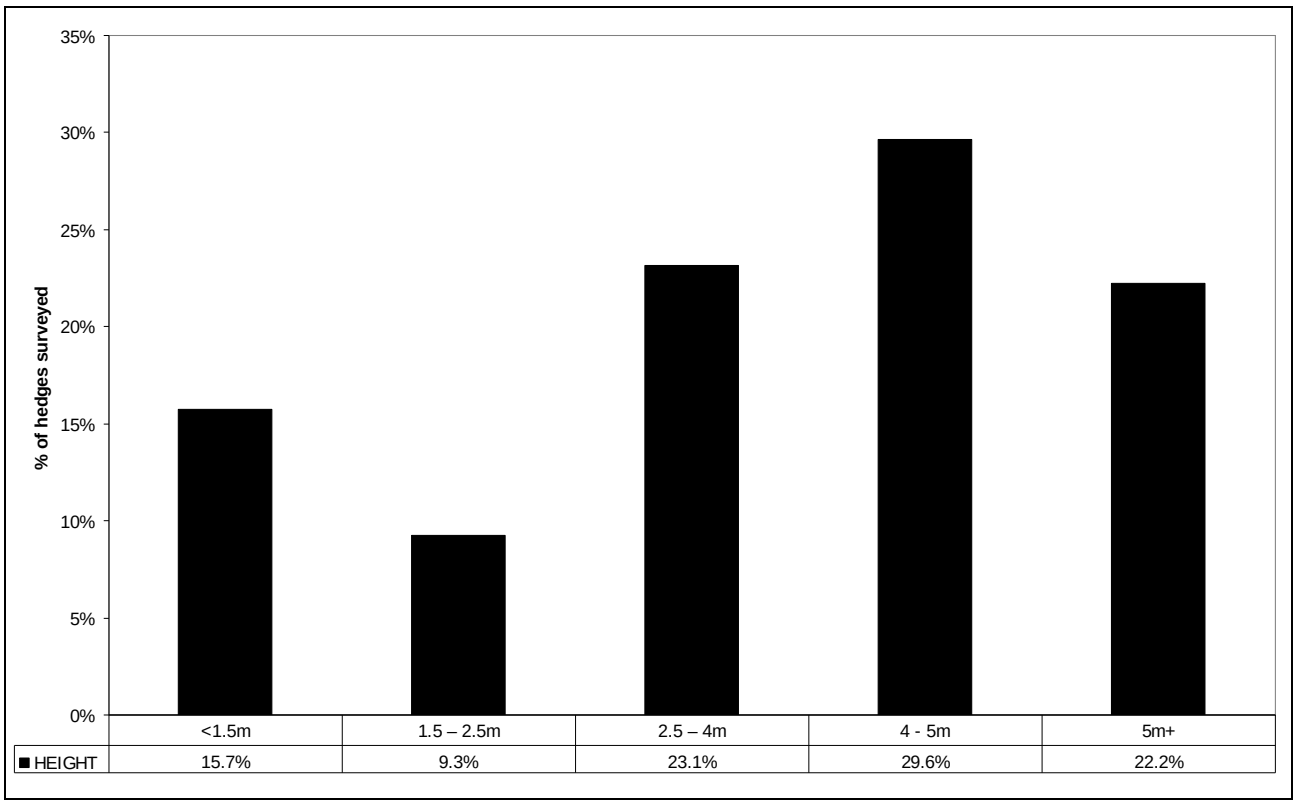


Figure 4.5.1 Proportion of hedges in hedge height categories

Research indicates that taller hedges are generally better from a wildlife perspective. Hedgerow height is largely determined by management methods, but height can also be influenced by altitude, exposure and soil quality. Almost 16% of sampled hedges in County Monaghan were recorded in the lowest height category (<1.5m). However the vast majority (75%) of hedges have an average height greater than 2.5m with 22% of the sample hedges being over 5m in height.

Hedge Width

Increasing width generally correlates with improved biodiversity in hedgerows. As can be seen from Figure 4.5.2, the results of the survey show that 96% of hedges surveyed in County Monaghan are over 1m wide. During the fieldwork for the survey a number of linear features that appeared to be hedges on aerial photographs on closer investigation were classed as being linear scrub. This was due to the spreading of hedgerow shrubs (predominantly gorse and blackthorn). 16% of hedges were in the largest width category of 3m+.

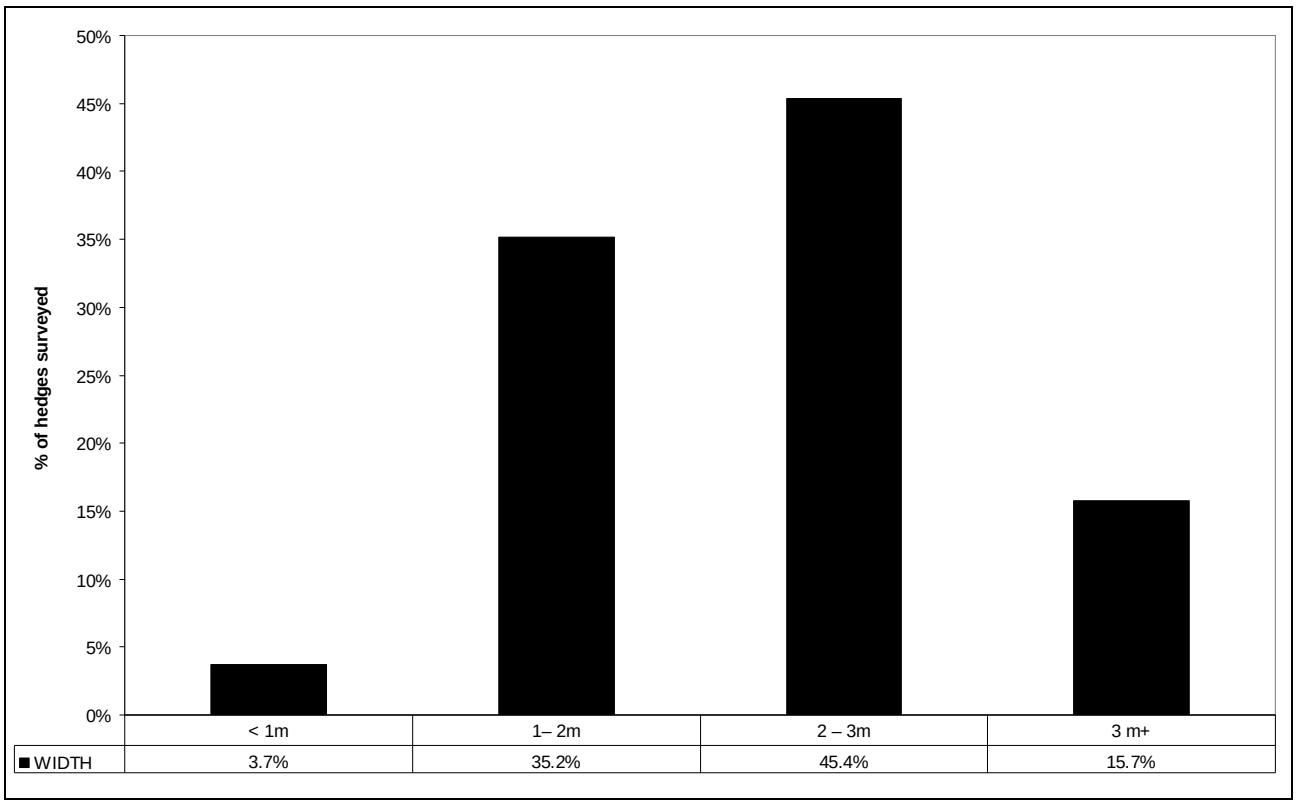
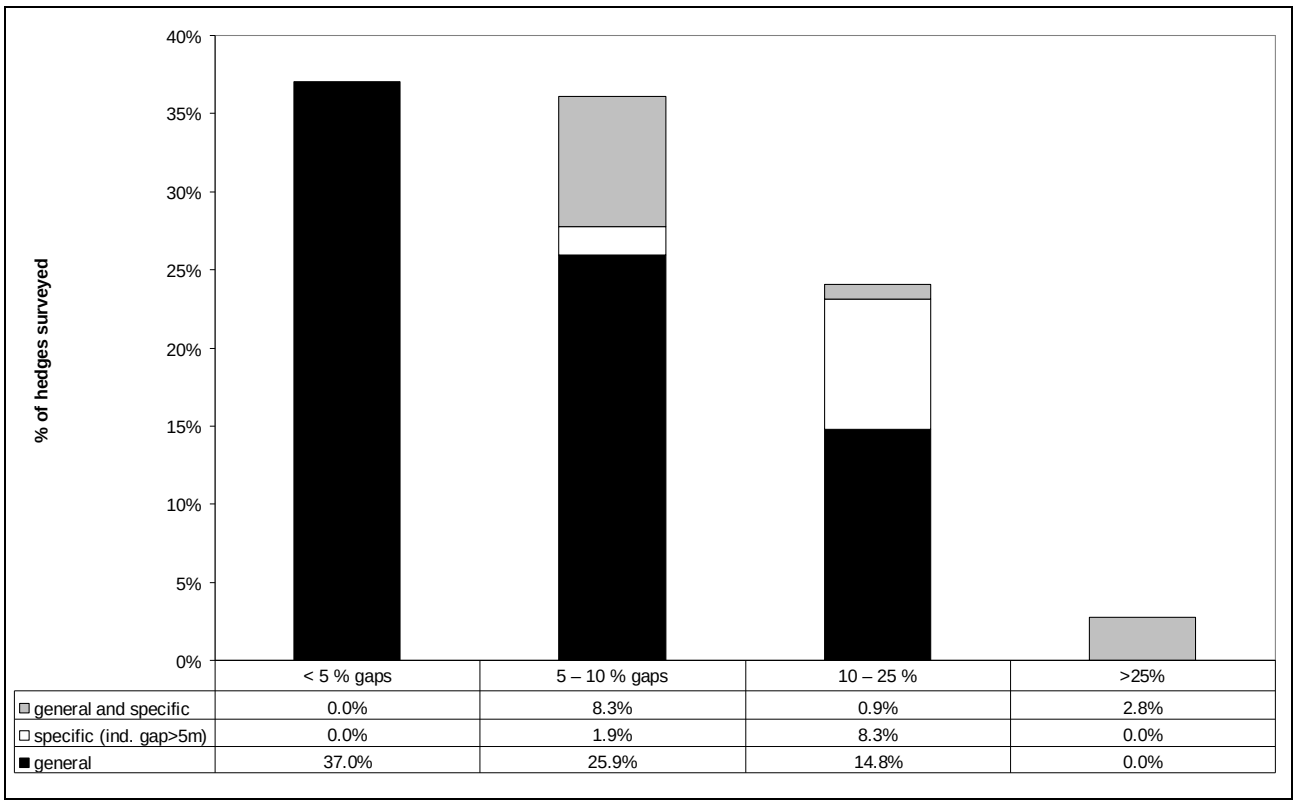


Figure 4.5.2 Proportion of hedges in hedge width categories

Percentage of Gaps

'Gappiness' is an assessment of the percentage of the whole length of the hedge that no longer has a cover of hedgerow shrubs. Gaps are associated with a weak hedge structure and are often a symptom of the deterioration of the hedge often caused by the demise of plants through age or inappropriate management. Some hedges have very well defined individual *'specific'* gaps; others have a low stocking density of shrubs and trees that result in a lateral weakness in the structure *'general gaps'*. A *specific* gap is defined as one that is at least 5m in length. Figure 4.5.3 shows the breakdown of the sample in terms of percentage gaps over the length of the hedge.



	< 5 % gaps	5 – 10 % gaps	10 – 25 %	>25%
general and specific	0.0%	8.3%	0.9%	2.8%
specific (ind. gap>5m)	0.0%	1.9%	8.3%	0.0%
general	37.0%	25.9%	14.8%	0.0%

Figure 4.5.3 Proportion of hedges in 'percentage gaps' categories

73% of sampled hedges had less than 10% gaps, with 37% of hedges having less than 5% gaps. At the other end of the spectrum just 3% of sampled hedges had gaps totalling greater than 25% of their length. However 22% of sampled hedges had individual gaps greater than 5m in length.

Basal Density

Recording how dense the growth of woody hedge shrubs is in the bottom metre of the hedge is an important indicator of the hedge structure both environmentally and agriculturally. A hedge where the woody shrub growth is dense at the base is obviously better from a stock control perspective but it also considered beneficial for the hedges ability to support wildlife. Figure 4.5.4 shows the breakdown of how the samples fared in terms of the hedge base categories. Porosity to light can be a useful indicator of basal density. *Semi- translucent* is recorded where there is more light than woody hedge growth in the base of the hedge. *Semi-opaque* is where there is more woody hedge growth than light. Where there is a lot of vegetation in the base of the hedge an assessment is made substituting *vegetation growth* for *light*.

The majority (70%) of sampled hedges showed some degree of translucence in the lowest 1m of growth, although only 20% could be classed as being open / translucent. Just 10% of hedges were classed as having a dense base. In 39% of cases dense plant vegetation (predominantly brambles or nettles) was recorded in the base of hedges which is usually an indication of a weakness in the woody component of the hedge.

Hedge with a dense base, Inishkeen (MN12)

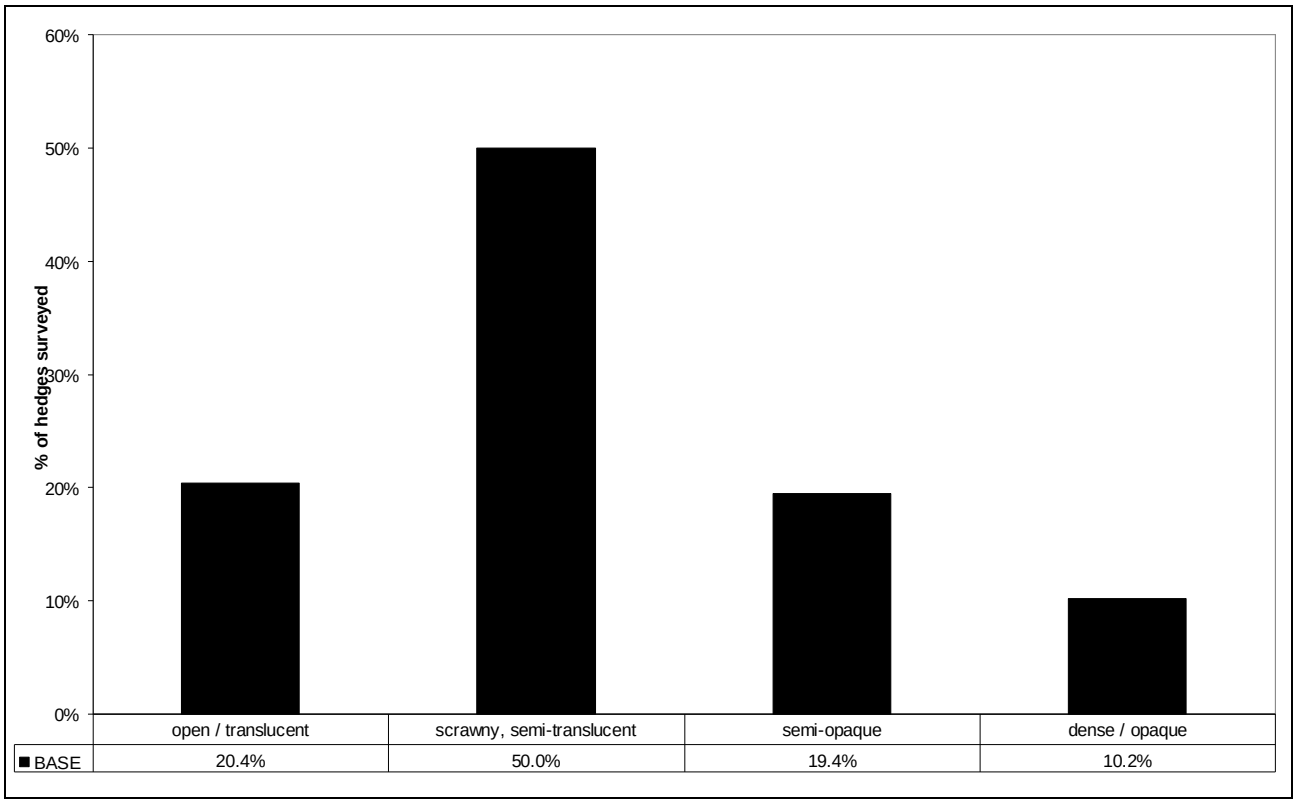


Figure 4.5.4 Proportion of hedges in basal density categories

Hedge Profile (cross section)

The basic cross-sectional profile of each sampled hedgerow was recorded based on a number of defined categories. As hedgerow shrubs mature, growth near to the base generally declines as the plant is no longer threatened by browsing. This process is recorded as '*losing structure*', and without management intervention plants can revert to their natural tree form with an empty or open base. Assessing the profile or cross sectional area of a hedge can be a good indicator of this process and the hedges potential need for rejuvenation. Hedgerows that contain a high proportion of spreading shrubs like blackthorn and gorse can eventually spread to a point where they are no longer considered to be hedges and are re-classified as other habitat types, most commonly scrub/ transitional woodland. The survey noted where the profile of the hedge included a significant element of outgrowths to the side of the main hedge line. An assessment of the findings in the sample hedges is shown in Figure 4.5.5.

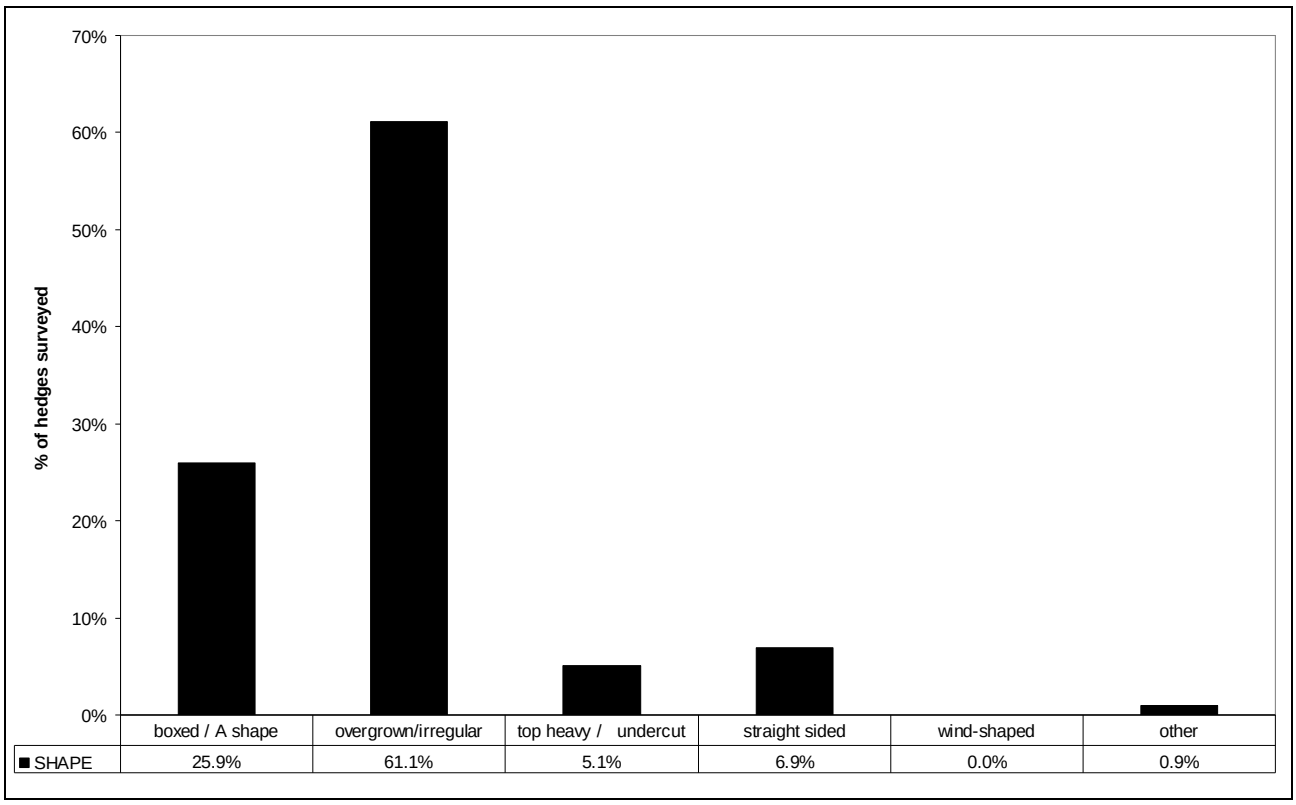


Figure 4.5.5 Proportion of hedges in profile categories

The majority of hedges (61%) in the County Monaghan sample have the *overgrown* profile indicative of lack of management in the recent past. Over a third of sampled hedges were recorded as losing their base structure and reverting to tree form which can be considered a sign of deteriorating quality. 7% of hedges were recorded has having significant outgrowths to the side of the main hedge line.

