

ENVIRONMENTALLY SENSITIVE AREAS IN NORTHERN IRELAND

# **Landscape Monitoring-**

**A comparison between**

**1995 and 1998**

## **Monitoring Team**

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## SUMMARY

1. A total of 183 quarter kilometre squares were surveyed throughout the five Northern Ireland ESAs in 1995. An extensive map based database was completed for each ESA using PC ARC/INFO and ArcView. The distribution and abundance of land cover elements such as boundaries, vegetation types and buildings were recorded. This survey was repeated in 1998.
2. Data were compared between the years 1995 and 1998 to determine changes in the distribution and abundance of land cover elements with respect to the ESA scheme. By considering the ESA as a whole and ESA participant farms, estimates were made on the effect of the ESA scheme on various land cover elements.
3. Due to the low occurrences and dispersed nature of some landscape elements which occurred infrequently in the survey, small variations in these caused large percentage changes in estimates. Coefficients of variation (CVs) were therefore used to give an indication of the reliability of the estimates. T-tests were also carried out between data sets for the two years to determine if differences were statistically significant.
4. The results indicated a continued rise in ESA scheme participation with the consequent increase in areas of threatened habitat under the protection of the scheme.
5. Lengths and numbers of boundaries increased in all ESAs except Slieve Gullion and this increase was mainly due to increases in fences. Dry stone walls increased in the Mourne & Slieve Croob and the Sperrins ESAs. Some boundary removal (mainly hedges) was noted in all ESAs except the Antrim Coast Glens & Rathlin. Removal occurred almost exclusively on non-ESA farms with the exception of the West Fermanagh & Erne Lakeland ESA where some removal was noted on an ESA participant farm. Estimates of complete, stock-proof boundaries increased in the Mourne & Slieve Croob, Fermanagh and Sperrins ESAs. Levels of boundary management increased in all ESAs except Slieve Gullion over the three year period. The West Fermanagh & Erne Lakeland ESA had the highest proportions of unmanaged overgrown boundaries/hedges. Boundary management is not necessarily ideal for conservation management as in many cases this involved excessive flailing. Hedges classified as unmanaged or overgrown often provided a more diverse species rich habitat and are therefore more appropriate to conservation aims. Boundaries with species poor ground

flora increased in both the Sperrins and Slieve Gullion indicating a possible need for the review of boundary management in these areas.

**6.** No significant changes were noted on heather moorland between years, with areas of wet and dry heath remaining at levels recorded in 1995. Areas of heather moorland under ESA agreement increased considerably over the three year period.

**7.** Estimates of improved grassland increased in the Sperrins ESA although this change was from unimproved species poor grassland. Areas of grassland classified as unimproved species rich increased whilst those classified as unimproved species poor decreased in all ESAs except the Antrim Coast Glens & Rathlin. This was not significant at this stage but may be indicative of future trends.

**8.** Areas of all woodland types remained the same over the three year period. Areas of woodland under ESA agreement increased and there were some positive indicators such as new planting of mixed woods in the Antrim Coast Glens & Rathlin ESA.

**9.** Incidences of inappropriate waste disposal increased in the West Fermanagh & Erne Lakeland and in the Sperrins ESAs.

**10.** There were no significant changes in the numbers of derelict traditional buildings although there was an increase in all ESAs which may be indicative of future trends. Newly restored traditional buildings were recorded in the Mourne & Slieve Croob ESA, the West Fermanagh & Erne Lakeland ESA and the Sperrins ESA.

**11.** Monitoring has indicated that practices such as field boundary removal and drainage and reseeded are continuing within the ESA boundaries. These changes have, however, been mainly limited to farms not participating in the ESA scheme. The ESA scheme is therefore instrumental in maintaining the characteristic landscape of each ESA by encouraging farmers to maintain major landscape elements and preserve vulnerable habitat.

**12.** Changes in land cover occur slowly and continued monitoring over an extended period of time should further highlight the effects of environmental protection initiatives in maintaining valuable land cover elements and vulnerable habitats.

# **1.0. INTRODUCTION**

A landscape monitoring programme was undertaken in all five ESAs, The Mourne & Slieve Croob ESA, The Antrim Coast, Glens & Rathlin ESA, The West Fermanagh & Erne Lakeland ESA, The Sperrins ESA and The Slieve Gullion ESA in 1995.

This programme provided an overview of the landscape character of each ESA as soon as possible after ESA designation. Land cover, vegetation, buildings, field boundaries and historic features were recorded resulting in a comprehensive assessment of land cover features. This exercise provided the basis for the current re-survey three years after the initial survey.

Re-monitoring provides an indication of the effectiveness of environmental management and ESA prescriptions, as land cover elements are a reflection of land use. This will permit refinement of management prescriptions where necessary.

## **1.1. Aim of landscape re-monitoring**

To identify change in land cover features in ESAs since 1995 and quantify these with regard to ESA prescriptions and participation.

## 2.0. METHODS

Re-survey methods follow those used for the initial survey (Millsopp *et al.* 1997). One hundred and eighty three, 0.25km squares covering 1.5-2% of the ESA land area were re-surveyed. Squares were originally chosen on a stratified random basis using the Northern Ireland land classification (Cooper, 1986). This method is potentially more accurate than simple random sampling as the number of squares sampled are proportional to the specific land class in any sample area, consequently sample squares are more representative of the survey areas.

Data obtained from sample squares is then extrapolated to provide an estimate for the entire ESA.

Number of squares and land classes sampled in each ESA are listed in Table 1.

Table 1. The land class composition of each Environmentally Sensitive Area and the number of sample squares (25 hectares) monitored.

Environmentally Sensitive Area	Land class group	Land classes	% of total ESA area	Number of sample squares
<b>Antrim Coast, Glens &amp; Rathlin</b>	Lowland	1-16	39	9
	Upland	17-23	61	13
	<b>Total ESA</b>			<b>22</b>
<b>Mournes &amp; Slieve Croob</b>	Lowland	1-16	58	13
	Upland	17-23	42	9
	<b>Total ESA</b>			<b>22</b>
<b>Slieve Gullion</b>	Lowland	1-16	50	8
	Upland	17-23	50	8
	<b>Total ESA</b>			<b>16</b>
<b>Sperrins</b>	Lowland	1-16	6	4
	Upland	17-23	94	60
	<b>Total ESA</b>			<b>64</b>
<b>West Fermanagh &amp; Erne Lakeland</b>	Lowland	1-16	73	43
	Upland	17-23	27	16
	<b>Total ESA</b>			<b>59</b>
<b>All ESAs</b>				<b>183</b>



## **2.1. Recording land cover**

Land cover features were recorded directly in the field onto 1:10 000 Ordnance Survey maps. The main landscape features were divided into seven groups, as listed below, with a separate map and specific recording codes for each group (Appendix 3).

1. Grassland /Crops
2. Woodland
3. Field boundaries
4. Heather moorland
5. Buildings/amenities
6. Other vegetation types
7. Historic monuments

Initially, field code definitions for landscape monitoring were derived from guidelines issued by the Department of Agriculture. Further descriptive codes were given in relation to the presence of common and indicator species which are characteristic of a common type of habitat, as derived from previous biological monitoring results (Hegarty *et al.*, 1994, 1995). Details of management practices such as grazing and types of animals were also coded. Farm ownership boundaries have been added to each sample square in the ESAs to enable comparison between ESA participants and non-participants. This information will be used to assess the effectiveness of the ESA scheme, by analysing land cover differences between years on land owned by ESA participants and land owned by non-participants.

## **2.2. Data storage, access and retrieval**

The Geographic information system PC ARC/INFO in conjunction with ArcView was used to store and process all map information. Initially every square was digitised using PC ARC/INFO and all field codes for each land cover type were stored as database files (Dbase V). Data and map information for recorded landscape features were compared between years for each ESA. Any changes in boundaries or buildings noted at re-survey were digitised and databases were similarly created for re-survey information.

ArcView was used to assign each parcel on the map square a unique parcel number and link this to the appropriate database file.

The ratio estimate method was used to calculate land cover estimates. Standard errors (SE) and coefficient of variation (cv), were used to describe the precision of the estimate (Cochran, 1977; Murray *et al*, 1992). The cv is an expression of the standard error as a percentage of the estimate. This allows standard errors of different resource types to be compared. The smaller the cv, the more accurate the estimate if repeated samples of a resource were taken from a population. A high cv (~100) indicates a very small number of samples, so there is a large variation of the estimate if repeated samples of a resource were drawn from a population a low cv (~1) indicates a higher resource and consequently a more reliable estimate.