Hedgerow Trees

This survey looked at both the abundance of trees in hedges (Figure 4.5.6) and also the age composition of the trees. Hedgerow trees can contribute significantly to the overall biodiversity of a hedgerow.

Hedgerow trees can be the result of intent where young (self sown) trees have been purposefully allowed to grow and mature as part of a management regime, or they can be a consequence of lack of management. Colonising species such as ash and sycamore become established in hedges and grow unchecked by management activities.
The proportion of hedgerow trees is assessed by their impact on the canopy of the hedge and the sample hedges were classified into four categories based on this.

18% of the sample hedges had no hedgerow trees, with a further 21% of hedges having *Few* trees (up to 15% canopy cover). At the other end of the spectrum, 9% of sampled hedges were classed as a *Line of Trees*, where over 75% of the canopy is dominated by trees. This is usually an indication of little or no management activity.

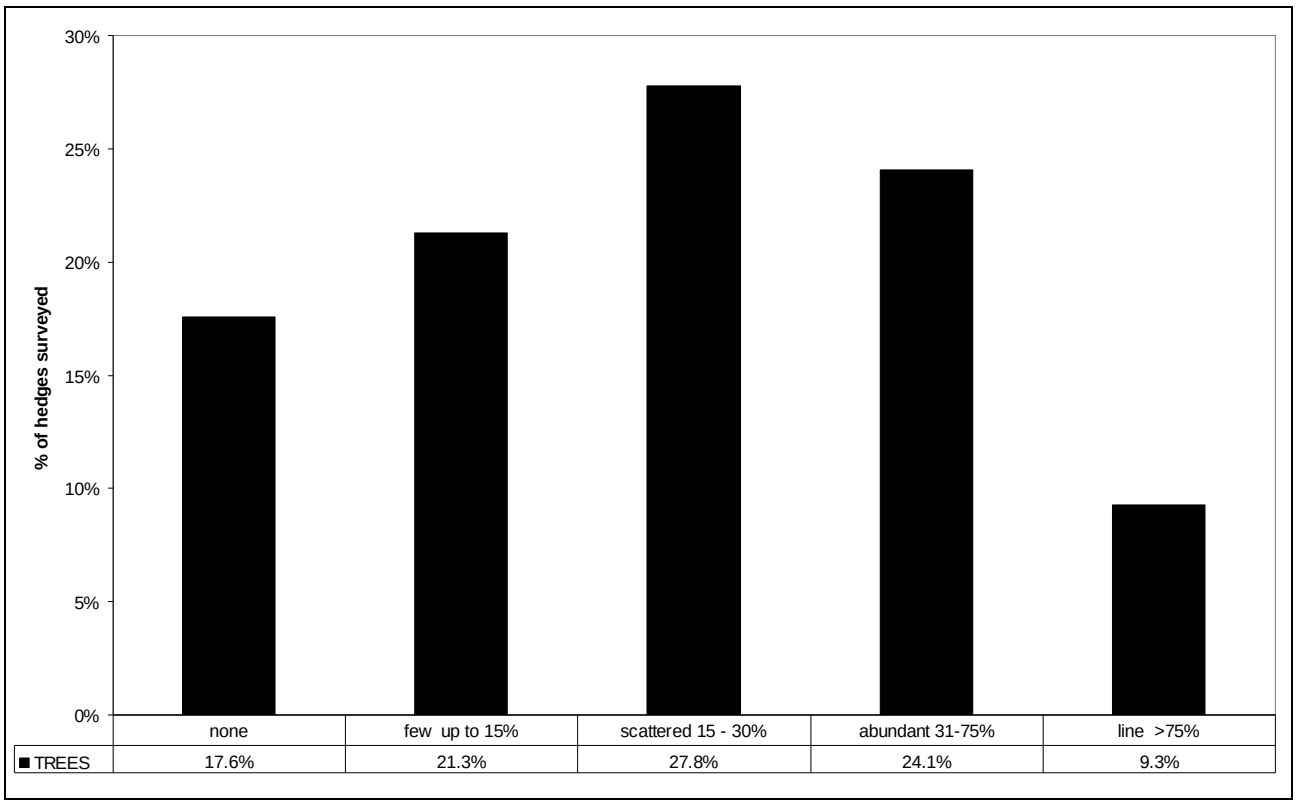


Figure 4.5.6 Proportion of hedges in abundance level of hedgerow trees categories

Tree Age Composition

It is generally considered that to achieve sustainable levels of hedgerow trees a balance between young, medium and older trees needs to be maintained. Young trees are defined as having a diameter at breast height of no more than 8cm. In 59% of sampled hedges (72% of hedges with trees) hedgerow trees were either exclusively or predominantly mature.

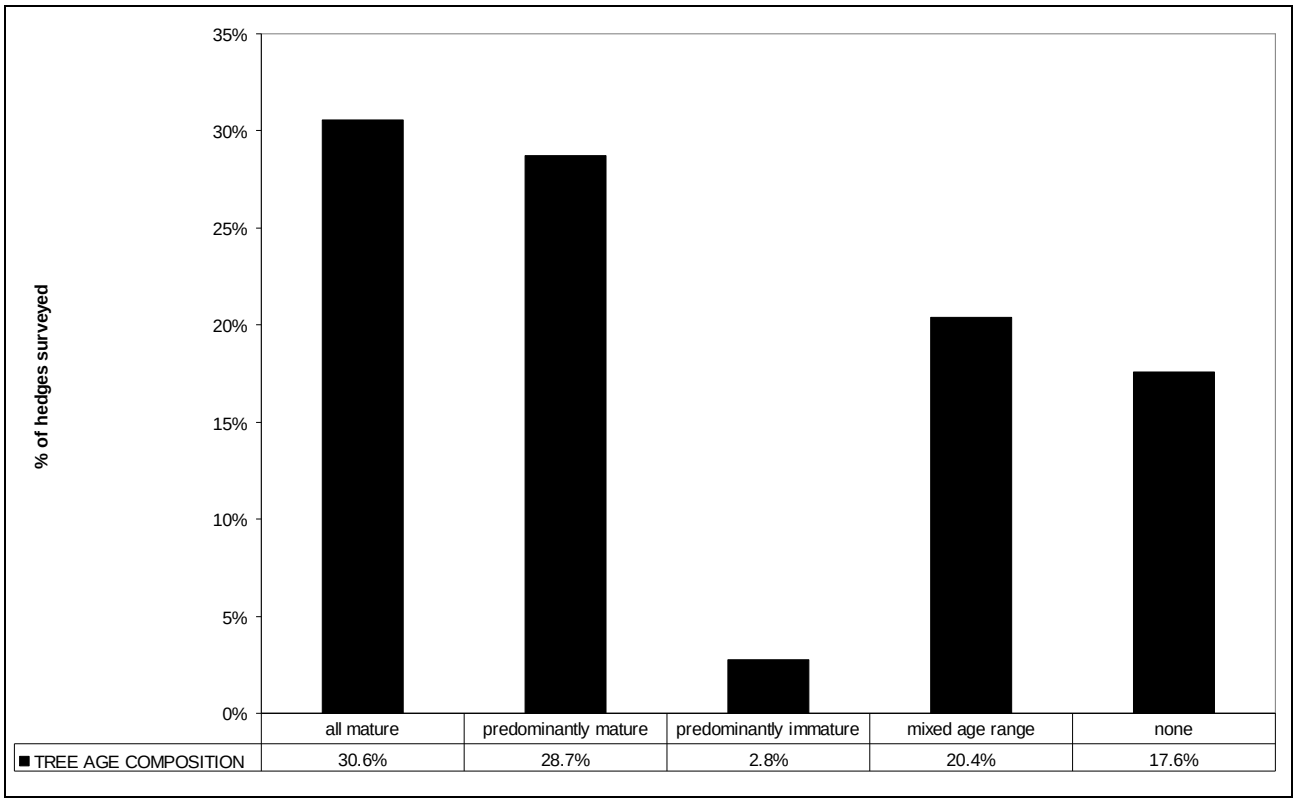


Figure 4.5.7 Proportion of hedges in tree age composition categories

Bank/Wall / Shelf Degradation
Where hedgerow shrubs are established in hedge banks the viability of the hedge can be threatened if the bank is damaged. Root systems are exposed to damage, drying and infection with the result that overall stability can be reduced. Ground flora in particular is also compromised. Sampled hedges were examined for damage to the supporting structure and the results are shown in Figure 5.5.8. *Minor* damage involves exposure of bare earth on the hedgebank. The damage was considered *severe* where there was significant erosion of the bank or wall. If the degradation extended to greater than 10% of the length of the sample hedgerow it was considered as *general* otherwise it was recorded as *isolated*.

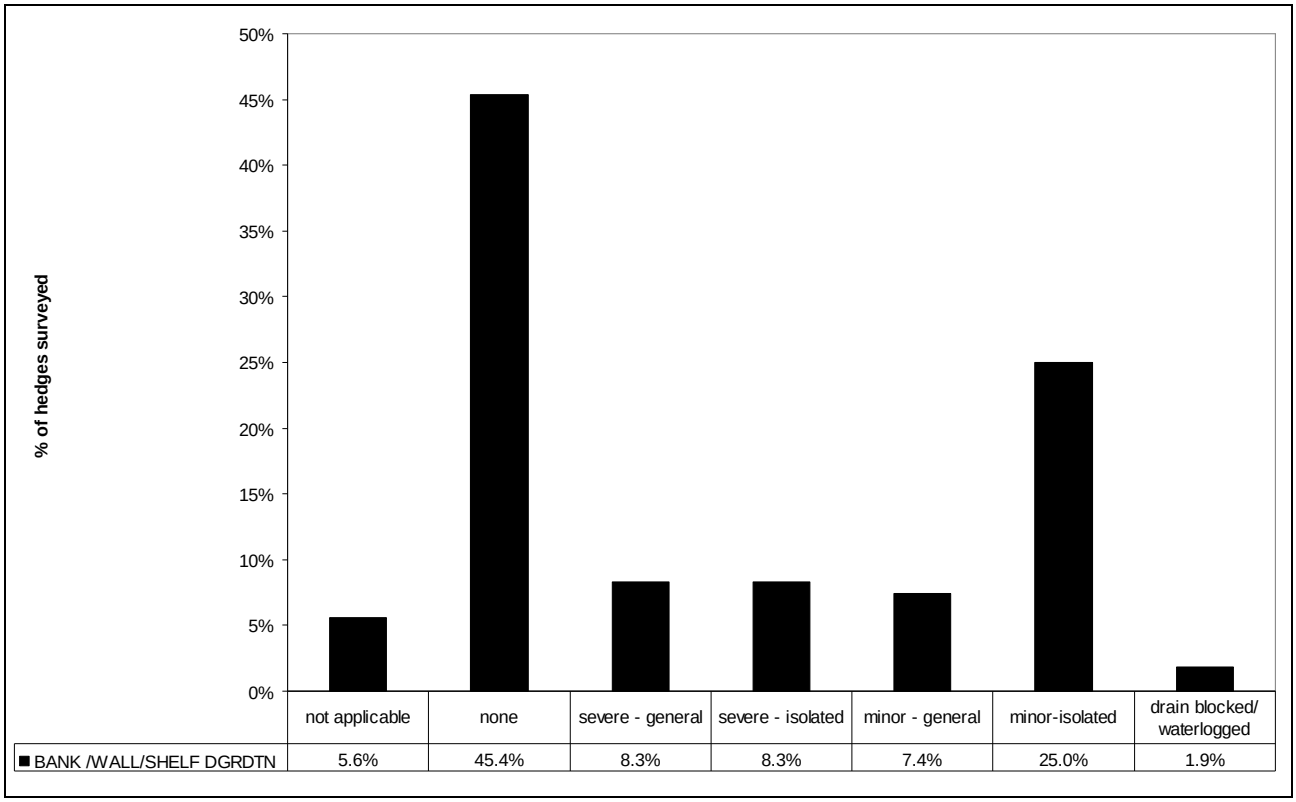


Figure 4.5.8 Evidence of degradation in hedges with a bank / wall / shelf

Degradation of hedge banks has been a common feature in all of the county hedgerow surveys conducted to date. 51% of hedges sampled during the County Monaghan survey exhibited some degree of damage to the supporting infrastructure of bank, wall or drain. In 17% of hedges this damage was considered to be severe in nature. 2% of sampled hedges had evidence of water-logging due to a blockage of the associated drain.

Margins
The presence of a verge or margin was recorded for each sampled hedges. A verge / margin is a permanent strip of undisturbed vegetation. It refers to an uncultivated strip alongside the hedge. In grassland situations a verge is where the edge of the field is clearly not seeded, managed, or utilised as the rest of the field, such as where grazers are excluded by a fence. A fenced off area 1m in from a hedge would count, but a 1m strip left after mowing for hay/silage does not. Margins are particularly important for the ground flora component of the hedgerow so any impact on the margin which could compromise ground flora was recorded; this included poaching and the use of herbicide.

Both sides of the hedge were investigated and in County Monaghan a third of the sample had a margin. In the majority of cases (74%) this was less than a metre in width. 8% of the sample showed evidence of poaching within 2m of the hedge. In 0.5% of cases herbicide use was recorded.

Vigour
With a view to long term viability an assessment was made of the overall vigour of the sampled hedges. This was assessed by examining the annual increment of new growth in the shoots of hedgerow shrubs. Lack of vigour, where noted, was due to disease, die-back or decay. 8% of the sample was deemed to be lacking vigour and a further 13% of hedges were noted as having poor vigour in part. 9% of sampled hedges showed evidence of basal decay to hedgerow stems.

4.6 MANAGEMENT OF HEDGES IN COUNTY MONAGHAN

The management of hedges affects the hedge structure, condition and sustainability which in turn impacts on functional, biodiversity and aesthetic values. For these reasons an assessment of hedge management forms an important part of this survey. The implications of management variables recorded are presented in section 5.0.

Figure 4.6.1 gives a breakdown of the hedgerows sampled by their type of management.

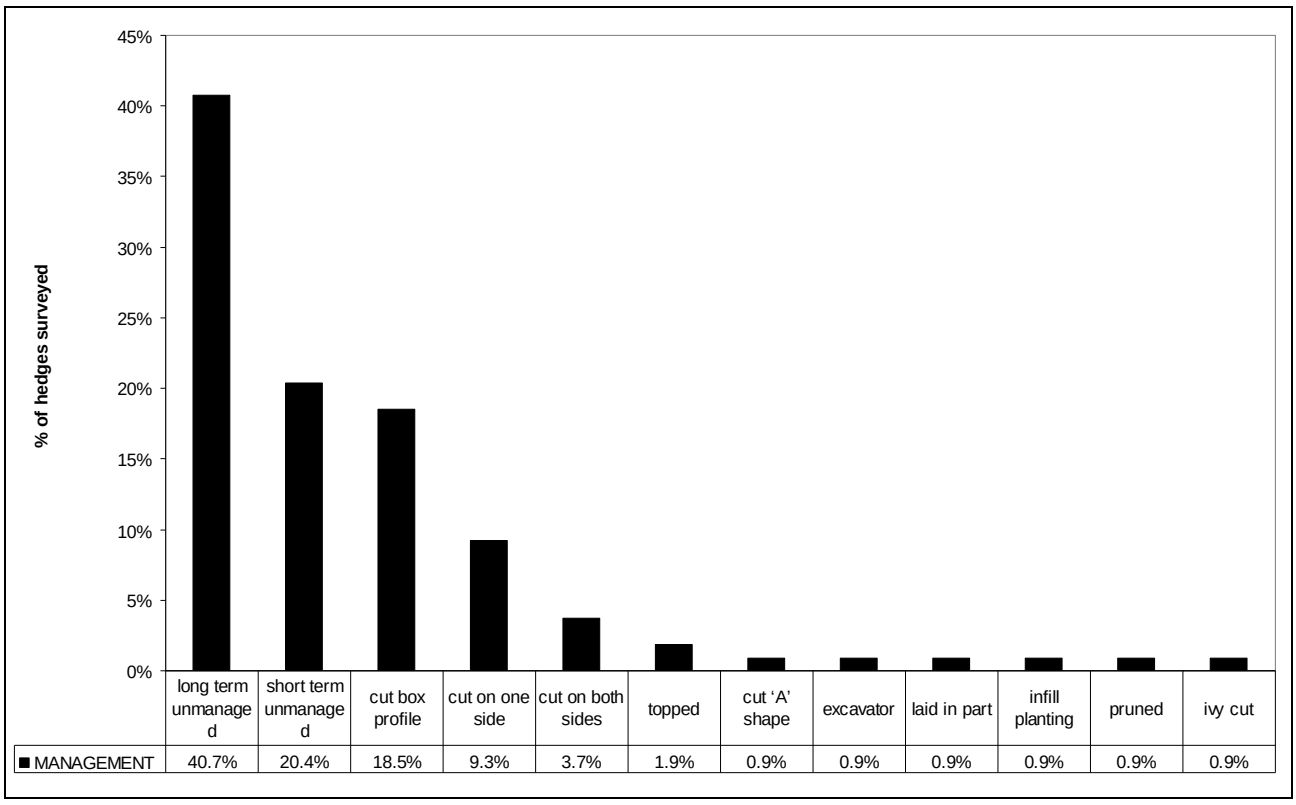


Figure 4.6.1 Breakdown of the management type of the sample

The majority (59%) of hedges in County Monaghan have received some degree of management intervention in the last 10 years. This varies from mechanical trimming to the pruning of individual trees or bushes or the cutting of ivy in individual trees. Over a third of hedges had been managed within the last 12 months. 1% of hedges sampled showed evidence of infill planting of gaps and another 1% showed evidence of rejuvenation through laying. These two forms of management are promoted by the REPS (Rural Environmental Protection Scheme). 1% of sampled hedgerows were noted as having been managed during the prohibited period of the Wildlife Amendment Act (2000). The method by which hedges were managed was also investigated. Where hedges have been managed in the short-term past, but not during the current season, detecting the precise means by

which the management was carried out can be difficult to establish, Figure 4.6.2 shows the proportion of managed hedges in the different management method categories.

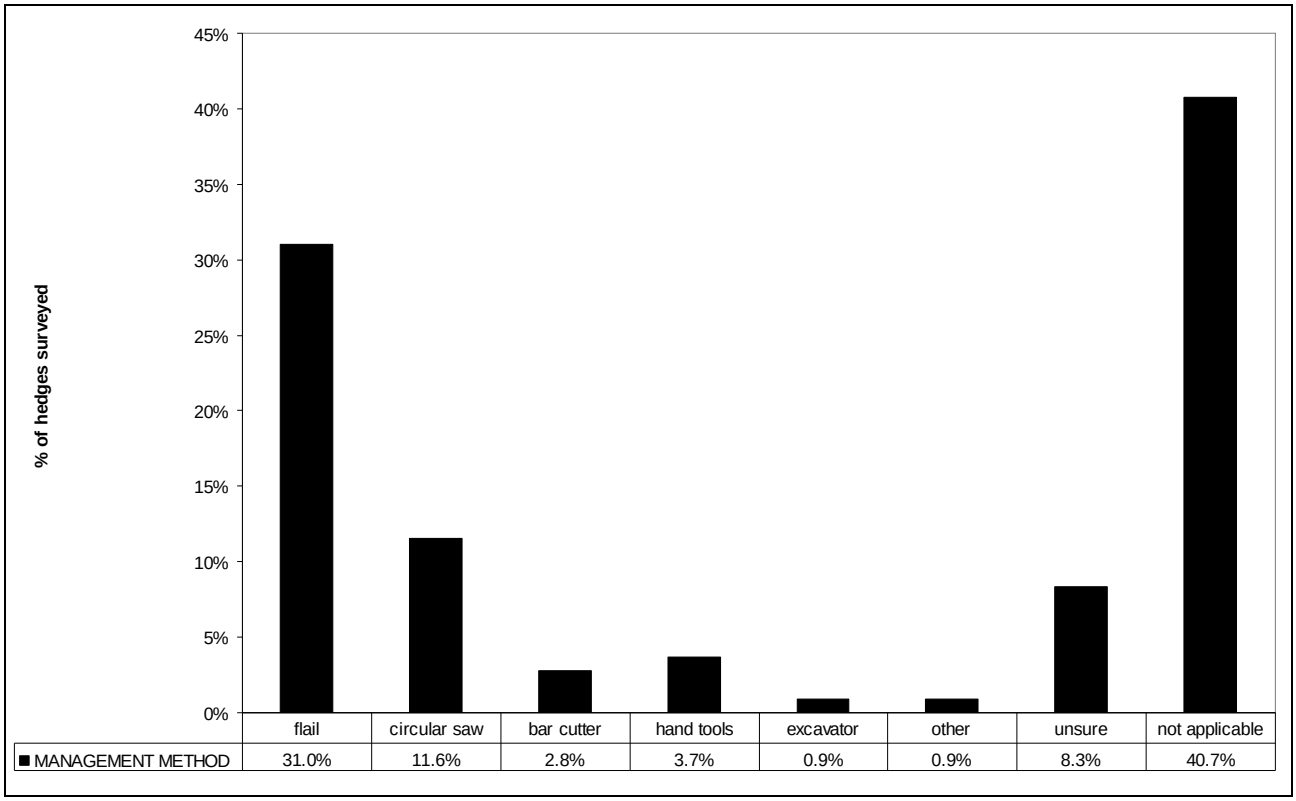


Figure 4.6.2 Proportion of managed hedges in management method categories.

The flail is the management tool responsible for at least 31% of the managed hedges recorded during this survey. Almost 12% of sampled hedges were cut using a circular saw. This is normally reserved for cutting larger growth to reshape overgrown hedges or where hedges are cut on longer rotations (as prescribed by the REPS). The use of an excavator was noted in 1% of the sampled managed hedgerows.

The principal original function of hedges was to act as stock-proof barriers. The current survey looked at to what extent the hedgerow network is being reinforced with additional fencing to maintain its stock retaining capacity. Each side of the hedge was assessed for the presence of fencing. The results are shown in Figure 4.6.3.

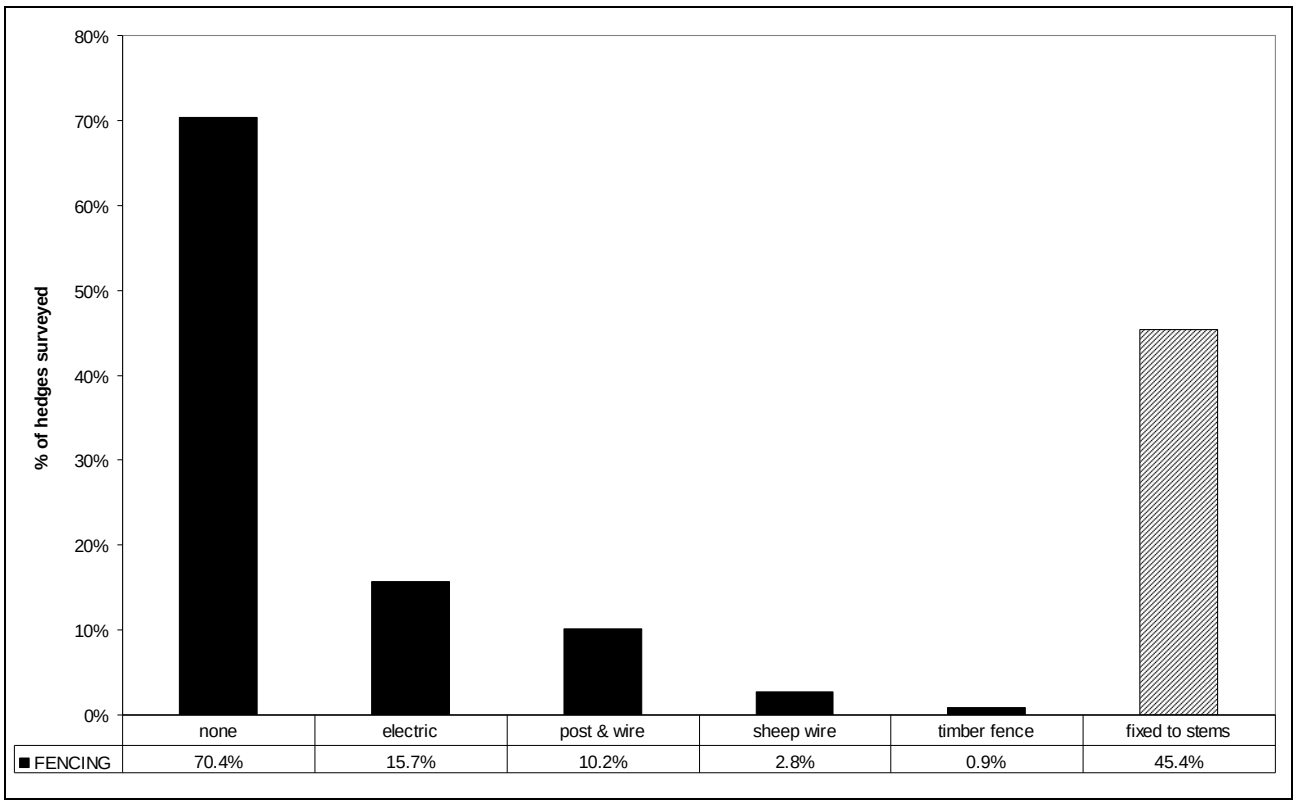


Figure 4.6.3 Additional fencing of hedgerows

Taking in to account both sides of the hedge 70% of the sampled hedges in County Monaghan had no additional fencing. In 53% of cases there was no fence on both sides of the hedge. However in 39% of these hedges wire has been fixed directly to hedgerow stems. This practice was very common in County Monaghan with evidence recorded in 45% of hedges. The principal means of supplementary fencing is through the use of electric fence wire which accounted for 16% of sample.

Hedge Laying

There is little evidence for a tradition of laying hedgerows in County Monaghan with just 3% of the sampled hedges showing some evidence of having been laid in the past. Evidence of old hedge laying can be difficult to detect in dense hedges or those with dense ground vegetation so it is possible that these results may be on the conservative side. Two sampled hedges had signs of having been laid (in part) in the recent past. There was evidence that some older thorn hedges had been coppiced in the past but this did not form part of the recording methodology, an omission which needs to be rectified in future surveys.

4.7 APPRAISAL OF HEDGES IN COUNTY MONAGHAN

HEDGEROW APPRAISAL SYSTEM (HAS)

A Hedgerow sub-group of the Woodlands of Ireland project recently has developed a system using criteria based on data recorded using the same methodology as this survey to identify hedgerows of ecological, historical and landscape significance (termed *Heritage Hedgerows*). This Hedgerow Appraisal System (HAS) also includes criteria for assessing the *Favourable Condition* status of individual hedges.

It was agreed that this system would be piloted as part of the Monaghan Hedgerow Survey.

A basic assessment of the hedgerows recorded in this survey using the Woodlands of Ireland draft criteria is included below.

APPRAISAL

The appraisal system is intended to identify hedgerows of historical, ecological and/or landscape significance. The system is based on ranking the significance of hedges on a scale of 0-4 (0 being lowest) in five categories; Historical Significance, Species Diversity Significance, Structure, Construction & Associated Features, Habitat Connectivity Significance and Landscape Significance. A score of 4 in any category indicates a hedge of high significance (*Heritage Hedgerow*). Hedges can also be considered of high significance (*Heritage Hedgerows*) if they record a sufficiently high cumulative score over the five categories. These hedges should be considered as high priority in terms of retention, management action, etc. Hedges recording lower scores may still be of value depending on the context.

CONDITION ASSESSMENT

For a qualitative assessment of hedgerow condition criteria have been set for desirable and undesirable attributes. These criteria are open to amendment based on further research.

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 Unfavourable Condition.

All sampled hedges were assessed against the above criteria.

Hedgerow Significance

Just over a quarter of hedges were accorded *Highly Significant* status in at least one of the four *Significance* categories. These were fairly evenly distributed around the county, although squares MN11 and MN12 had no *Highly Significant* hedgerows. Neither are typical hedgerow landscapes. The former is an elevated area of dry humid acid grassland, gorse and bramble scrub; the latter (a part square only) is dominated by gorse scrub and rock exposures.

Table 4.7.1 Percentage of sampled hedgerows achieving Highly Significant status

Significance Category	**Highly Significant (%) (*Heritage Hedgerow*)**	**Favourable Condition (% of Heritage Hedgerows)**	**Favourable Condition (% of total sample)**
Overall	*25.9*	*25.0*	*6.5*
Historical	15.7	23.5	3.7
Species Diversity	11.1	50.0	5.6
Structure, Wall, Trees	7.4	25	1.9
Habitat Connectivity	0	n/a	n/a
Landscape	0	n/a	n/a

27% of sampled hedgerows passed all of the *Favourable Condition* criteria, leaving 73% in *Unfavourable Condition*. Almost a third of hedges failed the criteria in more than one category and 7% of hedges failed in three or more categories. The results are detailed in Table 4.7.2.

Condition Status

Table 4.7.2 Percentage of sampled hedgerows in Unfavourable Condition

Condition Category	Condition Criteria	Unfavourable (%)
Overall		73.1
Height	<1.5m	15.7
Width	<1m	3.7
Basal Density	Open	20.4
% Gappiness	>10%	26.9
Specific Gaps	Individual gap >5m	22.2
Bank / Wall	>20% of the length of the hedge degraded	8.3
Proportion of introduced species	>10% of woody growth volume comprised of unfavourable species	5.6
Ground flora / hedge base	> 20% of ground layer showing evidence of Herbicide Use	0.9
Ground flora / hedge base	Contains Noxious weeds / > 20% Dominated by Nutrient Rich Species	26.9
Ground flora / hedge base	Presence of alien invasive species	0
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion	15.7
Proportion of canopy dominated by ivy	>25%	3.7

The level and nature of gappiness is the most significant reason why hedgerows in County Monaghan are not achieving *Favourable Condition* status with approximately 30% of the sampled hedgerows failing in this regard. The hedgerow base, whether through lack of density of woody growth or through excessive levels of nutriphiles (nettles, docks and cleavers) was also a responsible for a significant proportion of hedges failing to achieve *Favourable Condition* status. 16% of hedgerows failed the standard through lack of height.

Four different non-native species were present to levels considered excessive in terms of Favourable Condition status. These were, in descending order of prevalence, Sycamore, Beech, Non-native Willow species and Wilson's Honeysuckle.

A number of factors are not considered to be sufficiently significant to classify a hedgerow as being in unfavourable condition without more detailed assessment, but are flagged as having Warning Status.

Table 4.7.3 Percentage of sampled hedgerows having Warning Status

Condition	**Details**	**% of sample hedges with Warning Status**	**% of hedges in *Favourable Condition* with Warning Status**
Obvious signs of poor condition	Weak growth	3.7	0
	Basal decay	8.3	10.0
	Effects of spray drift	0	0
Risk of infection; Management Safety Issues	Wire fixed to stems	45.4	41.4
	Managed using excavator type machinery	0.09	0
Impact on biodiversity	Managed during the bird nesting season	0.09	0
Hedgerow Tree Sustainability	Only Mature Trees present	30.6	10.3

The two most significant reasons for hedgerows being flagged with a Warning Status are the presence of wire fixed to hedgerow stems (45%) and the fact that only mature trees are present in hedgerows with no immature trees or saplings evident to replace them in the future (31%).

4.8 PHASE 2 - SAMPLE OF POTENTIAL HIGH ECOLOGICAL VALUE HEDGEROWS

Townland Boundary Hedges and Hedges linking to Native Woodland

In the baseline survey 12% of all of the randomly chosen hedges surveyed formed part of townland boundaries and 8% linked at one end to semi-natural woodland or scrub. In order to look in more detail at hedges of this type of hedgerow additional recordings were made.

Frequency of Occurrence

A number of shrub species were recorded more frequently in townland boundary and native woodland linked hedges than in the baseline survey. Willow species were found in 38% of these hedges compared with just 20% of hedges sampled in the baseline survey. Other species which showed an increase were Hazel (+8%) and Wild Privet (+5%). Conversely, a number of species occurred less frequently; Ash (-19%), Hawthorn (-19%), Blackthorn (-13%) and Holly (-12%). Spindle was recorded in 4% of the townland boundary and native woodland linked hedges but was not found in any of the 30m sample strips of the baseline survey.

The majority of the herbaceous ground flora species occur slightly more frequently in townland boundary and native woodland linked hedges than in the baseline survey. There are a number of species which occur in less than 10% of the baseline survey sample hedges but in over 10% of the townland boundary and native woodland linked hedges. These include Wood Sorrell (12%: 4%), Ground Ivy (12%: 4%) and Hedge Woundwort (11%: 3%).

Species Diversity

The shrub, herbaceous ground flora and fern species diversity of townland boundary and native woodland linked hedges was compared with the results from the baseline survey. Townland boundary hedges showed slightly greater diversity in all three categories. Hedgerows linking to native woodland were significantly more diverse in their shrub and herbaceous ground flora composition, although the fern (and allies) diversity was unchanged. Townland boundary hedges that link to native woodland were significantly more diverse in all respects. The results are detailed in Table 4.8.1 below.

Table 4.8.1 Comparison of average species diversity figures for townland boundary and roadside hedges

	Average Species Diversity per hedge			
	All shrub species	Native shrub species	WoI herbaceous ground flora species	WoI fern (and allies) species
All hedges (Baseline Survey)	3.62	3.32	2.88	0.83
Townland boundary hedges	3.87	3.63	3.07	0.93
Hedges linking to Native Woodland	4.20	4.04	3.40	0.84
Townland boundary hedges linking to native woodland	4.48	4.26	3.83	1.5

Hedgerow Appraisal System

Hedgerow Significance

73% of townland boundary and native woodland linked hedgerows are classed as *Highly Significant* compared with just 26% of the sample in the Baseline Survey.

Table 4.8.2 Percentage of townland boundary and native woodland linked hedgerows achieving Highly Significant status

Significance Category	**Highly Significant (%) (*Heritage Hedgerow*)**	**Favourable Condition (% of Heritage Hedgerows)**	**Favourable Condition (% of total sample)**
Overall	*72.6*	*17.8*	*8.1*
Historical	64.5	17.5	11.3
Species Diversity	12.9	12.5	1.6
Structure, Wall, Trees	19.4	8.3	1.6

Habitat Connectivity	8.1	20.0	1.6
Landscape	0	n/a	n/a

Condition Status

Just 17.8% of townland boundary and native woodland linked hedgerows achieved *Favourable Condition* status. The degree and nature of gaps is the most significant reason for failing the criteria. The details are presented in Table 4.8.3.

Table 4.8.3 Percentage of townland boundary and native woodland linked hedgerows in Unfavourable Condition

Condition Category	Condition Criteria	Unfavourable (%)
Overall		82.2
Height	<1.5m	6.5
Width	<1m	1.6
Basal Density	Open	24.2
% Gappiness	>10%	46.8
Specific Gaps	Individual gap >5m	30.7
Bank / Wall	>20% of the length of the hedge degraded	9.7
Proportion of introduced species	>10% of woody growth volume comprised of unfavourable species	6.5
Ground flora / hedge base	> 20% of ground layer showing evidence of Herbicide Use	8.1
Ground flora / hedge base	Contains Noxious weeds / > 20% Dominated by Nutrient Rich Species	24.2
Ground flora / hedge base	Presence of alien invasive species	0
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion	22.6
Proportion of canopy dominated by ivy	>25%	3.2

5.0 ANALYSIS AND DISCUSSION

In this section the results of the survey are analysed in more detail and discussed in absolute and in relative terms.
In 'absolute' terms the hedgerow resource can be assessed in light of current thinking on best conservation practice and data can be compared against a set of agreed criteria for favourable attributes. The 'relative' assessment compares the resource with that from comparative studies in Counties Cavan, Donegal, East Galway, Kerry, Kildare, Laois, Leitrim, Longford, Offaly, Mayo, Roscommon, Sligo and Westmeath. Ideally all counties should commission County Hedgerow Surveys to allow for wider comparison and an assessment of the resource at a National level.
In the future, a relative assessment could involve a follow up survey to compare the future resource with its current condition.

Hedgerow Extent
Based on the results of this survey County Monaghan has a significant network of hedgerows with an estimated total length of 12,845km.
The Badger and Habitats Survey of Ireland (Smal, 1995) estimated the hedgerow/tree row network in Ireland to be approximately 382,000 km. The estimated figure for County Monaghan was 14,050km (3.7% of the national total).