T-tests were carried out between data sets for the two years to determine if differences were statistically significant.

## 3.0.

# RESULTS

### 3.1. Overview of landscape habitat results

An extensive map-based database has been completed for each ESA for 1995 and for 1998. This has been accessed and processed using ArcView and results compared between years. As the time period between the baseline survey and the re-survey was only three years there was little change in the percentage cover of land cover elements in any of the ESAs.

Grassland was the major habitat in each ESA. Improved grassland was most prevalent in the Mourne & Slieve Croob ESA (51% of total area), the Antrim Coast, Glens & Rathlin ESA (41% of total area) and Slieve Gullion (37% of total area) (Table 2). Woodland eligible for the ESA scheme was most common in the Antrim Coast, Glens & Rathlin ESA (9% of total area), in the West Fermanagh & Erne Lakeland ESA (6% of total) and in the Slieve Gullion ESA (6% of total area). Heather was most prevalent in the Sperrins ESA with an estimated 37377 hectares, 35% of the total area. There was more Bracken in the Slieve Gullion ESA than in any other ESA with an estimated 10% of the land area dominated by this species. The greatest length of hedges were found in Sperrins ESA (Table 3). However the densest field boundary network systems were found in the Slieve Gullion ESA with 26.8km/km<sup>2</sup> and the Mourne & Slieve Croob ESA with 24.4km/km<sup>2</sup>.

Significant changes in resource estimates between 1995 and 1998 included a slight increase in the area of grassland in the Mourne & Slieve Croob ESA and an increase in improved grassland in the Sperrins ESA (Table 2). Lengths of hedges and walls increased in the Mourne & Slieve Croob ESA and the Antrim Coast Glens & Rathlin ESA. Fencing increased in all ESAs and total length of field boundaries increased in all ESAs except Slieve Gullion. Boundary removal was noted in all ESAs except the Antrim Coast Glens & Rathlin (Table 3).

Areas of all habitats under ESA agreement increased in all ESAs over the three year period (Table 4).

Table 2. The estimated area of habitats in hectares in the Environmentally Sensitive Areas as a proportion of the total ESA area.

% = percentage change in the % total area of habitat between 1995 and 1998 in each ESA.

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Habitat	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
<b>Grassland</b>	28576 cv=8	<b>+2</b> <b>**</b>	27465 cv=7	<b>0</b>	56497 cv=10	<b>0</b>	56535 cv=2	<b>+2</b>	11279 cv=9	<b>0</b>
Improved	18704 cv=15	<b>+3</b>	15308 cv=20	<b>+6</b>	22235 cv=22	<b>+4</b>	25429 cv=5	<b>+11</b> <b>**</b>	5850 cv=23	<b>0</b>
Unimproved	7607 cv=32	<b>-6</b>	11853 cv=14	<b>-3</b>	28125 cv=14	<b>-2</b>	30662 cv=2	<b>-3</b>	5203 cv=19	<b>0</b>
<b>Woodland</b>	4124 cv=54	<b>+2</b>	4640 cv=18	<b>+2</b>	13140 cv=20	<b>+1</b>	10821 cv=4	<b>+2</b>	3487 cv=27	<b>0</b>
Eligible wood	1415 cv=40	<b>+2</b>	3264 cv=24	<b>0</b>	5266 cv=22	<b>+6</b>	3668 cv=14	<b>+5</b>	1044 cv=26	<b>0</b>
<b>Heather</b>	1870 cv=39	<b>0</b>	5009 cv=32	<b>0</b>	14786 cv=31	<b>+2</b>	37377 cv=3	<b>+3</b>	2297 cv=34	<b>+5</b>
wet heath	156 cv=42	<b>0</b>	4000 cv=24	<b>0</b>	12909 cv=33	<b>+3</b>	34750 cv=3	<b>+2</b>	110 cv=100	<b>0</b>
dry heath	1714 cv=39	<b>0</b>	1009 cv=100	<b>0</b>	1877 cv=80	<b>-3</b>	2627 cv=21	<b>+20</b>	2187 cv=37	<b>+5</b>
<b>Bracken</b>	646 cv=37	<b>+25</b>	1539 cv=26	<b>-4</b>	39 cv=100	<b>-87</b>	774 cv=12	<b>+3</b>	1664 cv=30	<b>0</b>
<b>Total Area</b>	<b>36300</b>		<b>37200</b>		<b>94800</b>		<b>106200</b>		<b>16000</b>	

Table 3. The predicted length of field boundaries in the Environmentally Sensitive Areas as a proportion of the total boundary length.

% = percentage change in the % total area of habitat between 1995 and 1998 in each ESA.

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Field boundary	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
<b>Hedge</b>	3583 cv=19	<b>+3</b> <b>*</b>	3348 cv=21	<b>+4</b> <b>*</b>	11090 cv=13	<b>+2</b>	8999 cv=3	<b>+2</b>	1639 cv=11	<b>+1</b>
<b>Wall</b>	4406 cv=20	<b>+5</b> <b>*</b>	1978 cv=23	<b>+4</b> <b>*</b>	694 cv=34	<b>-4</b>	1748 cv=3	<b>+11</b> <b>**</b>	1901 cv=18	<b>+17</b>
<b>Fence</b>	5534 cv=12	<b>+7</b> <b>**</b>	4864 cv=10	<b>+8</b> <b>**</b>	8311 cv=8	<b>+12</b> <b>***</b>	11945 cv=3	<b>+15</b> <b>***</b>	2598 cv=7	<b>+16</b> <b>*</b>
<b>River/stream/ditch without trees</b>	112 cv=49	<b>-26</b>	440 cv=31	<b>+17</b>	152 cv=29	<b>-11</b>	1734 cv=6	<b>+16</b> <b>**</b>	227 cv=34	<b>-2</b>
<b>Removed boundaries</b>	7 cv=89	<b>new</b>	0		176 cv=55	<b>new</b>	67 cv=7	<b>new</b>	9 cv=87	<b>new</b>
<b>Total field boundary</b>	8885 cv=8	<b>+5</b> <b>***</b>	6701 cv=6	<b>+7</b> <b>***</b>	15127 cv=9	<b>+5</b> <b>***</b>	16754 cv=2	<b>+8</b> <b>***</b>	4290 cv=5	<b>+12</b>

Table 4. The estimated areas of habitats (hectares) and length of field boundaries (km) under an Environmentally Sensitive Area agreement in each ESA.

% = percentage change in habitat area under ESA agreement as % of total ESA area.

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Habitat	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
<b>Grassland</b>	13383 cv=23	<b>+14 **</b>	17223 cv=13	<b>+15</b>	24922 cv=19	<b>+49</b>	22895 cv=3	<b>+39</b>	2735 cv=43	<b>+27</b>
Improved	8742 cv=31	<b>+12</b>	9263 cv=23	<b>+35</b>	9935 cv=34	<b>+58 *</b>	10125 cv=3	<b>+58 *</b>	1254 cv=35	<b>+16</b>
Unimproved	4049 cv=38	<b>+13</b>	7953 cv=18	<b>+6</b>	12917 cv=26	<b>+46 **</b>	12377 cv=4	<b>+25</b>	1481 cv=61	<b>+37</b>
<b>Woodland</b>	1135 cv=32	<b>+42</b>	3620 cv=20	<b>+70</b>	2027 cv=34	<b>+46 **</b>	1426 cv=18	<b>+118 *</b>	461 cv=28	<b>+84</b>
Eligible wood	464 cv=41	<b>+274</b>	2864 cv=24	<b>+108</b>	1595 cv=39	<b>+36 *</b>	526 cv=51	<b>+89</b>	394 cv=36	<b>+63</b>
<b>Heather</b>	1684 cv=42	<b>+44</b>	3622 cv=32	<b>+2</b>	5644 cv=35	<b>+83</b>	21688 cv=3	<b>+63 **</b>	535 cv=38	<b>new</b>
wet heath	156 cv=42	<b>+70</b>	2876 cv=24	<b>+14</b>	5066 cv=34	<b>+79</b>	21030 cv=3	<b>+59</b>	-	-
dry heath	1528 cv=42	<b>+42</b>	747 cv=100	<b>-26</b>	578 cv=41	<b>+118</b>	657 cv=76	<b>new</b>	535 cv=38	<b>new</b>
<b>Total Field Boundary</b>	4068 cv=23	<b>+22 *</b>	3709 cv=11	<b>+22</b>	6381 cv=20	<b>+56 ***</b>	6630 cv=3	<b>+73 ***</b>	824 cv=38	<b>+44</b>

## **3.2.**

## **FIELD BOUNDARIES**

Field boundaries were described in terms of their type, structure, management and component plant species. These descriptors help quantify the differences in field boundary type and composition between and within ESAs and between years.