A comparison was carried out between the extent results from the Badger and Habitats Survey of Ireland and this study. The results indicated that overall there has been an approximate decrease of 8.6% in hedgerow extent, but individual squares showed a wide range from 263% increase (highly improbable) to a 79% decrease. In order to try and determine the reasons for the discrepancies examination was made of the relevant field recording sheets from the Badger and Habitats Survey. A number of explanations exist for the discrepancies, these include;

- The map areas were not totally aligned in all cases, with differences of up to approximately 40m.
- One sample square (MN12) was not recorded in the Badger and Habitats Survey.
- Roadside hedges did not appear to be recorded consistently.
- Features classified as Hedgerows in one survey have been recorded as other habitat types in the other. This may reflect changes in habitat or a difference in definition of what constitutes a *hedgerow* between the surveys.
- Short stretches of new hedgerow have been established around some new properties that border agricultural land.
- Some hedgerow *loss* can be attributed to change of habitat; either as a result of reversion to scrub, or through hedgerows being absorbed into areas of afforestation.

More detailed analysis was not possible within the scope of this study but such analysis would provide useful data on the nature of hedgerow loss.

Hedgerow Density
The average figure for hedgerow density (km of hedgerow / km²) in County Monaghan is 9.93.
The highest recorded hedgerow density was in sample square MN05 (Greaghglass, Ardaghey) with a density of almost 15.98 km / km². The highest hedgerow density figure recorded in any of the specific Irish county based hedgerow surveys to date is 22.51 km/km² in a square near to Drumsna, County Leitrim.

The results from the other county hedgerow surveys are shown for comparison, along with the standard deviations in Table 5.1.

Table 5.1 Comparison of average hedgerow density

Year of Survey	County	Average Density (km/km²)	Standard Deviation
2006	Cavan	11.01	4.76
2010	**Monaghan**	**9.93**	**4.52**
2006	Longford	8.23	6.14
2006	Leitrim	7.31	6.98
2005	Laois	7.28	3.15
2006	Kildare	5.92	3.61
2006	East Galway	5.88	n/a
2004	Westmeath	5.82	3.28
2005	Offaly	5.81	4.32
2004	Roscommon	5.43	4.75
2008	Sligo	5.33	4.76
2008	West Kerry / An Daingean Peninsula	4.97	4.26
2009	North Kerry	3.70	3.48
2007	Mayo	2.26	2.99
2008	Donegal	1.96	n/a

At 9.93 km/km² County Monaghan is the second most densely hedged county surveyed so far. Standard deviation of hedgerow density statistics gives an insight into the overall nature of the hedgerow landscape within a county. A high standard deviation figure is recorded, such as in County Longford, where there is a wide variation in hedgerow density across the county, from areas of bog and forestry, with little or no hedges to the areas with a much heavier concentration of hedges. In contrast, County Laois has a high hedgerow density, but relatively low standard deviation, which indicates a more consistent hedgerow landscape. The standard deviation figure for County Monaghan indicates some degree of variation in the hedgerow density across the county.

Hedgerow Distribution

In terms of CORINE Land Cover classifications, 98% of sampled hedgerows fall within either the *Pastures* or *Land principally occupied by agriculture* classes. This gives the potential for stratified sampling techniques for hedgerow surveys in the future.

Hedgerow Loss

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

‘Hedgerows’ being absorbed into areas of afforestation near Scotstown MN06)

It is anticipated, on the basis of observations made during the current study that over the next decade there will be a net loss of hedgerow as a result of ‘loss’ through habitat change.

The further development of agri-environmental schemes, like REPS and AEOS, should create a quantity of new hedgerow stock which should, to some extent, counteract losses in other areas.

Direct loss through removal for development purposes is less likely to be a reason for hedgerow loss in the future. Where it does occur this involves the removal of short lengths to facilitate access and sight lines for new one-off houses, or for road improvements. Loss rates are relatively small but accumulative habitat fragmentation may become an issue. A report by the Department of Environment: "Urban and Rural Roles" (2001), estimates that 420 km of hedgerow was removed in Ireland to facilitate sight-line requirements to new rural dwellings in 1999 alone. This rate of removal is inconsistent with the recommendation of the National Heritage Plan (2002), which states that “*For the future, the overall goal should be to have no net loss of the hedgerow resource*” (paragraph 2.27).

Significant hedgerow removal was required to facilitate this interchange outside Castleblaney

Early indications from research that has been conducted in County Roscommon (Foulkes, 2008c) indicate that it is possible to successfully physically move mature hedgerows. If this can be carried out in a cost-effective way without diminishing substantially the qualities of the hedgerow then this could become a recommendation within planning consents where existing hedgerows are interfering with new sight-line requirements.

With effect from 2009, under Cross Compliance measures in the Single Farm Payment Scheme Hedgerows are classed as Landscape Features and their removal is no longer permitted unless mitigation planting is carried out on another area of the farm in advance of the removal of the existing hedgerow. Loss of hedgerows through deterioration in quality and ageing is likely to be the main cause of hedgerow loss on farms if rates of rejuvenation are not increased. Abandonment of the management of farm land will result in the development of scrubland, particularly where spreading and suckering species are common, and this was observed during the current study.

New, one-off, housing developments are a potential cause of hedgerow loss and degradation. Care is needed at the Local Authority planning level. Evidence from the County Sligo Hedgerow Survey (Foulkes, 2008a) and a specific study in Co. Cork (McDonnell, 2005) indicate that hedgerow conservation measures included in planning consents are not being adhered to on the ground and that greater enforcement of planning conditions is necessary.

It will be an important component of any future survey that the nature of any future hedgerow loss be classified. Loss through change of habitat type may be considered a positive feature from a

biodiversity perspective. This would depend on the new habitat type created; semi-natural woodland or scrub generally being preferable to non-native woodland.

The extent data recorded during this survey sets a benchmark for future surveys. A repeat of this survey in the future will enable quantification of the degree of gain/loss of hedgerows.

The hedgerow network is largely a feature of land ownership patterns and agricultural practices of the nineteenth century. Changes in farming methods and practices have an influence on the relevance of the network to modern farming. Rationalisation of field sizes particularly in light of modern agricultural methods and machinery size has taken place on many farms particularly during the 1960's and '70's. Extensification can also result in hedgerows becoming redundant for stock control purposes as stock are allowed to range over a wider area rather than grazed in rotation on smaller blocks of land. Results from the hedgerow surveys undertaken in Ireland indicate that these changes have happened to different degrees in different areas. In the south midland counties of Laois and Offaly just 8% of hedges were considered to be redundant, this figure rises to an average of almost 20% in the more western Counties of Leitrim, Longford, Sligo, Roscommon and West Kerry (19%). County Monaghan has just 9% of hedgerow boundaries classed as redundant.

Species composition
A total of 35 shrub species, including 27 native species, were found in the hedge layer of this sample of hedges in County Monaghan.

Compared with other County Hedgerow Surveys a number of species occur more frequently than average in County Monaghan; these include Blackthorn, Ash and Holly. Of the less common species Rowan, Wild Cherry and Yew are more common in County Monaghan hedges. The non-native species Sycamore and Beech are also more common than is the average. Conversely, Elder, Wild Privet and Crab Apple were found less frequently. As a general observation the frequency of occurrence of Gooseberry was a notable feature of hedgerows in County Monaghan.

Gooseberries in Castleblaney hedge (MN09)

54% of hedges could be described as Hawthorn (Whitethorn) dominated. Hawthorn is the best understood and most versatile of hedging plants adaptable to all types of management.

Approximately 4% of hedges are dominated by Blackthorn, 3% by Gorse, 2% by Wild Privet and 1% by each of the following Ash, Elder, Willow and Wild Plum. The remaining 36% of hedges had no dominant species.

The average number of species found in the representative sample of the selected hedges was 3.62 (3.32 for native species only). Species diversity figures for County Monaghan are broadly similar to those recorded in other eastern and midland counties, which are slightly higher than those found in western counties.
The average species diversity for all hedges recorded in fourteen County hedgerow surveys is shown in Table 5.2.

Table 5.2 Comparison of species diversity statistics from County Hedgerow Surveys

County	Mean Species Diversity (All)	Mean Species Diversity (Native)
Cavan (includes rose species)	4.60	n/a
Laois	4.00	3.56
Leitrim	3.93	3.65
Offaly	3.81	3.25
Monaghan	**3.62**	**3.32**
Kildare	3.48	2.88
Donegal	3.3	n/a
Longford	3.26	2.80
East Galway	2.8	2.6
West Kerry / An Daingean Peninsula	2.8	2.4
Westmeath	2.80	n/a
Sligo	2.71	2.37
Mayo	2.70	2.49
North Kerry	2.62	2.33
Roscommon	2.50	n/a

The results would suggest that species selection advice for new planting (agri-environmental schemes, mitigation planting, etc.) should be specific rather than general and should reflect local conditions.

37% of sampled hedges in County Monaghan were classed as being species rich (an average of four or more native tree / shrub species per 30m strip). Of the counties where comparable figures are available, only Counties Laois and Leitrim have recorded a greater proportion of species rich hedges. 73% of hedgerows sampled were comprised solely of native species.

Table 5.3 shows a comparison of the proportion of the species rich hedges in all of the Hedgerow Surveys where comparable data is available.

Table 5.3 Proportion of species rich hedges in County Hedgerow Surveys

County	Proportion of species rich hedges recorded (%)
Leitrim	46.9
Laois	44.7
Monaghan	**37.0**
Offaly	31.5
West Kerry / An Daingean Peninsula	21.2
Kildare	18.8
Longford	15.4
East Galway	14.7
Mayo	12.9
Sligo	12.8
Roscommon	5.4
Westmeath	5.1
North Kerry	4.7
Donegal	n/a

In this study, Townland boundary hedges made up 12% of the sample; the range from other county hedgerow surveys is from 3% (County Donegal) to 15% (County Offaly).

Roadside hedges are at the forefront of the public's perception of hedgerows. In County Monaghan, hedges adjacent to public roads accounted for 12% of the sample. In previous hedgerow surveys, specific studies in County Mayo (Condon and Jarvis, 1989), County Kildare (Murray, 2001), and in Northern Ireland (Hegarty and Cooper, 1994) these two classes of hedge have been found to contain higher mean species diversity than non townland boundary or non roadside hedges. Roadside hedges showed greater species diversity than average – 4.0 species per 30m strip compared with 3.62. Only 16% of sampled hedgerows adjacent to public roads were classed as being in *Favourable Condition*.

On the evidence from all of the surveys so far conducted the higher species diversity found for townland boundary and roadside hedges makes them candidates for particular care and attention in their management, and measures should be taken to avoid their degradation and removal wherever possible. There is currently little or no distinction, in terms of planning and development, or agri-environmental schemes between the different types of hedgerow recorded as part of this survey and their relative agricultural, ecological and aesthetic importance. The concept of '*Heritage Hedgerow*' should be considered to raise the status of certain hedgerows that have notable historical, structural, ecological or landscape qualities. A hedgerow sub-group of the Woodlands of Ireland project has developed draft criteria for what constitutes a Heritage Hedgerow (Foulkes et al. (2010). Hedgerows meeting these criteria could be noted on agri-environmental scheme plans; be identified in planning applications, land is re-zoning, etc. This should enable them to be monitored and might eventually enable their appropriate conservation to qualify for incentives for the landowner.

Hedges with a large associated drain are, in general, more diverse than those without a drain. Hedges in the largest drain size category had a mean species diversity of 4.07 species per hedge compared with 3.06 species per hedge for those with no drains. This is consistent with the results from other County Hedgerow Surveys. Research conducted in Northern Ireland has revealed similar findings (Moles (1975) and Watson and Orr (1983)).

Rare Species

Yew was recorded in almost 3% of sampled hedges. There have been no records of yew in half of the County Hedgerow Surveys to date making it one of the rarer native hedgerow species.

Hedgerow Trees

82% of sampled hedgerow in County Monaghan contained hedgerow trees. There is a good distribution of hedges containing different proportions of trees which is generally good for biodiversity. There are two issues of slight concern; firstly the fact that 60% of hedges contained only mature or predominantly mature trees means that the long term viability of the hedgerow tree population is vulnerable unless the recruitment rate of new young trees is increased. This issue is a major conservation concern in the UK where hedgerow tree populations are now in serious decline because this issue was not addressed in time. The second concern would be that two of the top four most frequently occurring hedgerow trees are non-native species (Sycamore and Beech). Sycamore (present in tree form in 21% of hedgerows) can be invasive and both Sycamore and Beech cast a heavy shade which can be detrimental to the growth of other species. Sycamore is regularly planted as part of afforestation programmes and the potential impact of it spreading in to hedgerows should be considered as part of Forest Biodiversity Guidelines.

Only Counties Leitrim, Longford and Westmeath have recorded a greater proportion of hedgerows containing hedgerow trees.

Species Distribution

The main shrub species recorded appeared to show a general distribution throughout the county although a number of species were more localised. Alder, Rowan and Birch were more frequently occurring in the north of the county. Also, Willow species were scarce in the four most southerly sample squares. Hazel was not recorded in the three most south-easterly sample squares, although it was recorded in hedges linking to native woodland in that general area of the county. The distribution of elm species also appears to be localised.

Ivy, Woody Climbers

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

One view suggests that ivy can dominate its host and cause it to lose vigour and even eventually kill it. The other view suggests that ivy only dominates trees and shrubs that are already in poor condition and that ivy itself is not destructive. The truth probably lies somewhere between the two. Over 10% of 30m strips recorded in County Monaghan had ivy dominant at the canopy level for over 25% of their length with a further 18.5% in the 10-25% cover category. This should be of some concern and does not augur well for the long term viability of those hedges. High proportions of ivy in hedgerows are usually symptomatic of over or under management.

Bramble (*Rubus fruiticosus* agg.*)* was recorded as being present in a total of 91% of sample strips in County Monaghan hedges surveyed which is broadly consistent with results from other County Hedgerow Surveys. A high level of abundance of brambles in hedgerows can have an impact on ground flora diversity and this is of concern in a number of counties, but less so in County Monaghan.

Wild Rose species were found in 63% of sample strips; only counties Kildare, Laois and Offaly have recorded greater frequencies of occurrence, with the average across all County Hedgerow Surveys being 41%. The frequency of occurrence of Honeysuckle in County Monaghan was also above the average; 43%, compared with an average of 27%.

Ground Flora

25 of the 31 herbaceous ground flora species listed in the Woodlands of Ireland Hedgerow Appraisal System (HAS) were recorded during the survey. There was an average of 2.88 species per 30m strip and 4.6% of sampled hedgerows were classed as highly significant under the HAS based on their ground flora component. There is no comparable data with which to contrast the results from this study, although County Monaghan is generally considered by botanists to relatively poor in terms of species diversity. The abundance of both brambles and nutriphiles species such as nettles and docks can both have a negative impact on the development of more benign hedgerow ground flora composition. Maintenance and restoration of the ground flora of hedgerows is a relatively new area of conservation and techniques are currently being pioneered in the UK for different types of hedgerow (Critchley et al. (2010)). This research should be monitored and the results should be incorporated in to agri-environmental schemes in the future.

History and Landscape Context

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

Monaghan, the first edition of maps was produced in 1834-35, followed by the second edition in 1909-10.
Where a boundary is present on the second edition Ordnance Survey maps, but is absent from the first edition it is possible, roughly, to date the origin of the hedge to the period 1834-35 to 1909. Boundary lines shown on the original edition maps were not necessarily hedgerows. 46% of the sample hedges were not present on the first edition maps from 1834-35. The second edition O.S. maps (1909-10) show just 1% of the sample hedges were not present. This means that we can estimate that approximately 5,900 km of hedgerow was established in the 75 year period between 1835 and 1910, compared with just 128 km in the 100 years between 1910 and 2010. This has severe implications for the hedgerow resource unless rejuvenation levels are increased significantly from those detected during the survey.

Hedgerows exist in the wider framework of the landscape. How hedges interface with the wider environment can have a significant bearing on their relative value in the landscape and their ability to support biodiversity. Where hedgerows sub divide arable land or improved grassland (over 69% of sampled hedges adjoin improved grassland) their absolute value for supporting a diverse ecology is reduced, but their relative importance for biodiversity in that area is increased. The importance of habitat linkage is particularly important in this situation. 97% of the sampled hedges in County Monaghan had at least one link with another natural or semi-natural habitat type.

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

Almost two thirds of sampled hedges in County Monaghan were recorded as being composed of either a single or double line of shrubs. This is indicative of a planted origin for the majority of hedgerows in the county.

Hedge banks, walls, and drains create niche environments for many wildlife species adding much to the habitat value of a hedge. They also improve the stock retaining capacity of hedges, particularly against sheep, and have a shelter value in their own right. In County Monaghan over 92% of hedges were associated with a bank, wall or shelf. This is predominantly an earth bank, but 10% of hedges were associated with a wall or stone-faced bank. Given the undulating drumlin topography of County Monaghan it is unsurprising that it has recorded the highest proportion (24%) of hedges with a shelf in any of the County Hedgerow Surveys so far conducted.
51% of hedgerows in County Monaghan were associated with a drain or watercourse. Hedgerows and their associated banks and drains act as buffers to nutrient loss from agricultural land, but there has been little or no research carried out in Ireland to evaluate to what extent. To reduce nutrient run-off, in Northern Ireland there are now moves to restrict the application of fertiliser on land with a gradient of greater than 20% (Irish News, 31-7-2010). A similar situation in County Monaghan would impact on a large number of farms. Given that the EU Nitrates Directive (1991) has been adopted on a national basis in Ireland research is needed to quantify the buffer role of different types of hedgerows in various agricultural situations.

Hedge Structure and Condition
Many studies have found that taller, wider, denser, and structurally more intact hedgerows are also preferred by most wildlife, including small woodland plants ((Hegarty and Cooper, 1994, Corbit and Marks, 1999, and Murray 2001); invertebrates (Burel, 1989), and hedgerow birds (Chamberlain et al, 2001, Arnold, 1983, and Lysaght, 1990).

In relative terms, the hedges recorded during the County Monaghan survey compare favourably with those from other counties in respect of their average height and width characteristics. One exception to this is in terms of the proportion of hedges that are kept very low. Maintaining hedges below 1.5m in height is not considered a desirable feature from a biodiversity perspective and has been shown to be least beneficial to nesting birds. Research indicates that increasing hedgerow height correlates positively with increasing diversity of bird species in a hedge (Arnold, 1983; Lack, 1987). During the County Monaghan survey almost 16% of sampled hedgerows were below 1.5m in height. This situation could be rectified easily by a small modification to existing management practices by allowing the hedge to grow in small incremental steps at each routine trimming.

Research has shown that increasing levels of gaps in the hedge structure correlates with lower species diversity (Murray, 2001). In terms of their linear integrity and lack of gappiness the hedges in County Monaghan are some of the best so far recorded with almost three quarters of sampled hedges having less than 10% gaps. Despite the positive assessment in relative terms there is still plenty of opportunity to improve the hedgerows in County Monaghan through the infill planting of gaps in the existing resource. This should be seen as preferable to the planting of new hedgerows in most situations and should be prioritised in agri-environmental schemes.