### **3.2.1. Field boundary type**

Hedges were the most frequent field boundary type in the West Fermanagh & Erne Lakeland ESA, the Antrim Coast Glens & Rathlin ESA and the Sperrins ESA with stone walls dominant in the Mourne & Slieve Croob ESA and the Slieve Gullion ESA where they occupied 49% and 44% of boundary length respectively.

Estimates of total boundary length increased significantly in all ESAs between 1995 and 1998. There were significant increases in the estimates of hedges in the Mourne & Slieve Croob and in the Antrim Coast Glens & Rathlin ESAs and increases in the estimates of walls in the Mourne & Slieve Croob and the Sperrins ESAs. Lengths of fences had increased significantly in all ESAs. Boundary removal had taken place in all five ESAs between 1995 and 1998 (Table 5). The highest proportion of removed boundaries occurring in the West Fermanagh & Erne Lakeland ESA. Removal throughout the five ESAs occurred mainly on non-participant farms although there was evidence of isolated incidences of boundary removal on ESA farms in the West Fermanagh & Erne Lakeland ESA. Hedges were the main boundary type removed in all ESAs followed by fences and walls (Table 7).

In the Mourne & Slieve Croob 63% of walls were under ESA agreement, an increase of 24% since 1995. In the Antrim Coast Glens & Rathlin 66% of walls and 59% of hedges are now estimated to be under ESA agreement, increases of 22% and 19% respectively.

Total field boundaries under agreement increased in all five ESAs the most notable increases were a 56% increase in boundaries under agreement in the West Fermanagh & Erne Lakeland ESA and a 73% increase in boundaries under agreement in the Sperrins ESA.

Table 5. The estimated lengths of field boundaries in the Environmentally Sensitive Areas

% = percentage change in total field boundary length in each ESA

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Boundary type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
<b>Hedge</b>	3583 cv=19	<b>+3 *</b>	3348 cv=21	<b>+4 *</b>	11090 cv=13	<b>+2</b>	8999 cv=3	<b>+2</b>	1639 cv=11	<b>+1</b>
<b>Wall</b>	4406 cv=20	<b>+5 *</b>	1978 cv=23	<b>+4</b>	694 cv=34	<b>-4</b>	1748 cv=3	<b>+11 ***</b>	1901 cv=18	<b>+17</b>
<b>Fence</b>	5534 cv=12	<b>+7 **</b>	4864 cv=10	<b>+8 **</b>	8311 cv=8	<b>+12 ***</b>	11945 cv=3	<b>+15 ***</b>	2598 cv=7	<b>+16 *</b>
<b>River/stream/ditch without trees</b>	112 cv=49	<b>-26</b>	440 cv=31	<b>+17</b>	152 cv=29	<b>-11</b>	1734 cv=6	<b>+16 **</b>	227 cv=34	<b>-2</b>
<b>Removed boundaries</b>	7 cv=89		0		176 cv=55		67 cv=7		9 cv=87	
<b>Total Field Boundary (Km)</b>	8885 cv=8	<b>+5 ***</b>	6701 cv=6	<b>+7 ***</b>	15127 cv=9	<b>+5 ***</b>	16754 cv=2	<b>+8 ***</b>	4290 cv=5	<b>+12</b>

Table 6. The estimated length of field boundaries under an Environmentally Sensitive Area agreement in each ESA.

% = percentage change in total field boundary length between 1995 & 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Boundary type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
<b>Hedge</b>	1063 cv=31	<b>+11</b>	1394 cv=23	<b>+19</b>	4871 cv=24	<b>+49 ***</b>	3269 cv=4	<b>+52 *</b>	422 cv=59	<b>+29</b>
<b>Wall</b>	2770 cv=28	<b>+24</b>	1338 cv=21	<b>+22</b>	312 cv=37	<b>+27</b>	547 cv=3	<b>+80 *</b>	235 cv=15	<b>+96</b>
<b>Fence</b>	2285 cv=25	<b>+24 *</b>	2574 cv=15	<b>+23</b>	3153 cv=19	<b>+82 ***</b>	4355 cv=3	<b>+77 ***</b>	487 cv=47	<b>+61</b>
<b>River/stream/ditch Without trees</b>	18 cv=42	<b>-14</b>	361 cv=24	<b>-9</b>	59 cv=48	<b>+110</b>	858 cv=3	<b>+85</b>	23 cv=93	<b>-56</b>
<b>Removed boundary</b>	0		0		66 cv=36		0		0	
<b>Total Field Boundary</b>	4068 cv=23	<b>+22 *</b>	3702 cv=11	<b>+26</b>	6381 cv=20	<b>+56 ***</b>	6630 cv=3	<b>+73 ***</b>	824 cv=38	<b>+43</b>

Table 7. Length (km) and relative proportions of each removed boundary type in each of the ESAs

% = percentage of total removed boundary length in each ESA.  
 cv = coefficient of variation (precision of estimate)

Removed boundary type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
<b>Removed hedge</b>	4 cv=100	<b>57</b>	0	-	81 cv=30	<b>46</b>	54 cv=9	<b>81</b>	7 cv=100	<b>78</b>
<b>Removed wall</b>	1 cv=42	<b>14</b>	0	-	10 cv=42	<b>6</b>	13 cv=3	<b>19</b>	0	-
<b>Removed fence</b>	2 cv=100	<b>29</b>	0	-	85 cv=100	<b>48</b>	0	-	2 cv=38	<b>22</b>
<b>Total removed</b>	7 cv=87		0	-	176 cv=55		67 cv=7		9 cv=87	

### 3.2.2. Field boundary management

In 1995 the majority of field boundaries were unmanaged, with the Sperrins and Slieve Gullion ESAs having the highest proportion of unmanaged boundaries. Management of boundaries increased in all ESAs over the three year period with the greatest increases occurring in the Sperrins (Table 8). These increases were significant in all ESAs except Slieve Gullion. Proportions of total managed hedges under ESA agreement increased over the three year period.



Table 8. The length of managed and unmanaged field boundaries in each ESA

% = percentage change in boundary management between 1995 and 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Boundary management	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
Unmanaged	5958 cv=12	<b>+1</b>	3862 cv=11	<b>-6</b>	7977 cv=14	<b>0</b>	10620 cv=1	<b>-1</b>	2391 cv=17	<b>+4</b>
Managed <2 years	1224 cv=21	<b>+31*</b>	924 cv=46	<b>+71*</b>	2152 cv=21	<b>+14</b>	888 cv=28	<b>+62**</b>	292 cv=26	<b>+32</b>
Managed 2-5 years	493 cv=36	<b>16</b>	184 cv=36	<b>-35</b>	1041 cv=28	<b>+11</b>	280 cv=24	<b>-19*</b>	102 cv=62	<b>-20</b>
Managed >5 years	434 cv=40	<b>-21</b>	176 cv=41	<b>-19</b>	669 cv=30	<b>+22</b>	390 cv=6	<b>+39*</b>	34 cv=39	<b>+17</b>
Total Managed	2151 cv=21	<b>+12*</b>	1284 cv=37	<b>+23*</b>	3862 cv=18	<b>+15***</b>	1558 cv=19	<b>+34**</b>	428 cv=32	<b>+14</b>

Table 9. The length of managed and unmanaged field boundaries under ESA agreement in each ESA.

% = percentage change in boundary management between 1995 and 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Boundary management	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
Unmanaged	3112 cv=27	<b>+23</b>	1970 cv=14	<b>+10</b>	3584 cv=24	<b>+57***</b>	3813 cv=3	<b>+47*</b>	545 cv=46	<b>+33</b>
Managed <2 years	424 cv=57	<b>+30</b>	324 cv=30	<b>+67</b>	997 cv=29	<b>+45</b>	334 cv=13	<b>+333**</b>	71 cv=57	<b>+22</b>
Managed 2-5 years	119 cv=33	<b>0</b>	116 cv=52	<b>-40</b>	428 cv=53	<b>+67</b>	42 cv=3	<b>-57</b>	17 cv=41	<b>0</b>
Managed >5 years	134 cv=37	<b>-21</b>	110 cv=25	<b>-9</b>	197 cv=48	<b>+44</b>	123 cv=3	<b>+241</b>	9 cv=38	<b>+200</b>
Total Managed	677 cv=37	<b>+10</b>	569 cv=24	<b>+10</b>	1622 cv=30	<b>+46**</b>	499 cv=9	<b>+136*</b>	97 cv=42	<b>+27</b>

Hedgerow management prescriptions within the ESA scheme should result in a greater proportion of well managed, species-rich hedges. It is not possible to assess hedgerow quality simply on the basis of whether or not management has taken place. Bad management as well as good occurs in all of the ESAs. Excessive flailing can be just as damaging to a hedge as neglect.