The density of shrub growth in the bottom metre of the hedge is an important indicator of the hedge structure. Continuous hedges with a good woody basal structure are more agriculturally valuable as they may not need additional fencing, and good growth from the bottom of the hedge also improves the shelter value. Several studies have shown that density of growth in the hedge base also influences the hedges capacity for supporting wildlife (Arnold, 1983; Osborne, 1984). In relative terms County Monaghan hedges compare favourably in this category with those in other counties, although 20% of sampled hedges recorded failed to meet the *Favourable Condition* criteria in respect of the woody growth in the hedge base. Weak woody growth in the base structure of hedgerows has been a consistent feature in County Hedgerow Surveys.

The majority of sampled hedgerows in County Monaghan have the irregular cross sectional profile indicative of lack of intensive recent management. This can be beneficial for wildlife. But there are negative implications if hedges are left unmanaged for longer periods. Significantly, 34% of the sampled hedges were considered to be losing their base structure (where many of the shrubs and thorns of the hedge no longer display low dense growth, and most of the stems are visible). This condition applies to both managed and unmanaged hedges and is usually a result of inappropriate management and would be considered an undesirable feature. Without appropriate management intervention these hedges will become *derelict* over time.

In common with the results from the other county hedgerow surveys, damage to banks, walls and shelves is a frequent occurrence in County Monaghan. 53% of hedgerows having one of these features exhibited some damage to the basic foundation of the hedge; this was noted as *severe* in 17% of cases, which is slightly below the average figure from all surveys. Livestock are generally the main agents of the damage. Positive features of sound structure of the woody component of a hedge can be compromised in the longer term where the hedge bank is badly damaged. Renovation of the damage accompanied by protective fencing may be required to rectify the problem. This

basic component of hedgerow construction needs to figure more in management plans for hedgerows, particularly in agri-environmental schemes.

8% of the hedges recorded were classed as being of *poor vigour*, with a further 13% noted as having poor vigour in part. There were a number of causes of the partial lack of vigour including basal decay and die-back, possibly caused by the effect of water-logging. Basal decay is usually indicative of senescence (ageing) in plants which may be nearing the end of their natural lifespan.

Hedgerow Management

In most areas hedgerows are predominantly man-made features and most require a degree of management intervention to fulfil agricultural and biodiversity functions and remain sustainable.

There has been considerable variety in the degree to which hedges are managed across the country. Based on the county surveys conducted to date they range from County Laois where 23% of hedges have not received any management intervention in the recent past (last five years) up to County Roscommon where the figure is 61%. Management levels in County Monaghan are relatively high with just 41% of the hedges sampled classed as *long term unmanaged*. Commercial hedge management in Ireland is almost exclusively carried out using either tractor-mounted flail cutters or circular saws. Alternative modern hedge cutting equipment is now available which is likely to be much more suitable to hedge cutting regimes. Research needs to be conducted to determine the effectiveness of different types of hedge cutting machinery on hedgerow quality.

Just 3% of hedges recorded showed evidence of having been laid in the past. This is much lower than the 24% and 26% recorded in counties Offaly and Westmeath respectively where the technique is widespread. There was some indication that a number of hedges had been coppiced in the past. Only 1% of hedges showed evidence of recent rejuvenation and this figure will need to be increased significantly if the long term viability of many hedgerows is to be maintained.

The presence of old wire fixed to hedgerow stems is a significant feature of the sampled hedgerows in County Monaghan. This has implications for the safety and cost of hedgerow management, particularly rejuvenation work.

1% of sampled hedgerows were noted as having been managed during the prohibited period of the Wildlife Amendment Act (2000). Since fieldwork was completed by the 23rd July it is highly probable that this figure under-represents the amount of ‘out of season’ cutting.

Agri-Environmental Schemes

Since 1994 the Department of Agriculture & Food (DAFF), through the Rural Environment Protection Scheme (REPS) has set the tone for hedgerow management in Ireland. The scheme has guidelines for appropriate hedgerow management as part of the Departments contract with participating farmers. Each farm had a five year plan drawn up by a Department approved Planner.

Measure 5 of the scheme concerns the Maintenance of Farm and Field Boundaries. The objective of this measure is to conserve, maintain and enhance permanent boundary fences, roadside fences, stonewalls and hedgerows in the interest of stock control, bio-security, wildlife and scenic appearance of the area.

A minimum of 140 metres of hedgerow length per hectare must be scheduled for maintenance over the period of the REPS contract.

Participants in REPS 4 were also able to choose from a number of biodiversity options to qualify for additional payments. In respect of hedgerows, this could involve planting a minimum of three metres of new hedgerow per hectare annually, or rejuvenating a minimum of three metres of hedgerow per hectare annually through coppicing or two metres per hectare by laying on a maximum of 20 hectares of their holding.

The REP scheme closed to new entrants from 10th July 2009 but existing REPS farmers will see out the five years of their contract. The Agri-Environmental Options Scheme (AEOS) launched in April 2010 is the new agri-environmental scheme to replace the REPS.

The AEO Scheme provides direct payments for farmers who undertake measures to address the key challenges of Contributing to Halting Biodiversity Decline; Contributing to Maintaining Water Quality and Contributing to Combating Climate Change. These include New Hedgerow Establishment, Coppicing Hedgerows and Laying Hedgerows.

26% of sampled hedgerows during the County Monaghan Hedgerow Survey were classed as *Highly Significant* under the Woodlands of Ireland Hedgerow Appraisal System (HAS). These hedgerows can be considered to be *Heritage Hedgerows* and should be considered for prioritisation in terms of conservation action under the Scheme.

Not all potential *Heritage Hedgerows* within the study area fall are protected and supported within the scope of existing legislation, land designation or incentive schemes. Given their role as ecological corridors it is important that the appropriate management of all of these hedgerows be incentivised in order to prevent a fragmented countryside. This should be done through the combined efforts of DAFF, Local Authorities, NPWS, the Heritage Council and other semi-state agencies.

With only 27% of hedges meeting *Favourable Condition* criteria it would be prudent if agri-environmental schemes concentrated management efforts at improving the condition of the existing resource before adding to it.

Assessment of works carried out under AEOS is quantitative and not qualitative. In order to tackle issues of hedgerow quality this situation needs to be addressed.

In the context of agri-environmental schemes it would be very useful if a full habitat survey of each farm were conducted (consistent with Fossitt, (2000)). This should enable greater prioritisation of management actions in order to maintain and enhance biodiversity at the farm level.

New Hedges

An issue in relation to the increase in hedge planting generated by agri-environmental schemes is the use of planting stock from Irish seed sources, referred to as Irish provenance. Current research carried out by Jones et al (2001) indicates greater establishment success where Hawthorn (Whitethorn) provenance is closely matched to the planting site and that locally provenanced plants can be superior to commercially available material. The same report concludes that in Britain the current state of the commercial nursery sector is not sufficiently well regulated to ensure the necessary controls over provenance of material for hedgerow plantings. There is no information to suggest that the situation in Ireland is better and anecdotal evidence would indicate that the vast majority of the planting stock for Irish hedgerows is sourced from other parts of Europe. Local provenance is likely to be particularly important in coastal, upland and exposed areas. The ability to source planting material of a known genetic provenance is important and more information is needed on the status and production capacity of the hedgerow nursery sector in Ireland.

There is no mandatory requirement in the AEOS for the use of native provenance planting material in new hedgerow establishment. This failure to insist on Irish provenance for new tree and hedge planting is a negative aspect of the new Scheme and would appear, given the Departments acknowledgement in the REPS4 specifications (*"In order to conserve Ireland's genetic biodiversity the species selected should originate from suitable indigenous sources of native seed")*, to contradict one of the objectives of the scheme, which is to Contribute to Halting Biodiversity Decline. This issue should be addressed at the earliest possible opportunity.

Hedgerow Quality

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

27% of all hedges sampled in County Monaghan met all of the *Favourable Condition* criteria of the Woodlands of Ireland HAS. This is the first time that the HAS been used to assess hedgerow quality in a County Hedgerow Survey. Previous hedgerow surveys have assessed hedgerows against five of the nine *Favourable Condition* criteria of the UK Biodiversity Action Plan (BAP). Although not directly comparable with the results from the HAS the figures do give an indication of relative quality of the hedgerow resource around the country.
All of the available figures from the other County surveys are shown in Table 5.4.

Table 5.4 Comparison of the 'Favourable Condition' status of hedges County by County

County	% of hedges in Favourable Condition
Leitrim	25.0
Kildare	23.0
Mayo	22.3
Sligo	21.9
Laois	20.0
North Kerry	18.8
West Kerry / An Daingean Peninsula	16.7
Longford	6.4
Offaly	4.8
Cavan	n/a
Donegal	n/a
East Galway	n/a
Roscommon	n/a
Westmeath	n/a

In common with all other County Hedgerow Surveys the level of gappiness and the basal structure are the two categories responsible for the majority of the hedges failing to meet the criteria. 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* test in County Monaghan.

Relative to other counties that have conducted Hedgerow Surveys the overall condition of hedgerows in County Monaghan is very good.

Potential High Ecological Value Hedgerows

73% of townland boundary hedges and hedges linking in to area of native woodland were classed as *Highly Significant* compared with 26% in the sampled survey. This was primarily due to the fact that townland boundary hedges, by definition, are *Historically Significant.* The sample of townland boundary hedges and hedges linking in to area of native woodland showed greater species diversity than the baseline data. In particular, townland boundary hedges linking in to native woodlands had significantly greater species diversity in both the shrub/tree and ground flora layers. Townland boundary and native woodland linked hedgerows not only had greater species diversity but their structure and construction was also more likely to result in them being classified as *Highly Significant.* Hedgerows with *Highly Significant* species composition were found on a range of different soil types.

The distribution of *Heritage Hedgerows* was widespread and it is unlikely that any simple criteria can be used to identify the location of all such hedgerows without the need for on the ground recording. Older boundaries linking in to long-standing semi-natural features (particularly woodland) are more likely to qualify but this is not exclusively the case. Local groups and individuals should be encouraged to carry out local hedgerow surveys to identify *Heritage Hedgerows* in their areas.

Only 17.8% of townland boundary and native woodland linked hedgerows were classed as being in *Favourable Condition* compared with 26.9% in the of sampled hedges in the Baseline survey. In general the height and width characteristics of townland boundary and native woodland linked hedgerows were less likely to be a cause of failing to meet criteria, but the level and nature of gappiness were significantly more of a problem. In fact a number of the native woodland linked hedgerow boundaries had significant (>5m) gaps between the end of the hedge and the start of the woodland.

Gap between hedgerow and native woodland at Comertagh (MN1037)

The Woodlands of Ireland Hedgerow Appraisal System is a significant step towards the differentiation between hedgerows of different significance and quality and farmers, landowners and agri-environmental consultants should be encouraged to recognise key factors which may indicate hedgerows with high historical or ecological value.

The importance of education on the values and appropriate care of hedgerows can not be underestimated and hedgerows have a potential educational value in their own right.

6.0 RECOMMENDATIONS

The recommendations included in this section are based on the results of this survey considered in the light of current best conservation practice.

6.1 CONTEXT

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

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

In recent years the conservation of our natural and cultural heritage has gained importance, as reflected in current environmental and conservation policy. The major vehicle for guiding hedgerow conservation in Ireland since the early 1990's has been the Rural Environment Protection Scheme (REPS). However this Scheme has now been closed to new entrants and a new scheme the Agri-Environmental Options Scheme (AEOS) was launched in April 2010.

The movement to the Single Farm Payment (SFP) is expected to reduce livestock numbers in Ireland considerably. It is yet to be seen fully how this will affect land utilisation. Will farmers maintain stocking density and put surplus land into forestry or other alternative enterprises, or will the same land be farmed more extensively? Either option has consequences for hedgerows.

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

The key to successful hedgerow conservation policy is that it is formulated in an appropriate and relevant context. This applies from management requirements for a single hedge up to policy decisions at a National (or even European) Level. In the context of this survey it is important that regional factors are not over-looked in the context of National initiatives.

The value of a hedgerow or a network of hedgerows in any given environment is relative to its wider environmental context. A species rich hedgerow, in good structural condition, in an area well populated with similar hedges, in an area dominated by semi-natural vegetation, may be of lower relative importance in its setting than a less diverse hedge, in poorer condition, in an intensively farmed area with few hedges or other semi-natural features. The former may be a sub-optimum habitat for many species in its area; the latter might be the *only* habitat. The exposed nature of much of the study area gives added value to the micro-climatic effect of hedgerows.

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

- Some of the desirable qualities of hedgerows are subject to value judgements.
- Hedgerows are a multi-functional resource. In the absence of a full cost/benefit analysis it in not possible to determine what constitutes a cost effective measure.
- Fencing-off and leaving alone is not an option for most hedgerows. Hedgerows are man-made features of the landscape and the majority need a degree of appropriate active

management to ensure their long term viability. Leaving them alone can be appropriate in the short term but is generally not a sustainable long-term option.

- Most hedgerows are private property. Ownership of hedgerows lies in the hands of thousands of farmers and land owners.
- The variable type, condition and regional differences make uncomplicated management guidelines difficult to frame.
- A significant percentage of the current network has fallen in to disrepair over a period of decades. Reparation of degraded hedgerows involves substantially higher costs than the routine maintenance of hedges in good condition.
- Lack of knowledge/skill base.
    - Intensification of agriculture has tended to diminish the agricultural value of hedgerows. Prior to the introduction of the REPS in 1994 there were no external incentives for farmers to retain hedgerows whereas grants have been available for land reclamation and drainage which have involved hedgerow removal. Declining agricultural functional value led to a fall off in the practical knowledge and skills needed to manage hedges appropriately.
- Relevance of the resource to the modern landscape.
    - The value of the hedgerow resource to the modern environment in terms of the eco services provided is becoming increasingly well documented. However, the current division of lands is still largely the same as it was over 100 years ago. The relevance of this to modern farming practices and methods is open to question.
    - In 2002, the number of agricultural holdings in Ireland totalled 136,500, compared with 419,500 in 1855, less than a third the number (CSO, 2002).
      Agricultural methods have changed significantly, especially in relation to mechanisation. In addition, the decline in the number of people engaged in agriculture is of consequence.

Hedgerow conservation is within the remit of numerous stakeholders who have differing degrees of influence over the resource. These are listed in Table 6.1.
In order to assign responsibility for dealing with each of the recommendations a Lead Partner has, where appropriate, been identified.

Table 6.1 List of Hedgerow Stakeholder Groups

Stakeholder Group	Abbreviation
Agri/Environmental Consultants	A/E C
Community Groups	
Department of Agriculture, Fisheries and Food	DAFF
Department of Education	DoEd
Department of the Environment, Heritage and Local Government	DoEHLG
Developers	
Environmental N.G.O.'s	
Environmental Protection Agency	EPA
Farmers/Landowners	F/L
Farming Organisations	IFA
Forest Service/Foresters	FS
Hedge Laying Association of Ireland	HLAI
Irish Seed Savers Association	ISSA
Monaghan County Council	MCC
LEADER	LDR
Management Professionals	
National Biodiversity Data Centre	NBDC
National Parks & Wildlife Service	NPWS
National Roads Authority	NRA
Nurseries, Garden Centres	
Research Institutions	
Semi-State Bodies	
Teagasc	Tgsc
The Heritage Council	HC
Woodlands of Ireland	WoI

6.2 RECOMMENDATIONS

No.	Recommendation	Lead Partner
1.0	**Monaghan County Council should produce and adopt a 'Habitat Action Plan for Hedgerows".**	MCC
1.1	**Stakeholders should ensure all relevant staff (and any contractors used) have the necessary skills and data sources to implement or evaluate best practice hedgerow conservation.**	All
1.2	**Stakeholders should provide appropriate training for staff in aspects of hedgerow conservation relevant to their position.**	All
1.3	**All of the relevant Stakeholders listed in Table 6.1 should commit to eliminating the cutting of hedges during the period indicated in the Wildlife Amendment Act (2001) (1st March to 31st August) except where absolutely necessary for safety reasons. They should also commit to implement forward planning in order to minimise the necessity for cutting for safety reasons.**	All
1.4	**A log should be kept by the local authority (or other body) detailing all hedge cutting carried out during the bird nesting season as stated in the Wildlife Amendment Act (1st March – 31st August). Details to include are the date of cutting; machine operator; location; landowner; details of any Section 70 Notification; length of hedge cut; and precise justification for management. This will provide a useful record for the council (or other body) in the case of any complaints or actions taken. Recording photographic evidence prior and subsequent to the action would also be recommended.**	
1.5	**Special emphasis should be placed on the best practice maintenance of roadside hedgerows and verges.**	MCC / NRA
1.6	**Farmers and landowners in County Monaghan should be encouraged not to trim hedgerows below 1.5m in height.**	IFA, Tgsc, HLAI
1.7	**Farmers and landowners in County Monaghan should be encouraged to allow saplings to develop in hedgerows.**	IFA, Tgsc, HLAI
1.8	**Farmers and landowners in County Monaghan should be encouraged to remove old wire from hedgerows.**	IFA, Tgsc, HLAI
1.9	**The rejuvenation of hedgerows needs to be strongly promoted to ensure sustainability of the resource.**	DAFF, Tgsc, HLAI
1.10	**The Woodlands of Ireland Hedgerow Appraisal System should be adopted as the standard means of assessing hedgerow significance and the '*favourable conservation status*' of hedgerows.**	All
1.11	**Individual and community groups should be encouraged to conduct local**	MCC

	hedgerow surveys. From this a register of *Heritage Hedgerows* could be established.	
1.12	**Incentives for the maintaining of, or renovation to, *Favourable Condition* of all significant *Heritage Hedgerow's* should be available to all landowners who are responsible for such hedges.**	**DAFF, MCC, NPWS**
1.13	**Agri-environmental schemes need to focus on improving the quality of existing hedgerows.**	**DAFF**
1.14	**Unless there are specific conservation objectives agri-environmental schemes should prioritize the filling of gaps in existing hedgerows over the planting of new hedgerows.**	**DAFF**
1.15	**Species selection advice for new hedge and infill planting should be area specific rather than general and should reflect local conditions.**	**Tgsc**
1.16	**The use of local provenance native plant material should be a mandatory requirement for any hedgerow planting (including hedgerow trees) covered by planning legislation or funding subsidy within the study area.**	**DAFF / MCC**
1.17	**The restoration and protection of degraded hedge banks and walls should be fully costed and included in the options for hedgerow management under future agri-environmental schemes.**	**DAFF**
1.18	**A study should be conducted of nursery suppliers and garden centres to determine the availability of native planting stock (including provenance) for the range of hedgerow tree and shrub species recorded in County Monaghan Hedgerow Survey. This information should be disseminated to interested parties.**	**MCC**
1.19	**A programme should be developed for the identification, registration, and certification of local provenance seed sites for woody hedgerow shrubs in County Monaghan.**	**FS**
1.20	**The impact of different types of hedge cutting techniques and machinery should be investigated to determine impact on hedgerow quality.**	**NPWS**
1.21	**Research is needed to quantify the nutrient buffer effect of hedgerows in different agricultural situations.**	**EPA / DAFF**
1.22	**Forest Biodiversity Guidelines should include consideration of the potential impact of the new forestry on the wider ecology in the locality.**	**FS**
1.23	**A number of showcase sites of best practice covering different aspects of conservation and management relevant to County Monaghan should be developed.**	**Tgsc, HLAI**
1.24	**Identify suitable hedgerows convenient to schools and colleges for use in environmental education.**	**MCC**
1.25	**General Awareness of the values of hedgerows should be encouraged**	

	among rural communities through circulation of educational materials, an increase in targeted education for schools, and with the promotion of initiatives such as the Golden Mile Competition.	**MCC**

7.0 CONCLUSIONS

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

Hedgerows link archaeological, geological, social and natural heritage. They have utility in the present but mark the past. Their values are multi-functional in both practical and spiritual terms. They enrich our understanding of history, ecology, rural society and farming practices. They give character to an area giving aesthetic appeal and creating a sense of place

Hedgerows are primarily a feature of lowland agricultural landscapes and as such they do not generally qualify for designation and protection. It is therefore important that appropriate conservation measures are adopted in order to safeguard the resource. These need to be based on accurate and up-to-date knowledge of the extent, nature and status.

The future drive of agri-environmental policy, for the foreseeable future, will be towards increasing High Nature Value farmland. This usually applies to farms with a high proportion of semi-natural habitats that are used for extensive livestock grazing, or more intensively managed farmland that supports species of conservation concern. The main opportunity for farmers in County Monaghan to avail of opportunities in High Nature Value farming is in having "*Farms with smaller areas of semi-natural habitat occurring in mosaic with more intensive agriculture*" (Heritage Council, 2010). That semi-natural habitat mosaic is primarily hedgerow.

In absolute terms, there is plenty of scope for improvement in the resource to maximise its full multi-functional potential, but in relative terms, the hedges of County Monaghan compare very favourably in most categories with those in other counties and areas previously surveyed.

The recommendations presented, if implemented, should contribute towards conserving and enhancing this extensive and interesting resource into the future.

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9.0 APPENDICES

9.1 SITE MAPS

LEGEND

HEDGEROW

SAMPLED HEDGEROW

TOWNLAND BOUNDARY
(MAIN TOWNLANDS NAMED)

MN01

ORDNANCE SURVEY REFERENCE	**H65**
AREA	**0.19 km²**
TOWNLANDS INCLUDED	**CLONKEEN, DERNAVED**
LINEAR EXTENT OF HEDGEROW	**2.68 km**
HEDGEROW DENSITY	**14.1 km/km²**
NO. OF HEDGEROWS SAMPLED	**4**

MN02

ORDNANCE SURVEY REFERENCE	**H64**
AREA	**1 km²**
TOWNLANDS INCLUDED	**DERRYNASELL EAST, FEEBAGHBANE, CLONTYBUNNIA, KNOCKNALUN, DRUMSCOR, KNOCKBALLYRONEY**
LINEAR EXTENT OF HEDGEROW	**14.66 km**
HEDGEROW DENSITY	**14.66 km/km²**

MN03

ORDNANCE SURVEY REFERENCE	**H74**
AREA	**1 km²**
TOWNLANDS INCLUDED	**DONAGH, SRANANNY, LISGOAGH, MULLAGHDUFF, MULLAGHBANE, ROSSARRELL, TULLYCALLICK**
LINEAR EXTENT OF HEDGEROW	**9.22 km**
HEDGEROW DENSITY	**9.22 km/km²**

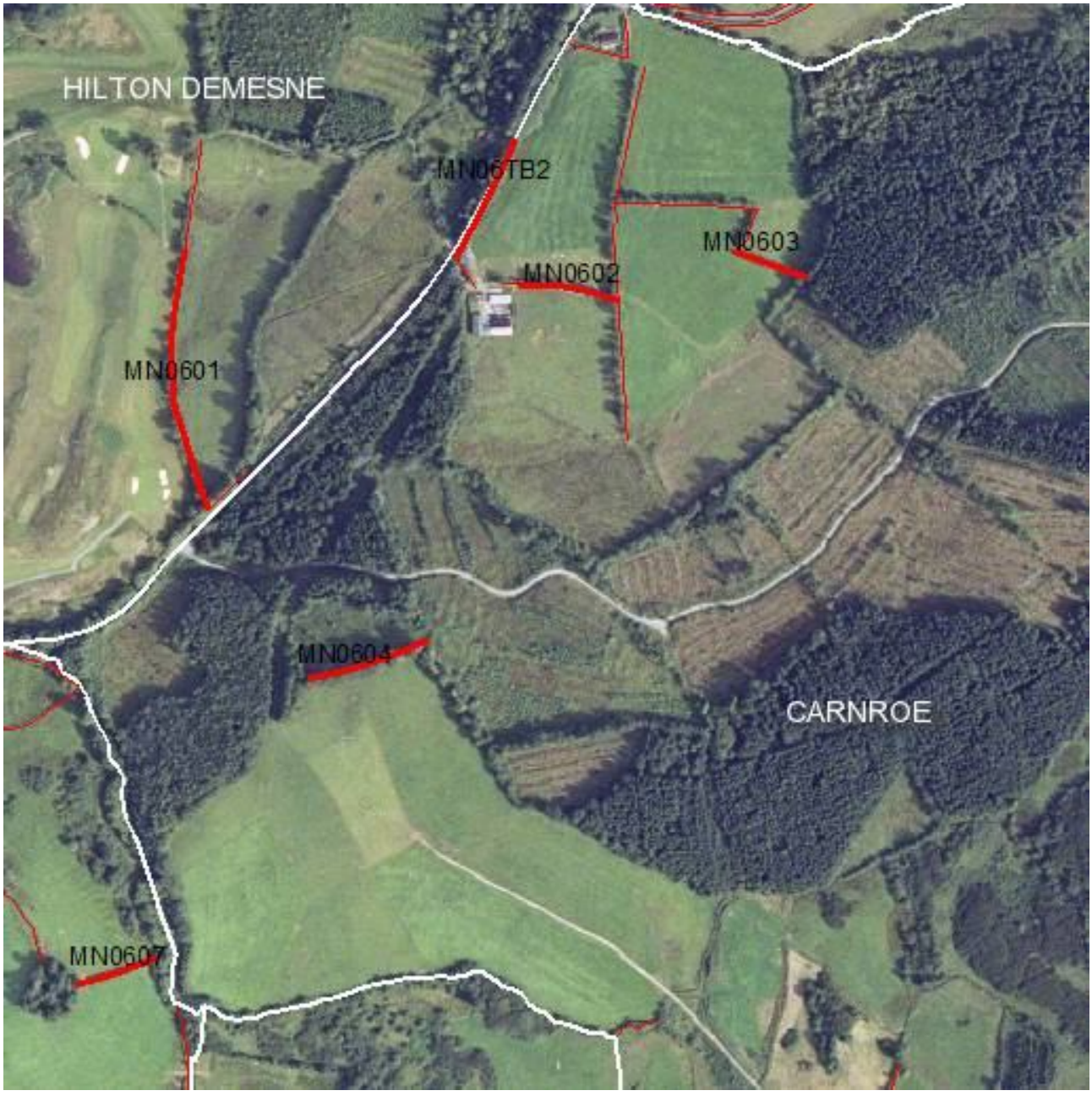
MN04

ORDNANCE SURVEY REFERENCE	**H63**
AREA	**1 km²**
TOWNLANDS INCLUDED	**SKERVAN, LISCAT, GORTMORE SOUTH, MULLANAVANNOG, MULLANACROSS, BROOKVALE, NAGHILL, KILLYKEERAGH**
LINEAR EXTENT OF HEDGEROW	**12.93 km**
HEDGEROW DENSITY	**12.93 km/km²**

MN05

Ordnance Survey Reference	**H73**
Area	**1 km²**
Townlands included	**Greaghglass, Annaroe, Ardaghy, Carrickanoran, Crosses, Lisleitrim**
Linear extent of Hedgerow	**15.98 km**
Hedgerow Density	**15.98 km/km²**

MN06



ORDNANCE SURVEY REFERENCE	**H52**
AREA	**1 km²**
TOWNLANDS INCLUDED	**CARNROE, GORTNANA, KILLYFARGY, HILTON DEMESNE, LISNALEE**
LINEAR EXTENT OF HEDGEROW	**2.21 km**
HEDGEROW DENSITY	**2.21 km/km²**

MN07

ORDNANCE SURVEY REFERENCE	**H62**
AREA	**1 km²**
TOWNLANDS INCLUDED	**ANNAGHYDUFF, AGHADRUMKEEN, ANAGHYBANE, KILMORE EAST, DERRYLOSSET, TOMANY, KILNAHARVEY**
LINEAR EXTENT OF HEDGEROW	**9.76 km**
HEDGEROW DENSITY	**9.76 km/km²**

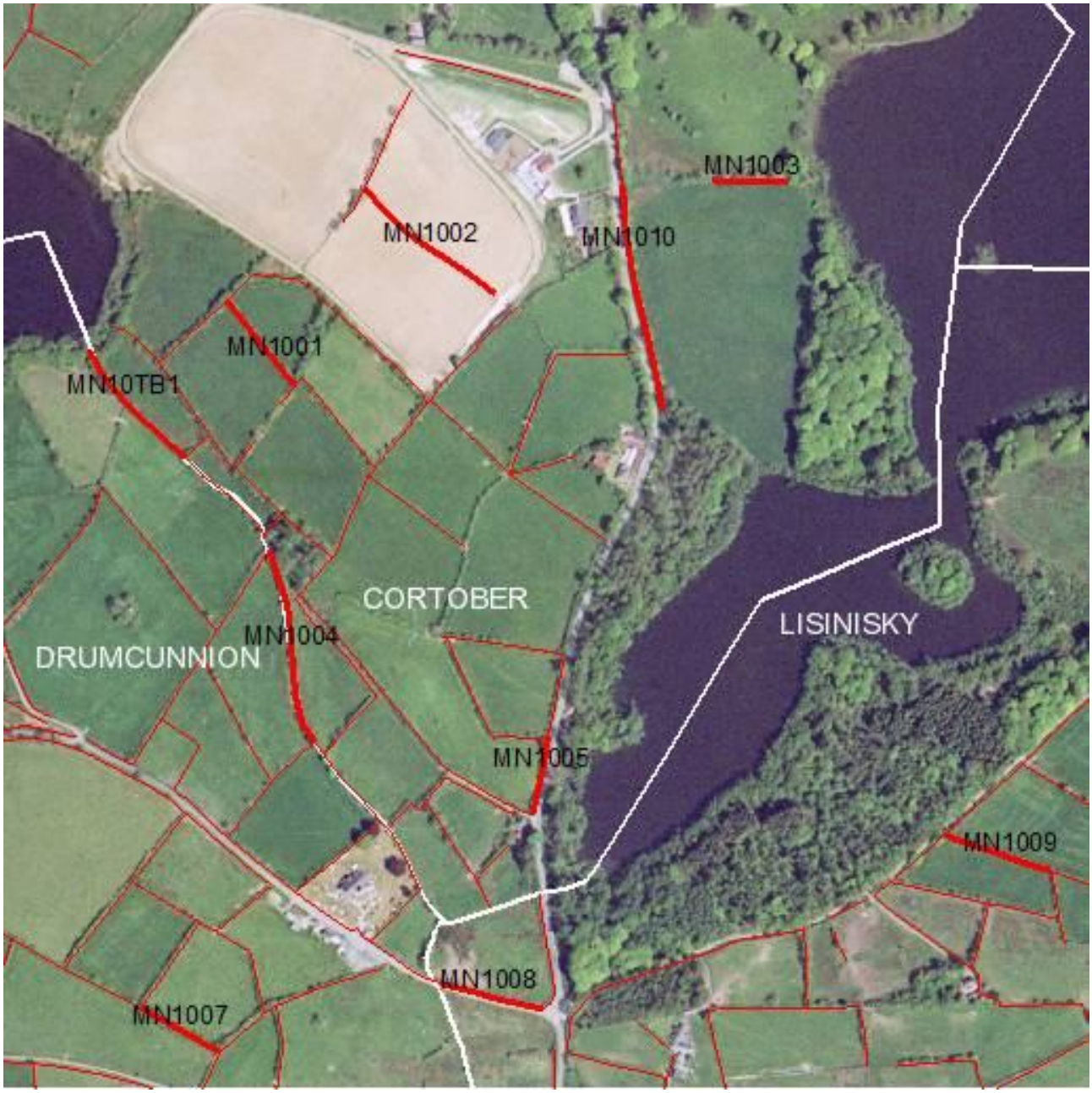
MN08

ORDNANCE SURVEY REFERENCE	**H72**
AREA	**1 km²**
TOWNLANDS INCLUDED	**DERRYVALLEY, BALLADIAN, DERRYNALOOBINAGH, CORFAD, ANNANEESE**
LINEAR EXTENT OF HEDGEROW	**11.99 km**
HEDGEROW DENSITY	**11.99 km/km²**

MN09

ORDNANCE SURVEY REFERENCE	**H82**
AREA	**1 km²**
TOWNLANDS INCLUDED	**CORRINSHIGO, GRIG, MODEESE, MULDRUMMAN, KILLYCARD, CORRACLOGHAN**
LINEAR EXTENT OF HEDGEROW	**12.20 km**
HEDGEROW DENSITY	**12.20 km/km²**

MN10

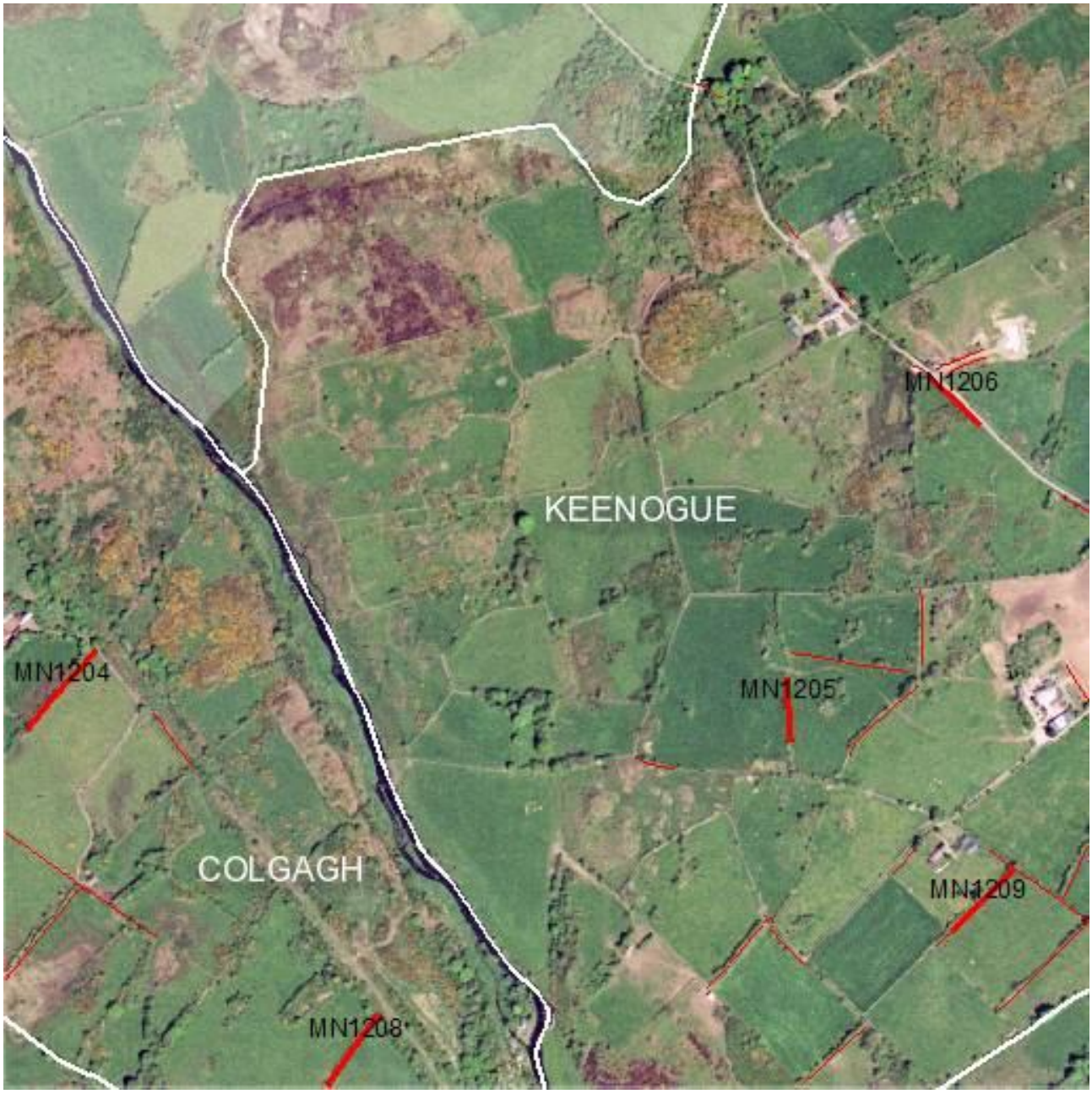


ORDNANCE SURVEY REFERENCE	**H71**
AREA	**1 km²**
TOWNLANDS INCLUDED	**CORTOBER, LISINISKY, SHANTONY, DRUMCUNNION**
LINEAR EXTENT OF HEDGEROW	**10.10 km**
HEDGEROW DENSITY	**10.10 km/km²**

MN11

ORDNANCE SURVEY REFERENCE	**H81**
AREA	**1 km²**
TOWNLANDS INCLUDED	**DUNAREE, DUNAREE LATIN, DRUMBERAGH, BOCKS UPPER**
LINEAR EXTENT OF HEDGEROW	**4.62 km**
HEDGEROW DENSITY	**4.62 km/km²**

MN12



Ordnance Survey Reference	**H91**
Area	**0.87 km²**
Townlands included	**Keenogue, Colgagh, Aughrim Beg, Magoney**
Linear extent of Hedgerow	**1.90 km**
Hedgerow Density	**2.19 km/km²**