### 3.2.3. Field boundary structure

In 1995 the majority of hedges in all ESAs were gappy, with less than 35% of hedges in any ESA being a stockproof, complete boundary without the use of fencing wire (Table 10). By 1998 estimates of stockproof complete boundaries had increased significantly in the Mournes & Slieve Croob ESA the West Fermanagh & Erne Lakeland ESA and the Sperrins ESA (Table 10).

Table 10. The length of complete and gappy field boundaries in each ESA.

% = percentage change in boundary structure between 1995 and 1998

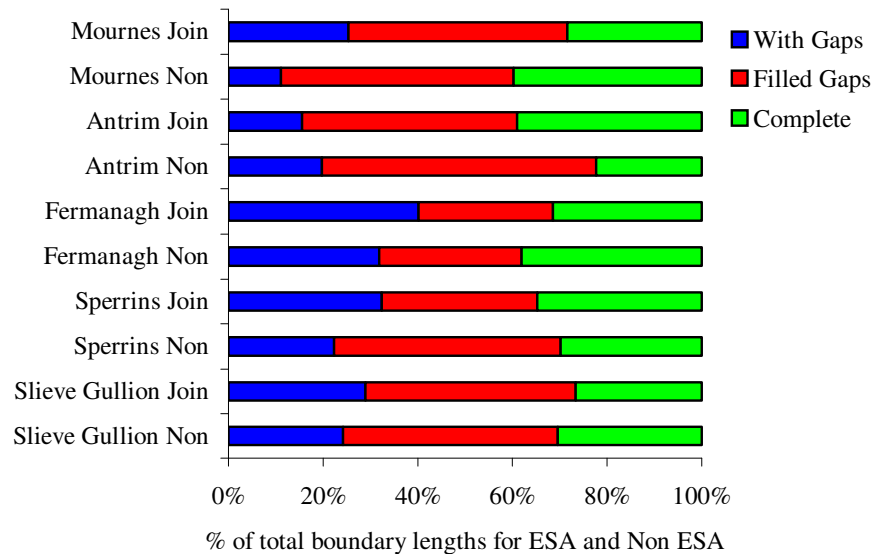
cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Boundary Structure	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
Boundary with gaps	1561 cv=24	<b>+8</b>	1158 cv=19	<b>+16</b>	5312 cv=17	<b>+4</b>	4230 cv=2	<b>+3</b>	1074 cv=16	<b>+3</b>
Boundary with filled gaps (wire etc)	4254 cv=13	<b>+1</b>	3407 cv=12	<b>+8</b>	4412 cv=14	<b>+3</b>	6775 cv=4	<b>+5 *</b>	1934 cv=12	<b>+4</b>
Complete boundary	3074 cv=23	<b>+8 *</b>	2079 cv=12	<b>-2</b>	5305 cv=12	<b>+12 ***</b>	5109 cv=2	<b>+17 ***</b>	1270 cv=38	<b>+29</b>

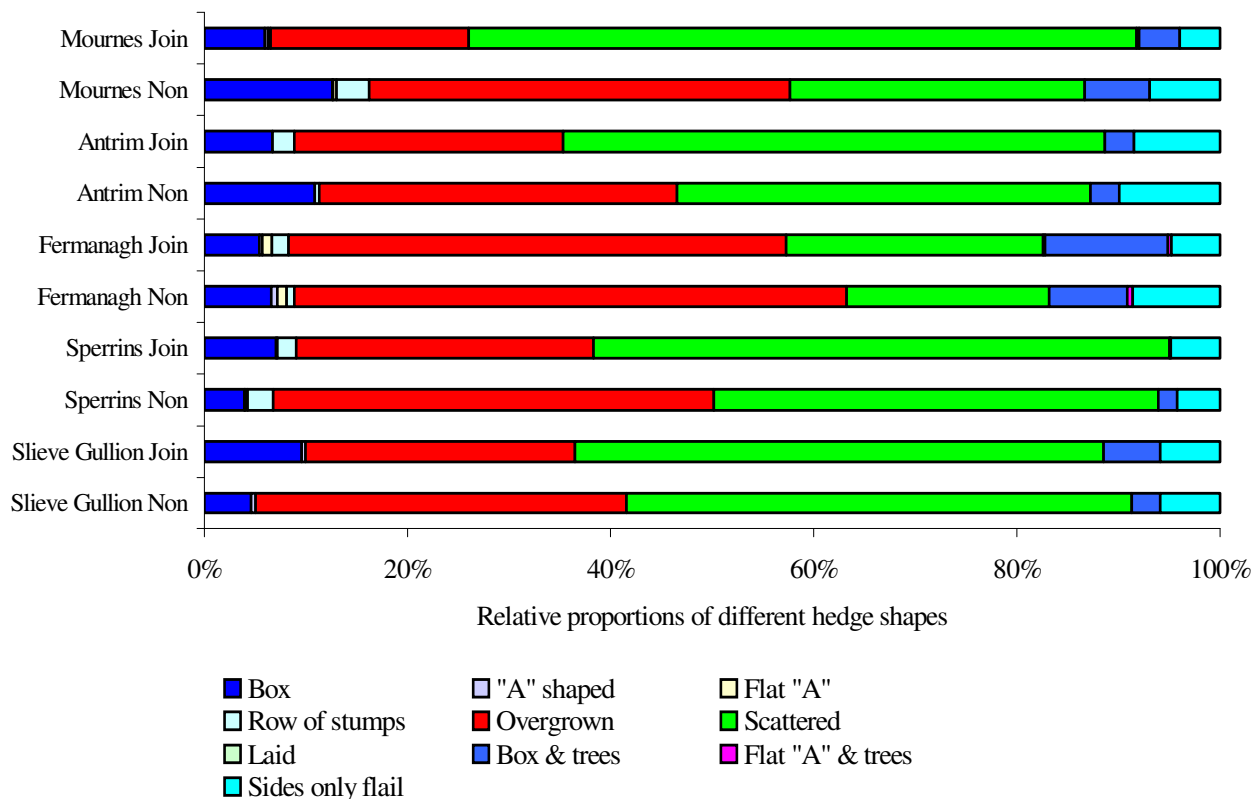
To establish the effect of the scheme's prescriptions on boundaries within the ESAs it is necessary to look at the structural components of hedges on participant and non-participant farms separately (Figure 1).

Figure 1. The relative proportions of different hedge structure types within ESA participant (Join) and non-participant farms (Non) in 1998.



The proportion of complete, gappy and filled hedges varied throughout the ESAs, on ESA participant and non-participant farms. On ESA participant farms in the Antrim Coast, Glens & Rathlin 39% of boundaries were classified as complete. This is higher than on participant sites in any of the other ESAs but lower than on non-participant sites in the Mournes & Slieve Croob where 40% of boundaries were complete. The highest proportions of boundaries with filled gaps (58%) were found on non-participant farms within the Antrim Coast Glens & Rathlin ESA. While the smallest proportion of filled gaps (28%) were found in boundaries on non-participating farms in the West Fermanagh & Erne Lakeland ESA. This ESA also demonstrated the highest proportion of hedges with gaps within ESA participant farms.

Figure 2. The relative proportions of different hedge shapes within ESA participant and non-participant farms in 1998.



The two most commonly found shapes of hedges in all five of the Environmentally Sensitive Areas were ‘overgrown’ and ‘scattered trees and shrubs’ (Figure 2). This highlights the scale of hedgerow neglect throughout the designated areas and emphasises the requirement for some form of active management.

In all five of the ESAs the proportion of overgrown hedges was higher on participant sites than on farms outside the scheme.

Rows of stumps correspond to hedges which have undergone recent coppicing, this is recommended to encourage rejuvenation of gappy hawthorn and blackthorn hedges. In the Antrim Coast Glens & Rathlin ESA and the West Fermanagh & Erne Lakeland ESA boundaries under ESA agreement showed a higher proportion of this form of management than boundaries on equivalent non-participant farms.

In the Mourne & Slieve Croob ESA there was a comparatively high proportion of hedges made up of scattered trees and shrubs, especially on participant sites. The greatest proportion of non-participant boundaries in this ESA were classified as overgrown, indicating a possible lack of management. Some hedge laying had taken place on ESA participant sites.

The West Fermanagh & Erne Lakeland ESA exhibited the widest range of different hedge shapes. Examples of the less common shapes e.g. “A” shape, flat “A”, flat “A” with trees and coppiced were found throughout the ESA. In addition to these, the ESA participant sites contained examples of hedges that had been recently laid. Box-shaped hedges with trees were found to be more common in the West Fermanagh & Erne Lakeland ESA than in any of the other ESAs. Overgrown hedges were also most common in the West Fermanagh & Erne Lakeland ESA. This was particularly the case on non-participant sites where overgrown hedges represented approximately 54% of the total.

### 3.2.4. Hedge plant species

Table 11. Tree and shrub types within hedges in each of the ESAs

% = percentage change in length between 1995 and 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Tree / shrub type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
Gorse/Hawthorn/Rowan	3430 cv=11	<b>+1</b>	1163 cv=37	<b>-2</b>	928 cv=40	<b>+11</b>	3619 cv=4	<b>-1</b>	1215 cv=21	<b>+1</b>
Willow/Alder/Hazel	272 cv=34	<b>+9</b>	237 cv=64	<b>-1</b>	4456 cv=20	<b>+2</b>	1176 cv=29	<b>+4</b>	31 cv=60	<b>-23</b>
Blackthorn/Hazel/Holly	256 cv=34	<b>+17</b>	209 cv=19	<b>-5</b>	1528 cv=29	<b>+20</b>	509 cv=19	<b>+2</b>	120 cv=43	<b>+13</b>
Hawthorn/Ash	1596 cv=23	<b>+1</b>	1737 cv=16	<b>-1</b>	2925 cv=22	<b>+3</b>	2615 cv=7	<b>+8</b> <b>*</b>	1500 cv=19	<b>+8</b> <b>*</b>
Hawthorn/Rose	331 cv=38	<b>0</b>	432 cv=73	<b>+11</b>	708 cv=32	<b>+3</b>	27 cv=3	<b>+4</b>	12 cv=40	<b>-50</b>
“Castlewellan Gold”	62 cv=95	<b>+32</b>	17 cv=55	<b>-6</b>	63 cv=43	<b>+5</b>	30 cv=23	<b>+15</b>	18 cv=68	<b>+100</b>
Garden species	72 cv=51	<b>+16</b>	88 cv=19	<b>+83</b>	57 cv=48	<b>-2</b>	61 cv=12	<b>+91</b>	38 cv=51	<b>+6</b>
Mature deciduous trees	83 cv=100	<b>0</b>	3 cv=24	<b>-82</b>	26 cv=69	<b>+24</b>	61 cv=3	<b>+17</b>	0 -	<b>-100</b>
Conifer	14 cv=42	<b>+8</b>	41 cv=68	<b>-32</b>	91 cv=55	<b>+90</b>	248 cv=10	<b>-1</b>	5 cv=100	new

Hedges recorded in each ESA were classified into nine vegetation groups based on the tree and shrub composition and four hedge ground flora groups according to their dominant species, Tables 11 and 12. Willow/alder/hazel dominated hedges were most frequent in the West Fermanagh & Erne Lakeland ESA (42% of hedges). Gorse/rowan hedges were the commonest hedge found in the Sperrins ESA (45% of hedges). The West Fermanagh & Erne Lakeland ESA had the greatest length of hedges with a species-rich ground flora (44% of hedges) (Table 12). Slieve Gullion had the highest percentage of hedges (85%) with a species-poor ground flora.

The only significant differences in hedge species composition occurred in the Sperrins and the Slieve Gullion ESAs where hawthorn/ash hedges were estimated to have increased by 8%.

Hedges dominated by “Castlewellan Gold” leyland cypress increased in most of the ESAs, notably Slieve Gullion and the Sperrins ESAs. This was however based on a small sample size and mainly occurred in domestic situations. The length of boundaries made up of mature

deciduous trees remained constant in the Mourne & Slieve Croob ESA and increased in the Sperrins and the West Fermanagh & Erne Lakeland ESA. The length of boundaries with mature deciduous trees in the Antrim Coast Glens & Rathlin was predicted to have decreased by 82%, however this figure is based on a very small overall length (3km) and is representative of a loss of only 0.65km of this boundary type over the entire ESA. Small sample size also explains the 100% decrease of this hedge type in Slieve Gullion. Between 1995 and 1998 the total length of conifer hedges was estimated to have increased in all the ESAs with the exception of the Antrim Coast, Glens & Rathlin and the Sperrins, (the ESA with the greatest length of conifer boundaries-248km) where a very slight decrease was observed.

Gorse/hawthorn/rowan hedges were the most frequent hedge type in the Mourne & Slieve Croob ESA (56% - 3430km) and in the Sperrins where they made up 43% of the total (3619km). Hawthorn/ash hedges were the most frequent hedge type in the Antrim Coast, Glens & Rathlin ESA (44% of hedges – 1737km) and in the Slieve Gullion ESA (51% of hedges). Willow/alder/hazel hedges were the most commonly found in the West Fermanagh & Erne Lakeland ESA (41% – 4456km). The proportion of hedges with species poor, grassy ground-floras increased significantly in the Sperrins and Slieve Gullion ESAs (Table 12).

Table 12. Ground flora types within boundaries in each of the ESAs

% = percentage change in ground flora type between 1995 and 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Ground flora types	Mourne & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%	Length 1998	%
Species poor Grasses/brambles	4265 cv=11	<b>+5</b>	2815 cv=14	<b>+1</b>	5522 cv=18	<b>+7</b>	6610 cv=4	<b>+6</b> <b>*</b>	2519 cv=11	<b>+7</b> <b>*</b>
Species poor Daisy/overgrazed	90 cv=64	<b>+1</b>	532 cv=54	<b>-1</b>	495 cv=59	<b>+7</b>	1776 cv=3	<b>+2</b>	157 cv=37	<b>-13</b>
Species rich Primrose/ivy	386 cv=51	<b>+14</b>	500 cv=49	<b>-3</b>	3578 cv=22	<b>+2</b>	514 cv=45	<b>+3</b>	80 cv=28	<b>+54</b>
Species rich Upland foxglove/bilberry	1575 cv=28	<b>-8</b>	262 cv=34	<b>+6</b>	1260 cv=46	<b>+11</b>	2471 cv=4	<b>+1</b>	418 cv=40	<b>-4</b>

### 3.3.

## HEATHER MOORLAND

In 1995 different heather types dominated each ESA, with wet heath the most common heather type in the Sperrins ESA, the Antrim Coast, Glens & Rathlin and in the West Fermanagh & Erne Lakeland. Dry heath was more frequent in the Mourne & Slieve Croob ESA and in the Slieve Gullion ESA. The majority of the Sperrins ESA (71%) and half of the Antrim Coast, Glens & Rathlin were classified as grassy wet heath. Areas of heather in the Antrim Coast Glens & Rathlin, the Mourne & Slieve Croob and the Slieve Gullion ESA remained the same between 1995 and 1998 with no significant differences. There were however some trends which may prove significant in the future. In the Sperrins for example ESA estimates of grassy dry heath increased between 1995 and 1998 (Table 13). Marginal areas of rough grazing classified as grassland in 1995 were reclassified as grassy dry heath in 1998 due to *Calluna vulgaris* increasing beyond the critical level of 25% (a slight decrease in the amount of unimproved grassland was also observed in this ESA). Reductions in grazing pressure may have increased the proportion of this species to above the critical 25% level and allowed reclassification of the area from unimproved grassland to grassy dry heath (a slight decrease in the amount of unimproved grassland was also observed in this ESA). The total area of heather under agreement increased considerably in the Sperrins, the Mourne & Slieve Croob and the West Fermanagh & Erne Lakeland (Tables 15 & 16). Half of the heather area in the Mourne & Slieve Croob was predicted to be under agreement in 1995, this has now increased to 90%. In 1995 no heather was predicted to be under ESA agreement in the Slieve Gullion ESA. Since then an estimated 535 ha of grassy dry heath has come under agreement in this ESA (Table 15).

Table 13. The estimated area of each heather type (ha) in the Sperrins and Slieve Gullion Environmentally Sensitive Areas.

% = percentage change in heather type between 1995 & 1998

cv = coefficient of variation (precision of estimate)

Heather vegetation type	Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%
Typical wet heath	8524 cv=3	<b>+4</b>	-	<b>0</b>
Grassy wet heath	26226 cv=3	<b>+1</b>	110 cv=100	<b>0</b>
Typical dry heath	1596 cv=3	<b>0</b>	132 cv=38	<b>0</b>
Grassy dry heath	1031 cv=54	<b>+75</b>	2055 cv=37	<b>+6</b>
<b>Total heather</b>	37377 cv=3	<b>+3</b>	2297 cv=34	<b>+5</b>

Table 14. The estimated areas of wet and dry heath (ha) in each of the remaining Environmentally Sensitive Areas.