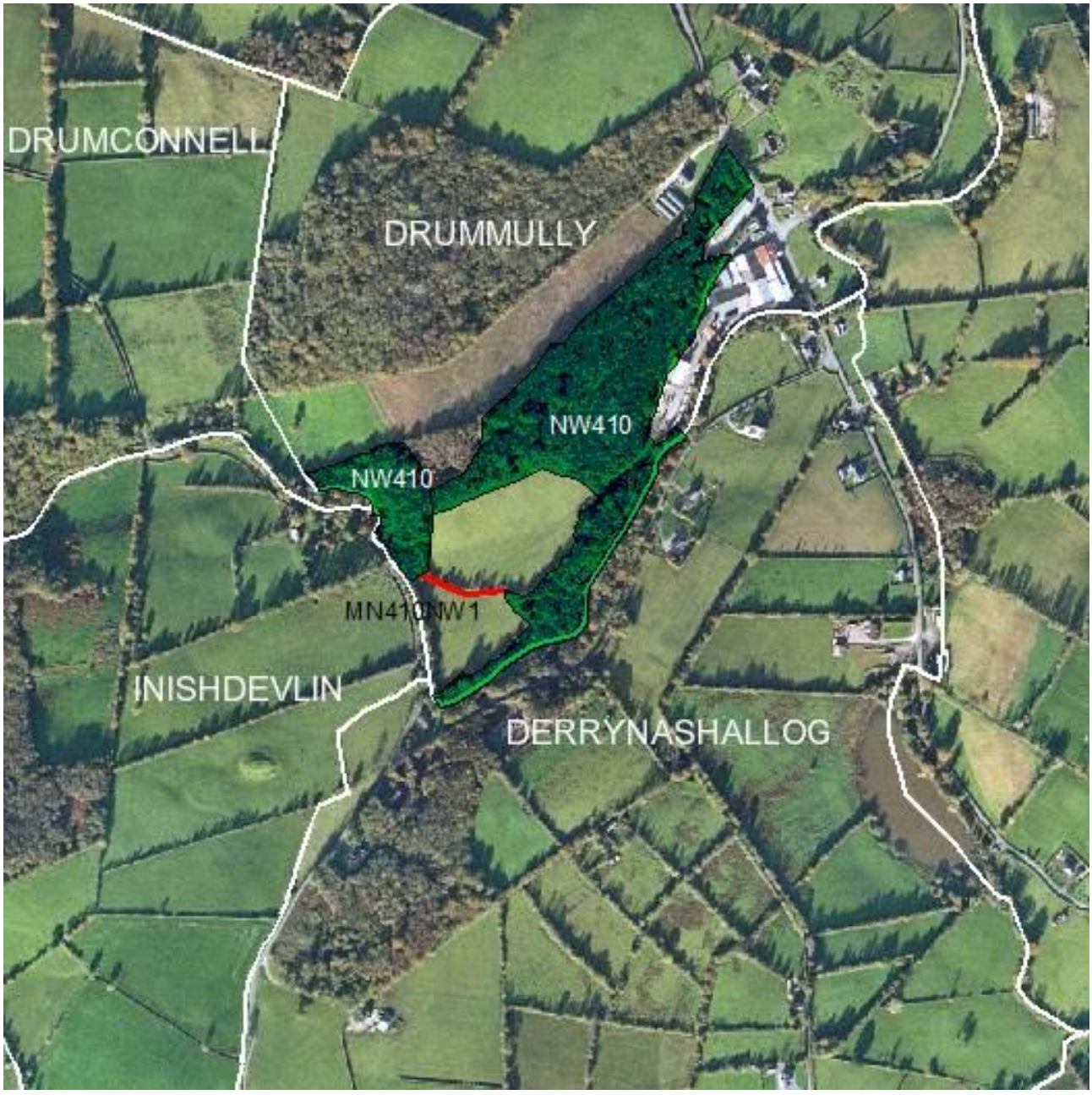
MN13

ORDNANCE SURVEY REFERENCE	**H80**
AREA	**1 km²**
TOWNLANDS INCLUDED	**KNOCKNACRAN WEST, KNOCKNACRAN EAST, DRUMMOND, DRUMGOOSAT**
LINEAR EXTENT OF HEDGEROW	**11.45 km**
HEDGEROW DENSITY	**11.45 km/km²**

MN401

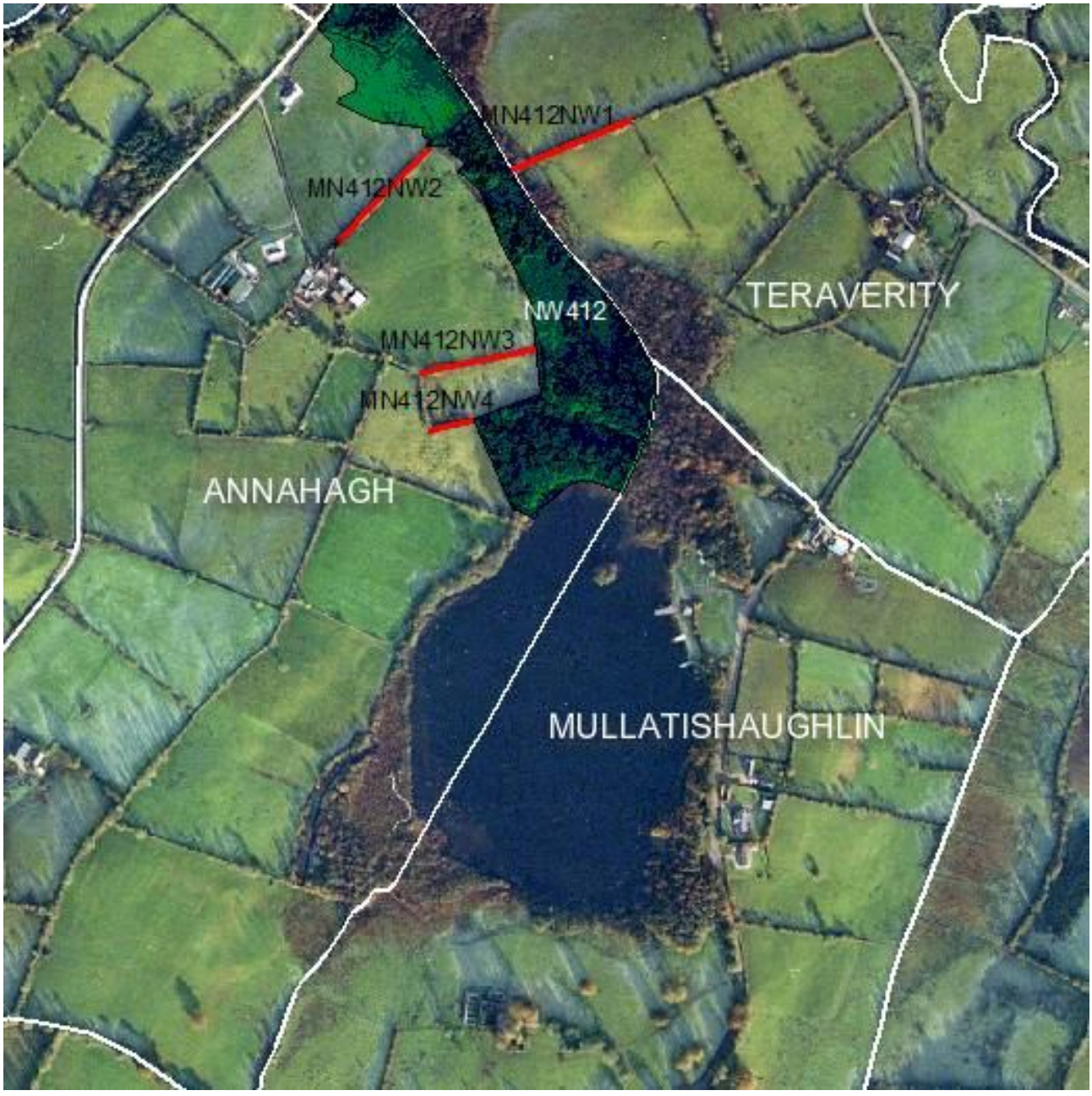
ORDNANCE SURVEY REFERENCE	**H8301**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**401**
NATIVE WOODLAND NAME	**LOUGH FEA DEMESNE**
WOODLAND TYPE/S	**MIXED BROADLEAF**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NHA**
TOWNLAND/S	**MAGHERABOY, BALLYLOUGHAN, LISCORRIN, NURE MORE**

MN410



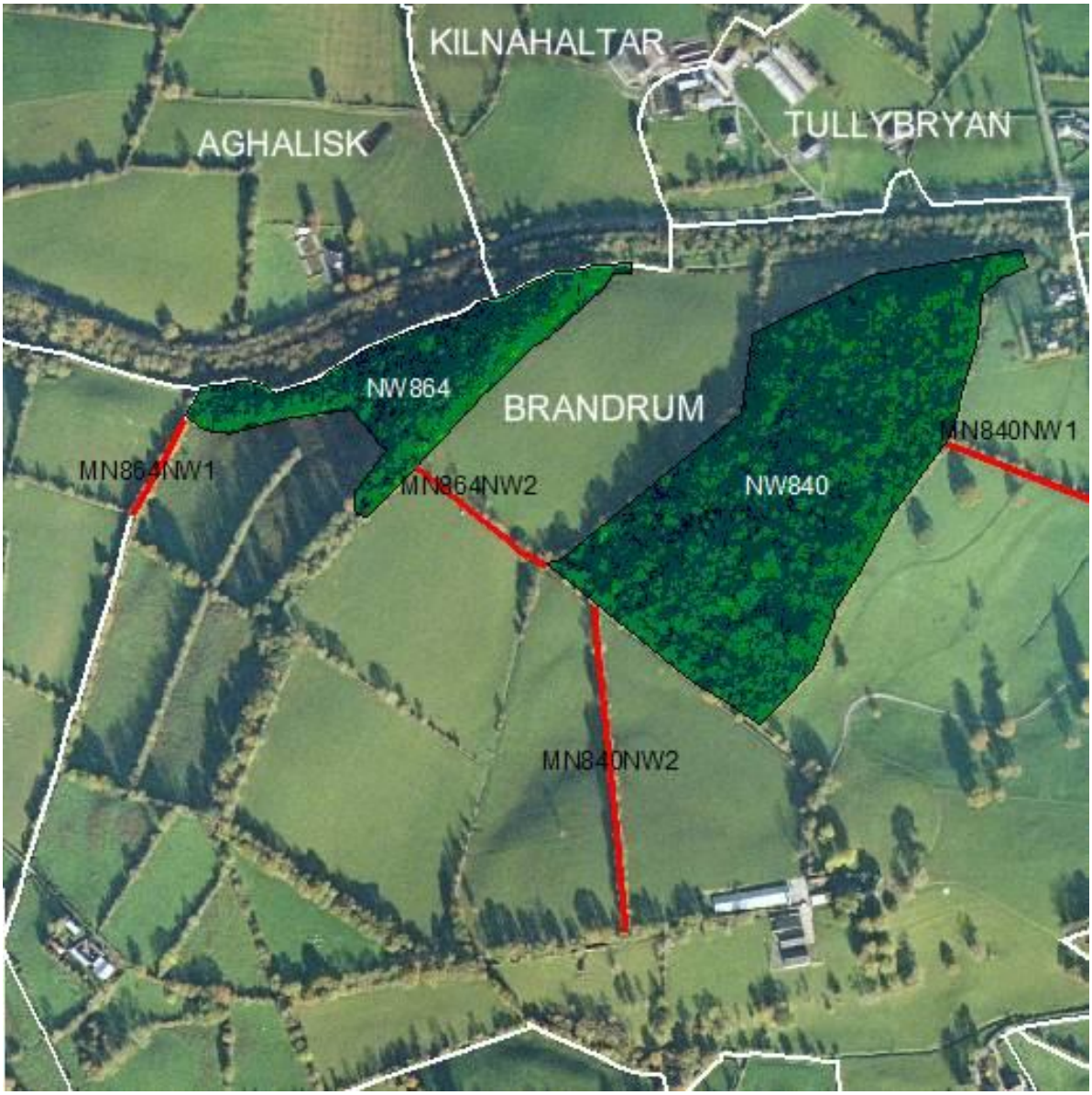
ORDNANCE SURVEY REFERENCE	**H6643**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**410**
NATIVE WOODLAND NAME	**DERRYNASHALLOG**
WOODLAND TYPE/S	**ASH/HAZEL**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NONE**
TOWNLAND/S	**DRUMULLY**

MN412



ORDNANCE SURVEY REFERENCE	**H6036**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**412**
NATIVE WOODLAND NAME	**HOLLYWOOD LAKE WOOD**
WOODLAND TYPE/S	**BIRCH/ALDER**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NONE**
TOWNLAND/S	**ANNAHAGH, TERAVERITY**

MN840 / 864

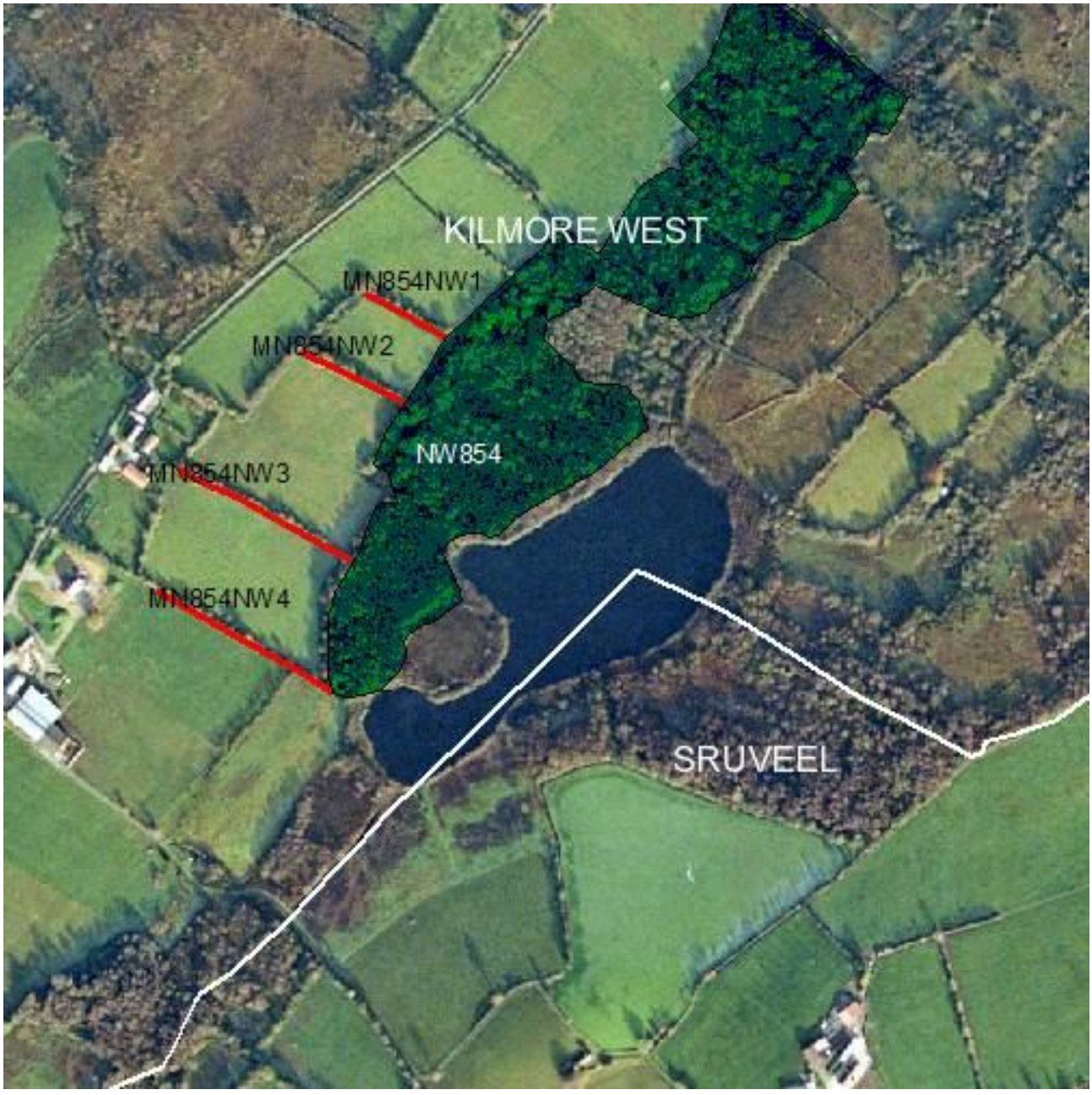


ORDNANCE SURVEY REFERENCE	**H6332**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**840**
NATIVE WOODLAND NAME	**HAZEL WOOD**
WOODLAND TYPE/S	**ASH/HAZEL**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NONE**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**864**
NATIVE WOODLAND NAME	**BACK WOOD**
WOODLAND TYPE/S	**ASH/BEECH**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NHA**
TOWNLAND/S	**BRANDRUM**

MN849

ORDNANCE SURVEY REFERENCE	**H8102**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**849**
NATIVE WOODLAND NAME	**CORRYBRACKAN**
WOODLAND TYPE/S	**WET WOODLAND**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**NO**
DESIGNATION	**NONE**
TOWNLAND/S	**CORRYBRACKEN, CORDUFF**

MN854



ORDNANCE SURVEY REFERENCE	**H5537**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**854**
NATIVE WOODLAND NAME	**KILMORE WEST**
WOODLAND TYPE/S	**BOG WOODLAND**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**NO**
DESIGNATION	**NONE**
TOWNLAND/S	**KILMORE WEST**

MN860

ORDNANCE SURVEY REFERENCE	**H7611**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**860**
NATIVE WOODLAND NAME	**REDUFF**
WOODLAND TYPE/S	**HAZEL / ASH / BIRCH**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NONE**
TOWNLAND/S	**REDUFF, TULLYGLASS, BEAGH**

MN862

ORDNANCE SURVEY REFERENCE	**H8308**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**862**
NATIVE WOODLAND NAME	**ANNAHAIA**
WOODLAND TYPE/S	**HAZEL / ASH**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**NO**
DESIGNATION	**NONE**
TOWNLAND/S	**CORLECK**

MN1037

ORDNANCE SURVEY REFERENCE	**H7603**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**1037**
NATIVE WOODLAND NAME	**COMERAGH**
WOODLAND TYPE/S	**WET WOODLAND**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**NO**
DESIGNATION	**NONE**
TOWNLAND/S	**COMERTAGH, GREAGHLONE**

MN1063

ORDNANCE SURVEY REFERENCE	**H7904**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**1063**
NATIVE WOODLAND NAME	**THE GLEN**
WOODLAND TYPE/S	**WET WOODLAND**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NONE**
TOWNLAND/S	**CARRICKMACLIM**

MN1162

ORDNANCE SURVEY REFERENCE	**H8500**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**1162**
NATIVE WOODLAND NAME	**MULLAGHMACATEER**
WOODLAND TYPE/S	**HAZEL / ASH**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**NO**
DESIGNATION	**NONE**
TOWNLAND/S	**MULLAGHMACATEER**

MN1176

ORDNANCE SURVEY REFERENCE	**H4921**
NATIONAL SURVEY OF NATIVE WOODLAND NUMBER	**1176**
NATIVE WOODLAND NAME	**THE DOWNS WOOD**
WOODLAND TYPE/S	**ASH / BIRCH**
WOODLAND PRESENT ON 1ST ED. ORDNANCE SURVEY	**YES**
DESIGNATION	**NONE**
TOWNLAND/S	**ANNIES**

9.2 STRUCTURAL RECORDING CATEGORIES

Context

A ADJACENT LAND USE
a tillage
b dairy
c cattle
d sheep
e mixed stock
f mixed stock + crops
g equine
h other
I fodder
j curtilage

B HISTORY
1 infill
2 townland boundary
3 canal side boundary
4 railway line boundary
5 farm boundary

B1 HISTORY Road/Stream
1 road **NP**, **NS**, **R**gnl, **L**cl, **U**n,**F**rm
2 stream
3 recently established

B2 HISTORY
1 Boundary present on 1st Edition OS
2 Boundary present on 2nd Edition OS
3 Boundary connects to feature on SMR
a Boundary links to woodland on OS1
b Boundary shown as treeline on OS1

C ADJACENT LAND CLASS & D HABITAT LINK CLASS
a arable (BC)
b improved grassland (GA)
b1 improved grassland reverting (GA)
c semi-natural grassland (GS)
d non-native woodland (WD)
e semi-natural woodland / scrub (WN)
f scrub/transitional woodland (WS)
g curtilage/built land (BL)
h peatlands (P)
i. lake/pond (FL)
j watercourse (FW)
k other (target note)
l. none
m. hedgerow (WL1,WL2) (no. of links)
n. earthbank (BL2)
s. marsh (GM1)
q. quarry (ED1)
w. swamp (FS1)