% = percentage change in heather type between 1995 & 1998

cv = coefficient of variation (precision of estimate)

Heather vegetation type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland	
	Area 1998	%	Area 1998	%	Area 1998	%
Wet heath	156 cv=42	<b>0</b>	4000 cv=24	<b>0</b>	12909 cv=33	<b>+3</b>
Dry heath	1714 cv=39	<b>0</b>	1009 cv=100	<b>0</b>	1877 cv=80	<b>-3</b>
<b>Total heather</b>	1870 cv=39	<b>0</b>	5009 cv=32	<b>0</b>	14786 cv=31	<b>+2</b>



Table 15. The estimated area of heather types (ha) under an ESA agreement in the Sperrins and Slieve Gullion Environmentally Sensitive Areas and percentage change in area of heather under agreement between 1995 & 1998.

% = percentage change in area of heather under agreement between 1995 & 1998.

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Heather vegetation type	Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%
Typical wet heath	3808 cv=3	<b>+98</b>	-	0
Grassy wet heath	17222 cv=3	<b>+52*</b>	-	0
Typical dry heath	0 -	<b>0</b>	-	0
Grassy dry heath	657 cv=76	new	535 cv=38	new
<b>Total Heather</b>	21688 cv=3	<b>+63***</b>	535 cv=38	new

Table 16. The estimated area of heather types (ha) and percentage change in area of heather under agreement between 1995 & 1998 under an ESA agreement in the Mourne & Slieve Croob, the Antrim Coast, Glens & Rathlin and West Fermanagh & Erne Lakeland Environmentally Sensitive Areas

% = percentage change in area of heather under agreement between 1995 & 1998.

cv = coefficient of variation (precision of estimate)

Heather vegetation type	Mourne & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland	
	Area 1998	%	Area 1998	%	Area 1998	%
Wet heath	156 cv=42	<b>+70</b>	2876 cv=24	<b>+13</b>	5066 cv=34	<b>+79</b>
Dry heath	1528 cv=42	<b>+42</b>	747 cv=100	<b>-26</b>	578 cv=41	<b>+118</b>
<b>Total Heather</b>	1684 cv=42	<b>+44</b>	3622 cv=32	<b>+2</b>	5644 cv=35	<b>+83</b>

### 3.4.

## GRASSLAND

Estimates of the area of improved grassland increased significantly in the Sperrins ESA and the total area of grassland increased significantly in the Mourne & Slieve Croob ESA. This was due to re-seeding in these areas. Estimates of species rich unimproved grassland increased in all ESAs except the Antrim Coast Glens & Rathlin where estimates decreased slightly. Estimates of species poor unimproved grassland decreased in all ESAs between the two years (Tables 17 & 19). Species-rich unimproved grassland was most frequent in the West Fermanagh & Erne Lakeland ESA and common in the Sperrins and the Antrim Coast, Glens & Rathlin (Table 17 & 19). Areas of species rich unimproved grassland under ESA agreement increased in all ESAs with over 75% of this habitat type now coming under agreement in the Antrim Coast Glens & Rathlin, the Mourne & Slieve Croob and the Slieve Gullion ESAs (Table 18).

Table 17. The estimated area of each grassland type in hectares in each of the Environmentally Sensitive Areas in 1998 and the percentage change between 1995 and 1998.

% = percentage change in grassland area between 1995 and 1998.

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

	<b>Mourne &amp; Slieve Croob</b>		<b>Antrim Coast, Glens &amp; Rathlin</b>		<b>Sperrins</b>		<b>Slieve Gullion</b>	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
<b>Unimproved grassland</b>	7607 cv=32	<b>-7</b>	11853 cv=14	<b>-3</b>	30662 cv=2	<b>-3</b>	5203 cv=19	<b>0</b>
species-rich	834 cv=36	<b>+49</b>	3803 Cv=19	<b>-3</b>	10388 cv=3	<b>+19</b>	391 cv=61	<b>+11</b>
species-poor	6639 cv=32	<b>-12</b>	8050 Cv=14	<b>-1</b>	20274 cv=3	<b>-4</b>	4812 cv=17	<b>-1</b>
<b>Improved grassland</b>	18704 cv=15	<b>+3</b>	15308 Cv=20	<b>+6</b>	25429 cv=5	<b>+11</b> <b>**</b>	5850 cv=23	<b>0</b>
<b>Total grassland</b>	28576 cv=8	<b>+2 **</b>	27465 Cv=7	<b>0</b>	56535 cv=2	<b>+2</b>	11279 cv=9	<b>0</b>

Figure 3. Estimated percentages of species-rich unimproved grassland under agreement in each of the ESAs in 1995 and 1998.

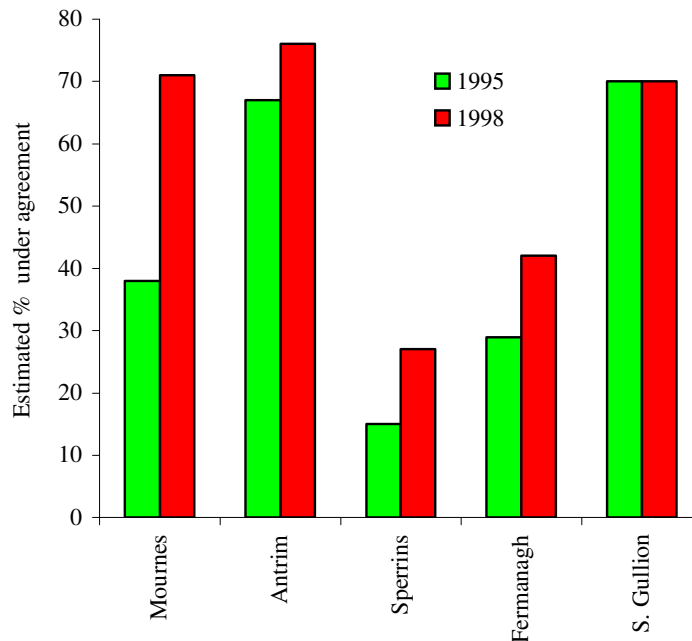


Table 18. The estimated area of each grassland type in hectares under an ESA agreement in each of the Environmentally Sensitive Areas and the percentage change between 1995 and 1998.

% = percentage change between 1995 and 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
<b>Unimproved grassland</b>	4049 cv=38	<b>+13</b>	7953 cv=18	<b>+6</b>	12377 cv=4	<b>+25</b>	1481 cv=61	<b>+37</b>
species-rich	594 cv=36	<b>+216</b>	2892 cv=21	<b>+1</b>	2840 cv=3	<b>+122 *</b>	272 cv=88	<b>+18</b>
species-poor	3342 cv=41	<b>-2</b>	5061 cv=20	<b>+11</b>	9894 cv=5	<b>+41 *</b>	1208 cv=58	<b>+41</b>
<b>Improved grassland</b>	8742 cv=31	<b>+12</b>	9263 cv=23	<b>+35</b>	10125 cv=3	<b>+58 *</b>	1254 cv=35	<b>+16</b>
<b>Total grassland</b>	13383 cv=23	<b>+14 **</b>	17223 cv=13	<b>+15</b>	22895 cv=3	<b>+39</b>	2735 cv=43	<b>+26</b>

The West Fermanagh & Erne Lakeland ESA was analysed further due to its diverse range of grassland types. These were classified into the habitat types, hay meadows, wet grassland, unimproved grassland and limestone grassland (Table 19). Hay meadows constitute an estimated

5% of the total grassland area, with the majority of these described as species-rich. Wet grassland occupied a further 5%, with limestone grassland representing 1% of the total predicted grassland area. The estimated areas of hay meadows, wet grassland, and limestone grassland classified as species poor increased whilst those classified as species rich decreased in the ESA as a whole. It is estimated that about 60% of grassland habitat types remain outside the ESA scheme although there has been substantial increases in areas under agreement in the last three years (Table 19).

Table 19. Areas in hectares of grassland habitats in the West Fermanagh & Erne Lakeland ESA and percentage change between 1995 & 1998.