E BOUNDARY FUNCTION
1 hedge redundant
2 active boundary

I DRAIN SIZE
1 not present
2 small (<0.5m)
3 medium (0.5 – 1m)
4 large (>1m)

I1 DRAIN WET/DRY
a dry ditch / drain
b wet ditch / drain

Structure/Condition

J PROFILE
a remnant
b relict (derelict)
c boxed / A shape
d overgrown/irregular
e. top heavy / undercut
f straight sided
g wind-shaped

J1 PROFILE, suffix
a. losing structure
b. outgrowths at base

K HEIGHT
1 <1.5m
2 1.5 – 2.5m
3 2.5 – 4m
4 4 - 5m
5 5m+

K1 HEIGHT, suffix
a overhead wires/cables

L WIDTH
a < 1m
b 1– 2m
c 2 – 3m
d 3 m+

M GAPPINESS
1 complete
2 < 5 % gaps
3 5 – 10 % gaps
4 10 – 25 %
5 25 – 50 %
6 > 50 %

M1 SPECIFIC OR GENERAL
a general
b specific (ind. gap>5m)

N BASE
a open / translucent
b scrawny, semi-translucent
c semi-opaque
d dense / opaque

N BASE, suffix
a + vegetation

R VERGE / MARGIN
a < 1m
b 1 – 2m
c 2 - 4m
d 4m +
e none

R1 VERGE / MARGIN, DEGR
1. >20% poached within 2m
2. >20% ploughed within 2m
3. >20% herbicide use

S OVERALL VIGOUR
a poor
b average
c good
d poor in part
e basal decay
f evidence of disease

Management

U MANAGEMENT
a cut box profile
b cut 'A' shape
c cut on one side
d cut on both sides
e topped only
f excavator
g fully laid
h laid in part
i coppiced
j short term unmanaged
k long term unmanaged
l infill planting
m pruned
n other (target note)
p. ivy cut

U1 MANAGEMENT, suffix
a. out of season

V MANAGEMENT METHOD
1 flail
2 circular saw
3 bar cutter
4 hand tools
5 excavator
6 other
7 unsure
8 not applicable

W EVIDENCE OF LAYING
a no evidence
b past evidence
c recent evidence

Construction

F OUTLINE
a linear
b non-linear

G1 BOUNDARY TYPE
1 Single Line Hedge
2 Double Line Hedge
3 Random Line

G2 BANK/WALL/SHELF
1 Bank
2 Wall
3 Shelf

G3 DRAIN
a External Drain
b Internal Drain
c Internal Path, Track-way, etc.
0 none of the above features

G1 BOUNDARY CLASS
1 WL1
2 WL2

H BANK/WALL/SHELF SIZE
a < 0.5m
b 0.5 – 1 m
c > 1m
d not applicable

O BANK /WALL/SHELF DEGRADATION, DEGREE
1 not applicable
2 none
3 severe
4 minor
5 drain blocked/waterlogged

O1 BANK /WALL/SHELF DEGRADATION, EXTENT
a general >10%
b isolated

P TREES
a none
b few up to 15%
c scattered 15 - 30%
d abundant 31-75%
e line >75%

Q TREE AGE COMPOSITION
1 all mature
2 predominantly mature
3 predominantly immature
4 mixed age range
5 none

X FENCING
1 none
2 fixed to stems
3 electric
4 post & wire
5 sheep wire
6 timber fence

Y GROUND FLORA
a species rich
b average
c species poor
d noxious weeds DAFOR
e nutrient rich >20%
f use of herbicide
g indicator species
h. invasive species

9.3 FULL LIST OF PLANT SPECIES RECORDED DURING THE SURVEY

Woodlands of Ireland Ground Flora target species in bold.

Botanical Name
Acer pseudoplatanus
Achillea millefolium
Aegopodium podagraria
Ajuga reptans
Alliaria petiolata
Allium ursinum
Alnus glutinosa
Anemone nemorosa
Angelica sylvestris
Anthriscus sylvestris
Apium nodiflora
Aquilegia vulgaris
Arctium minus
Arum maculatum
Betula pendula
Betula pubescens
Brachypodium sylvaticum
Bromopsis ramosa
Cardamine flexuosa
Cardamine flexuosa
Cardamine pratensis
Carex hirta
Carex remota
Carex strigosa
Carex sylvatica
Centaurea nigra
Cerastium fontanum
Chamerion angustifolium
Chrysoplenium oppositifolium
Circaea lutetiana
Cirsium arvensis
Cirsium palustre
Cirsium vulgare
Conopodium majus
Corylus avellana
Crataegus monogyna
Cytisus scoparia
Digitalis purpurea
Dryopteris affinis
Dryopteris dilatata
Dryopteris filix-mas

Botanical Name
Filipendula ulmaria
Fragaria vesca
Fraxinus excelsior
Galium aparine
Geranium robertianum
Geum urbanum
Glechoma hederacea
Glyceria fluitans
Hedera helix
Helleborus spp.
Heracleum sphondylium
Hieracium spp.
Hyacinthoides non-scripta
Hypericum androsaemum
Hypericum pulchrum
Ilex aquifolium
Juncus effusus
Juncus inflexus
Lamium album
Lapsana communis
Lathyrus pratensis
Ligustrum vulgare
Lonicera nitida
Lonicera periclymenum
Lotus corniculata
Lysimachia nemorum
Malus sylvestris
Mentha arvensis
Mercurialis perennis
Narcissus spp.
Oxalis acetosella
Phyllitis scolopendrium
Picea sitchensis
Pinus sylvestris
Plantago lanceolata
Polypodium vulgare
Polystichum setiferum
Potentilla anglica
Potentilla anserina
Potentilla sterilis
Primula veris

Botanical Name
Ranunculus acris
Ranunculus bulbosus
Ranunculus ficaria
Ranunculus repens
Ribes nigrum
Ribes uva-crispa
Rosa arvensis
Rosa canina agg.
Rubus fruticosus agg.
Rubus idaeus
Rumex acetosa
Rumex conglomerata
Rumex obtusifolius
Rumex sanguineus
Salix aurita
Salix caprea
Salix cinerea ssp. oleifolia
Salix viminalis
Sambucus nigra
Sanicula europaea
Scrophulara auriculata
Scrophularia nodosa
Senecio aquatica
Senecio jacobaea
Solanum nigrum
Sonchus oleraceus
Sorbus aucuparia
Stachys palustris
Stachys sylvatica
Stellaria graminea
Stellaria holostea
Stellaria media
Symphoricarpos albus
Taraxacum officinale
Taxus baccata
Trifolium pratense
Ulex europaeus
Ulmus glabra
Ulmus minor
Ulmus x hollandica
Umbilicus rupestris

Epilobium hirsutum
Epilobium montanum
Equisetum arvense
Equisetum palustris
Equisetum telmateia
Euonymus europaeus
Euphorbia helioscopia
Fagus sylvatica*
Primula vulgaris
Prunus avium
Prunus domestica
Prunus laurocerasus
Prunus spinosa
Pteridium aquilinum
Quercus petraea
Quercus robur
Urtica dioica
Vaccinium myrtillus
Veronica beccabunga
Veronica spp
Vicia sativa
Vicia sepium
Viola spp.

9.4 METHODOLOGY REVIEW

The methodology should be reviewed to ensure full compatibility with the Woodlands of Ireland Hedgerow Appraisal System criteria.

Suggested changes to recording

Category A. Adjacent Land Use – change to

a) Tillage
b) Pasture
c) Meadow / Fodder
d) Curtilage
e) Rough Grazing
f) Other

Category G. Add category for Double Ditch

Category Q. Add category for All Immature

Category W. Change to Historical Management

a) Hedge Laying
b) Coppicing of Shrubs
c) Coppicing of Trees

9.5 HEDGEROW HABITAT ACTION PLAN

Introduction

Hedgerows are a valuable multi- functional resource in our countryside, benefiting agriculture, wildlife, the landscape, the wider environment, tourism and the general community.
Much of the land in County Monaghan consists of intensively managed grassland. This land use type provides only a limited amount of habitat for invertebrate, bird and mammal species. Therefore field boundary features have an extremely important role to play in terms of maintaining farmland biodiversity. Over 600 species of plant, 1,500 of insects, 65 birds and 20 species of mammals have been recorded feeding or living in hedgerows at some point in their life cycle.
As largely man-made features hedgerows require periodic management intervention in order to remain viable over time. Sympathetic management also determines the conservation importance of hedges.

This Hedgerow Habitat Action Plan endeavours to promote actions which will ensure a diverse and sustainable hedgerow resource in County Monaghan which can be appreciated by all sectors of the community.

Hedgerow Definition

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

Other Definitions

Species rich hedges
A species rich hedge has an average of four or more native tree / shrub species per 30m strip

Significant Hedgerows / Heritage Hedgerows
These are classified using the Woodlands of Ireland Hedgerow Appraisal System. The Appraisal System is intended to identify hedgerows of historical, ecological and/or landscape significance. Hedgerows meeting the Highly Significant criteria of the System are classed as Heritage Hedgerows.

The Function and Value of Hedgerows

Hedgerows are important wildlife habitats and ecological corridors allowing the movement and dispersal of many species through the wider countryside. Their importance as wildlife corridors or green infrastructure is highlighted in article 10 of the European Habitats Directive. Hedgerows also provide invaluable wider ecosystem services; their regulatory functions include carbon sequestration, flood prevention, protection from soil erosion and preventing aquatic siltation.
They are also an important cultural resource, and many mark old route-ways or green roads, form part of townland boundaries or are remnants of ancient woodlands. The landscape value of hedgerows in the drumlin topography of County Monaghan cannot be underestimated. In addition, hedgerows play an important agricultural role. They act as stock barriers, provide shade and shelter for livestock and can play host to beneficial species of invertebrates.

Policy Framework

Habitat Action Plan - Hedgerows

Main Partners	• County Monaghan Heritage Forum • Monaghan County Council		
Other Partners	• Department of Agriculture • Teagasc • Environmental N.G.O.'s • Farmers/Landowners • Community Groups • Hedge Laying Association of Ireland		
Heritage framework	Monaghan Heritage Plan 2006-2010	Action 1.6 Survey Action 5.9 Management	County Hedgerow Survey and HAP. Heritage Plan project 2010
	Monaghan Biodiversity Action Plan 2009-2014	Action 1, 4 & 11.	
Planning framework	County Development Plan 2007 - 2012		

Current Status

Results from the County Monaghan Hedgerow (2010) survey indicate that there is an estimated hedgerow length of12, 845 km in the county with an average hedgerow density of 9.93 kilometres per square kilometre (km/km²).

Species Rich Hedgerows

37% of hedges recorded were classed as 'species rich' (an average of four or more native tree / shrub species per 30m strip).

Highly Significant (Heritage) Hedgerows

26% of hedgerows sampled were classed as Highly Significant in terms of their History, Species Composition, Physical Structure, Habitat Connectivity or Landscape value under the Woodlands of Ireland Hedgerow Assessment System (HAS).

Favourable Condition

27% of all hedges recorded met a series of Favourable Condition criteria defined in the HAS. These criteria are linked to structure, condition, species composition and continuity. The table below indicates how hedgerows failed to meet the favourable condition criteria.

Percentage of sampled hedgerows in Unfavourable Condition (Co. Monaghan Hedgerow Survey)

Condition Category	Condition Criteria	Unfavourable (%)
Overall		73.1
Height	<1.5m	15.7
Width	<1m	3.7
Basal Density	Open	20.4
% Gappiness	>10%	26.9
Specific Gaps	Individual gap >5m	22.2
Bank / Wall	>20% of the length of the hedge degraded	8.3
Proportion of introduced species	>10% of woody growth volume comprised of unfavourable species	5.6
Ground flora / hedge base	> 20% of ground layer showing evidence of Herbicide Use	0.9
Ground flora / hedge base	Contains Noxious weeds / > 20% Dominated by Nutrient Rich Species	26.9
Ground flora / hedge base	Presence of alien invasive species	0
Degraded Margin	Ploughing up to base of hedge shrubs or Poaching/erosion	15.7
Proportion of canopy dominated by ivy	>25%	3.7

Current Factors affecting the Habitat

Based on the results of the County Monaghan Hedgerow Survey the main issues affecting hedgerows in the county are:

Ageing Resource

A significant proportion (probably over 90%) of the hedgerow resource in Co. Monaghan is over 100 years old. Without timely rejuvenation hedgerows stems will slowly decline and die. The level of hedgerow rejuvenation is low in County Monaghan with only 3% of hedges sampled having evidence of recent laying or coppicing.

Linear Integrity

Approximately 30% of the sampled hedgerows failed to meet Favourable Condition status due to the level and nature of gappiness. Gaps are caused by plants dying through old age or inappropriate management with a consequent failure to infill plant.

Hedgerow Structure

20% of hedgerows failed to meet the Favourable Condition criteria due to a lack of woody growth in the base of the hedge and a further 16% of hedgerows failed the standard through lack of height. These factors are influenced by management activities.

Nutrient Enrichment

Excessive levels of nutriphiles (nettles, docks and cleavers) was responsible for a significant proportion of hedges (27%) failing to achieve Favourable Condition status. Both agricultural and hedgerow management practices can impact on nutrient levels.

Abundance of non-native species

Four different non-native species were present to levels considered excessive in terms of Favourable Condition status. These were, in descending order of prevalence, Sycamore, Beech, Non-native Willow species and Wilson's Honeysuckle. This affected the condition status of 6% of sampled hedges.

Best Practice Hedgerow Management

The Hedgerow Management Cycle

To manage hedgerows successfully we need to understand how the plants that make up hedgerows grow and respond to management activities. We can then manage them in order to control their natural growth and ageing patterns without subjecting them to the stresses that will cause long – term damage to their well being. There is little natural regeneration within most hedgerows and to ensure a long lifespan for the existing plants the key to the management cycle is to periodically rejuvenate plants by coppicing or laying the hedge. Routine trimming slows down the natural growth cycle of the plant and promotes a dense structure to the hedge which benefits wildlife. Sympathetic routine trimming, allowing incremental growth, can mean that periods of 30-40 years between rejuvenation are possible.

Current Action

Various legislative Acts, Directives, and Guidelines (International, European, and National) reflect the importance of the hedgerow resource and its management. The most significant of these are;

- (EU) Habitats Directive (1992)
  Article 10 requires that land use development plans incorporate policies to encourage management of features of the landscape which are of major importance for flora and fauna; including hedgerows.

- (EC) Council Regulations
  - 2078/1992 (Agri-Environmental Schemes)

  The Rural Environmental Protection Scheme (REPS) and Agri-Environmental Options Scheme (AEOS) operate under this European Regulation. Specifications set down the conditions by which participant farmers in the Schemes must manage their hedgerows in the interest of Biodiversity.

- The Wildlife Act, (1976), as amended by the Wildlife (Amendment) Act, 2000
  The purpose of the Act is to protect breeding birds during the nesting season by establishing a prohibition on the cutting of hedges during the period from 1st March to 31st August (inclusive) each year.

- National Biodiversity Plan (2002)
  The plan has a number of Actions that are relevant to Hedgerow Conservation.

- National Heritage Plan (2002)
  The National Heritage Plan recognises hedgerows as prominent and important features in terms of their ecological, archaeological and landscape values. Action 32 (Heritage in the Countryside) ensures the
  "protection and enhancement of hedgerows as a natural and archaeological heritage resource through the use of regulatory, educational and financial measures, as appropriate."

  Also some hedges can be part of archaeological features such as ring forts and will be protected through the Record of Monuments and Places.

Objective of Hedgerow Action Plan:

To ensure a sustainable and bio-diverse hedgerow network in Co. Monaghan which maximises the multi-functional potential of the resource.

Action Plan

Planning and development policies

Target	Action
Ensure that hedgerow conservation is achieved at all stages of the planning process, from plan to implementation, including the recognition that 'Heritage Hedgerows' warrant special protection.	Review County Development Plan objectives and policies which relate to hedgerows.

	Monitor hedgerows referred to in Planning Consents.
Set Objectives and Targets in relation to hedgerow conservation.	E.g. achieve favourable status for 5 km of Heritage Hedgerows by 2020.

Site Protection and Management

Target	**Action**
To set up systems for the practical protection and management of hedgerows	Identify hedges in local authority ownership and develop and implement management plans to ensure their long-term conservation Encourage members of the County Monaghan Heritage Forum and other controlling agencies to practise appropriate management for hedgerows along waterways, railways and underneath power and communications lines. Compile a database / register of hedges of significant ecological, historical, landscape, archaeological value (Heritage Hedgerows) within County Monaghan.
To ensure genetic integrity in order to strengthen the resilience of ecosystems	Secure the commitment of the local authority to using native species of local provenance in any Council Tree/ Hedge plantings in line with Actions 29 and 66 of the National Biodiversity Plan. Develop a programme for the identification, registration, and certification of local provenance sites for woody hedgerow shrubs in County Monaghan.

Education / Training / Advisory

Target	**Action**
Ensure staff (and L.A. Contractors) have the necessary skills and data sources to implement or evaluate any aspect of this plan.	Provide appropriate training for relevant Council Staff, particularly in Planning and Roads departments Commit to employing appropriately accredited contractors for council hedgerow management contracts.
Support Best Practice Hedgerow Conservation by providing access to information and advice for landowners,	Create a webpage on the Council's website which provides information or links to information on Training Courses,

community groups, etc.	Sources of Native Plants, and Accredited Contractors.

Research and Monitoring

Target	Action
Ensure actions are based on up-to-date sources of data.	Monitor data on the County's Hedgerow Resource by repeating Hedgerow Surveys at 10 year intervals. Cooperate in research projects being undertaken by relevant agencies into aspects of hedgerow conservation. Encourage community groups and tidy towns groups to undertake Local Hedgerow Surveys.

Communication / Publicity

Target	Action
Support and liaise with groups involved in promoting hedgerow conservation.	Encourage Hedgerow Conservation through such initiatives as Tidy Towns and The Golden Mile.
Promote Hedgerows as a Sustainable Resource	Promote the Ecosystem-Services provided by hedgerows through any communication in relation to hedge conservation and management

Roads

Target	Action
Reduce any possibly negative impacts of maintenance of the road network on hedgerow conservation.	Analyse the operation of Monaghan County Council's hedge-cutting operations, including methods, effectiveness, invasive alien species, cost to advise on best practice and economic savings which could be made. Through a process of forward planning; • Minimise disruption to the hedgerow habitat during road works. • Minimise mechanical hedge cutting for safety purposes between 1st March and 31st August (inclusive). Adopt a policy of re-instatement where hedgerows are removed for road widening works and planning consents

Management Standards

Target	Action

Improve the conservation value of hedgerows in County Monaghan by improving standards of hedgerow management.	Commit to employing or contracting only suitably qualified hedgerow management contractors. • Routine trimming should be carried out by operators qualified to Teagasc Unit MT 1302 – Mechanical Hedge Trimming. • Hedge laying should be to City & Guilds Standard (AO20) or equivalent. • Coppicing of hedgerows should be carried out to standards currently being developed by the Coppice Association of Ireland in conjunction with Standards bodies in the UK.

Monitoring

Devise a monitoring programme to ensure that HAP actions are being carried out and that targets are being achieved.