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Habitat	1998 Area	% change between 1995 & 1998	Area under ESA agreement in 1998	% change in area under agreement between 1995 & 1998
<b>Hay meadow</b>	2864 cv=45	-3	1174 cv=51	+28
Species-rich hay meadows	1990 cv=54	-10	802 cv=61	+6
Species-poor hay meadows	874 cv=75	+17	372 cv=62	+90
<b>Wet grassland</b>	2665 cv=49	+1	646 cv=44	+212
Species-rich wet grassland	1177 cv=55	-2	295 cv=66	+327
Species-poor wet grassland	1488 cv=38	+3	351 cv=62	+156
<b>Unimproved grassland</b>	28125 cv=14	-2	12917 cv=26	+46 **
Species-rich	12039 cv=26	+4	5478 cv=39	+58 *
Species-poor	16086 cv=15	-6	7439 cv=26	+38 **
<b>Improved grassland</b>	22235 cv=22	+4	9935 cv=34	+58 *
<b>Limestone</b>	594 cv=37	-28	239 cv=39	-49
Species-rich	218 cv=58	-52	144 cv=52	-62
Species-poor	376 cv=42	0	94 cv=42	0
<b>TOTAL GRASSLAND</b>	56497 cv=10	0	24922 cv=19	+49 ***

### 3.5.

## WOODLAND

There were no significant changes in the total estimated area of woodland eligible for the ESA scheme in any of the ESAs between 1995 and 1998 (Table 20). There were however some non-significant changes in the proportions of some woodland types and these may be indicative of future trends. Estimates of mixed wood increased in the Antrim Coast Glens & Rathlin and the West Fermanagh & Erne Lakeland and decreased in the Sperrins. Planting of new mixed wood was noted in the Antrim Coast Glens & Rathlin. Coniferous wood and gorse scrub, although not eligible for inclusion in the ESA scheme, make a highly visual contribution to landscape in ESA areas. Estimates of gorse scrub increased in the Mournes & Slieve Croob ESA. Estimated areas of coniferous forest increased in the Antrim Coast Glens & Rathlin ESA although this was a very small sample size (Table 20). The area of scrub in the Antrim Coast, Glens & Rathlin, the West Fermanagh & Erne Lakeland and the Sperrins ESAs was predicted to have increased between 1995 and 1998.

Table 20. The estimated area of woodland types (in hectares) in each of the Environmentally Sensitive Areas and percentage change between 1995 & 1998.

% = percentage change in woodland area between 1995 & 1998

cv = coefficient of variation (precision of estimate)

Woodland Type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
Broad-leaf	581 cv=84	<b>+3</b>	474 cv=23	<b>0</b>	1251 cv=41	<b>0</b>	2167 cv=15	<b>+8</b>	187 cv=36	<b>0</b>
Mixed wood	204 cv=99	<b>+4</b>	156 cv=24	<b>+11</b>	1089 cv=45	<b>+7</b>	146 cv=3	<b>-8</b>	233 cv=100	<b>0</b>
Conifer	1583 cv=100	<b>0</b>	118 cv=31	<b>+79</b>	6789 cv=37	<b>-2</b>	6561 cv=3	<b>-3</b>	1074 cv=34	<b>0</b>
Scrub	672 cv=36	<b>0</b>	2674 cv=24	<b>+5</b>	2518 cv=38	<b>+8</b>	1388 cv=17	<b>+3</b>	640 cv=30	<b>0</b>
Gorse	956 cv=43	<b>+5</b>	1195 cv=33	<b>0</b>	808 cv=42	<b>-7</b>	392 cv=3	<b>-5</b>	1316 cv=30	<b>0</b>
Other	128 cv=28	<b>+12</b>	23 cv=23	<b>+21</b>	821 cv=37	<b>-4</b>	158 cv=39	<b>-9</b>	36 cv=97	<b>0</b>
Removed	0		0		137 cv=91	new	15 cv=68	New	0	
<b>Total Woodland eligible for scheme</b>	1415 cv=40	<b>+2</b>	3264 cv=24	<b>0</b>	5266 cv=22	<b>+6</b>	3668 cv=14	<b>+5</b>	1044 cv=26	<b>0</b>

The estimated area of woodland types in hectares under an ESA agreement increased in all ESAs (Table 21). In the West Fermanagh & Erne Lakeland ESA there was a significant rise in the amount of woodland eligible for participation in the scheme.

Table 21. The estimated area of woodland types in hectares under an ESA agreement in each of the Environmentally Sensitive Areas and the percentage change between 1995 & 1997.

% = percentage change between 1995 & 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Woodland Type	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
Broad - leaf	13 cv=42	New	442 cv=23	<b>+4</b>	381 cv=83	<b>+32</b>	160 cv=100	<b>+452</b>	13 cv=100	<b>+333</b>
Mixed wood	44 cv=43	<b>+158</b>	27 cv=24	<b>+42</b>	208 cv=45	<b>+103</b>	84 cv=3	<b>+61</b>	18 cv=38	<b>0</b>
Conifer	2 cv=42	<b>0</b>	89 cv=37	<b>+368</b>	13 cv=67	<b>0</b>	536 cv=3	<b>+83</b> <b>*</b>	0	-
Scrub	428 cv=41	<b>+234</b>	2243 cv=24	<b>+144</b>	637 cv=44	<b>+72</b> <b>*</b>	296 cv=29	<b>+41</b>	372 cv=37	<b>+66</b>
Gorse	582 cv=45	<b>-3</b>	810 cv=45	<b>+15</b>	246 cv=36	<b>+267</b> <b>**</b>	70 cv=3	<b>+141</b>	55 cv=52	<b>+1733</b>
Other	66 cv=35	<b>+24</b>	9 cv=29	<b>-18</b>	530 cv=53	<b>+16</b>	58 cv=3	<b>+41</b>	4 cv=100	<b>+300</b>
Removed	0	-	0	-	13 cv=100	new	1 cv=100	new	0	-
<b>Total woodland eligible for payment in ESA scheme</b>	464 cv=41	<b>+274</b>	2864 cv=24	<b>+108</b>	1595 cv=39	<b>+36</b> <b>*</b>	526 cv=51	<b>+89</b>	394 cv=36	<b>+63</b>

Table 22. The estimated area of managed woodland in hectares in each of the Environmentally Sensitive Areas and the percentage change between 1995 & 1997.

% = percentage change in management between 1995 & 1998

cv = coefficient of variation (precision of estimate)

Management	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
Unmanaged	1715 cv=25	<b>-50</b>	3154 cv=18	<b>+1</b>	7231 cv=17	<b>+2</b>	3725 cv=9	<b>-1</b>	1556 cv=35	<b>+4</b>
Managed	2409 cv=97	<b>+313</b>	1486 cv=23	<b>+3</b>	6182 cv=33	<b>0</b>	5871 cv=8	<b>-17</b>	1930 cv=37	<b>-3</b>

Few differences were observed in the total areas of managed woodland between 1995 and 1998 (Table 22). There was a notable, although not significant decrease in the estimated area of unmanaged woodland in the Mournes & Slieve Croob ESA, which coupled with an increase in the area of managed woodland (Table 22) suggests that ESA management prescriptions are having an effect on the designated area as a whole. Predicted areas of managed and unmanaged woodland under agreement increased in each of the ESAs (Table 23).

Table 23. The estimated area of managed woodland in hectares under an ESA agreement in each of the Environmentally Sensitive Areas and the percentage change between 1995 & 1997.

% = percentage change between 1995 & 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Management	Mournes & Slieve Croob		Antrim Coast Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%	Area 1998	%
Unmanaged	808 cv=33	<b>+20</b>	2409 cv=21	<b>+144</b>	1336 cv=29	<b>+74</b> <b>**</b>	780 cv=34	<b>+65</b>	156 cv=31	<b>+250</b>
Managed	327 cv=78	<b>+160</b>	1212 cv=23	<b>+6</b>	691 cv=53	<b>+13</b>	646 cv=3	<b>+261</b>	306 cv=38	<b>+26</b>

### 3.6.

## WASTE

Incidences of inappropriate waste disposal increased significantly in the West Fermanagh & Erne Lakeland and the Sperrins ESAs. Inappropriate waste disposal was a broad category including farm waste and roadside dumping etc, so it was not possible to separate ESA participant and non-participant farms.

Table 24. The estimated changes in occurrences of inappropriate waste disposal in the ESAs between 1995 & 1998.

% = percentage change in waste occurrences between 1995 & 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

	Mournes & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
No. of occurrences of inappropriate waste disposal	No: 1998	%	No: 1998	%	No: 1998	%	No: 1998	%	No: 1998	%
	8453	-5	5361	+10	19033	+38	14337	+28	2520	-41
	cv=16		cv=13		cv=24	*	cv=4	*	cv=16	



### 3.7.

## BUILDINGS

Estimates of derelict traditional buildings increased between 1995 and 1998 in all of the ESAs (Table 25). These increases ranged from 3% in the West Fermanagh & Erne Lakeland ESA to 22% in the Sperrins and were not significant but may indicate a trend. New examples of restored traditional buildings were observed in the Mourne & Slieve Croob, West Fermanagh & Erne Lakeland and the Sperrins ESAs (Figure 4).

The largest proportion of derelict, traditional buildings were found in the Slieve Gullion ESA (Figure 4). This ESA also displayed the highest proportion of derelict modern buildings. A similar proportion of bungalows were recorded in all of the ESAs (between 8-9%) with the exception of the West Fermanagh & Erne Lakeland ESA where bungalows represent approximately 17% of total buildings in the ESA.

Table 25. Numbers of each building type per square kilometre within each ESA in 1998 and percentage changes in numbers between 1995 and 1998.

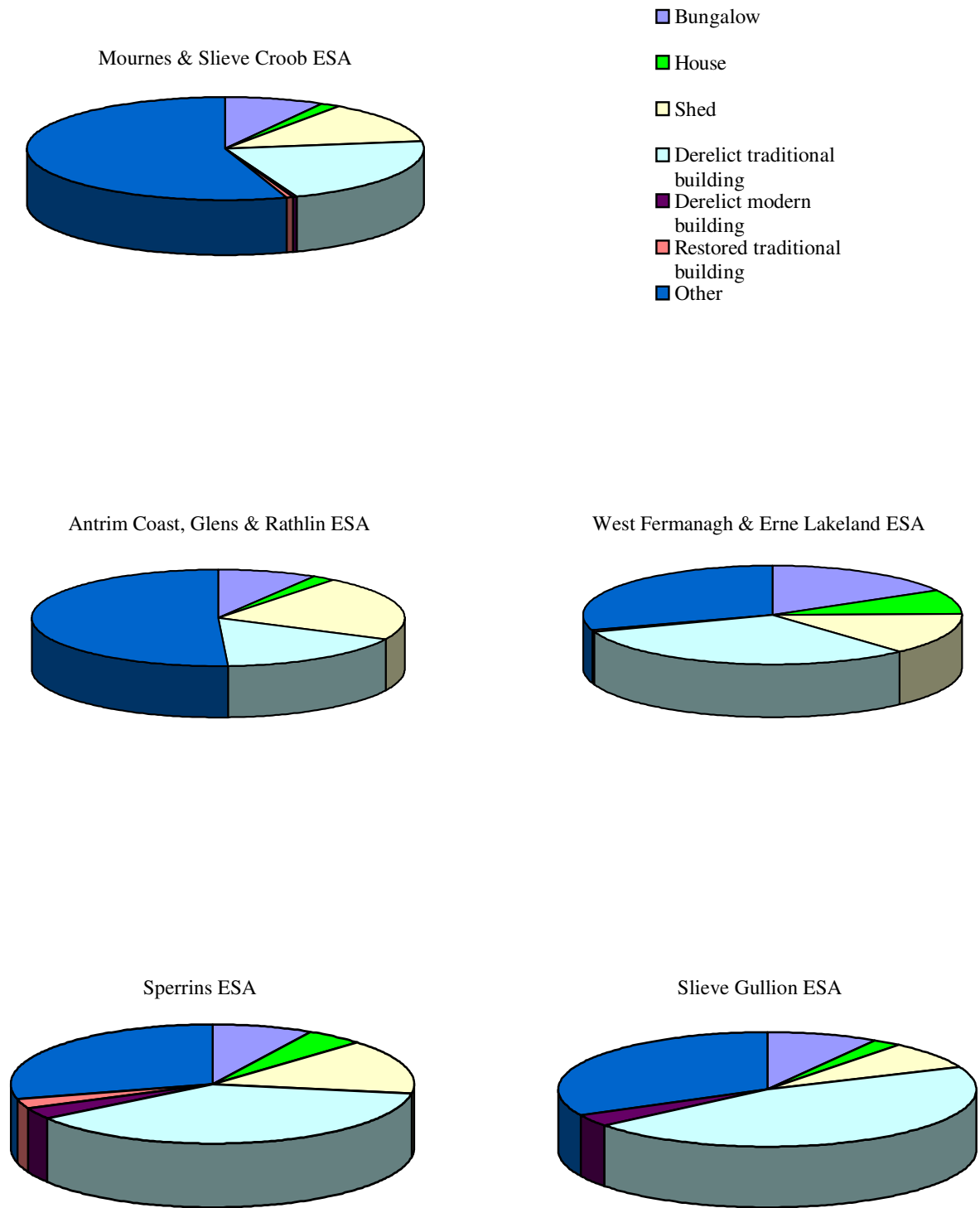
% = percentage change between 1995 & 1998

cv = coefficient of variation (precision of estimate)

\* P<0.05 \*\* P<0.01 \*\*\* P<0.001

Building type	Mourne & Slieve Croob		Antrim Coast, Glens & Rathlin		West Fermanagh & Erne Lakeland		Sperrins		Slieve Gullion	
	no./km <sup>2</sup> 1998	%	no./km <sup>2</sup> 1998	%	no./km <sup>2</sup> 1998	%	no./km <sup>2</sup> 1998	%	no./km <sup>2</sup> 1998	%
Bungalow	3.07 cv=47	<b>+21</b>	1.76 cv=64	<b>+63</b>	2.31 cv=50	<b>+31</b>	0.81 cv=42	<b>-7</b>	2.00 cv=72	<b>0</b>
House	0.71 cv=57	<b>-20</b>	0.36 cv=70	<b>0</b>	1.09 cv=91	<b>+33</b> <b>*</b>	0.50 cv=58	<b>+14</b>	0.50 cv=71	<b>-33</b>
Shed	5.05 cv=42	<b>0</b>	4.40 cv=18	<b>+20</b>	1.90 cv=39	<b>+33</b> <b>*</b>	1.50 cv=11	<b>0</b>	1.75 cv=53	<b>+17</b>
Derelict trad. Building	8.25 cv=25	<b>+15</b>	3.44 cv=33	<b>+5</b>	4.27 cv=23	<b>+3</b>	3.87 cv=13	<b>+22</b>	10.5 cv=24	<b>+11</b>
Derelict modern building	0.18 cv=100	<b>0</b>	-	-	-	-	0.31 cv=3	<b>-17</b>	0.75 cv=95	<b>-25</b>
Restored trad. Building	0.18 cv=100	new	-	-	0.07 cv=100	new	0.25 cv=3	new	-	-
Other	21.30 cv=27	<b>-14</b>	10.30 cv=43	<b>+4</b>	4.14 cv=34	<b>-13</b>	3.00 cv=15	<b>-25</b>	7.50 cv=59	<b>-17</b>

Figure 4. Relative proportions of the different building types within each ESA in 1998.



### 3.8. HISTORIC LANDSCAPE FEATURES

Due to the low occurrence and dispersed nature of historic landscape features estimates have not been extrapolated to the whole ESA area (Table 26). Actual numbers of monuments in the landscape survey are quoted and their condition noted. Any recent damage or changes since 1995 have also been noted.

Table 26. Numbers of historic features and their relative condition within each of the five ESAs.

Condition	Mournes & Slieve Croob	Antrim Coast, Glens and Rathlin	West Fermanagh & Erne Lakeland	Sperrins
	Number	Number	Number	Number
Well preserved	1	1		3
Substantial remains	1	1	4	6
Some remains	1		4	2
Slight remains		2	3	1
No visible remains				5
<b>TOTAL sites</b>	<b>3</b>	<b>4</b>	<b>11</b>	<b>17</b>

#### **Mournes & Slieve Croob**

A total of 3 historic landscape features fell within survey squares in the Mournes & Slieve Croob ESA. Sites recorded included: standing stones, raths, and lazy-beds. Past disturbance to the area around the survey sites (10m) included reseeding, grazing and tree removal. Any recent disturbance has been caused by livestock and has not been sufficient to result in deterioration in condition.

#### **Antrim Coast, Glens & Rathlin**

A total of 4 historic landscape sites fell within survey squares in the Antrim Coast, Glens & Rathlin ESA. Sites surveyed included: lazy-bed field systems, raths, souterrains, standing stones and graves. A degree of disturbance was present within 10 metres of all survey sites prior to 1995, this was mainly due to reseeding. Recent disturbance was due to the presence of livestock, however this was not sufficient to cause any further deterioration in condition of the monuments.

#### **West Fermanagh & Erne Lakeland**

A total of 11 monuments fell within survey squares in the West Fermanagh & Erne Lakeland ESA. The sites surveyed were less varied in type than in the other 3 ESAs and included only rath sites and a church. Past disturbance at rath sites has included tree-planting and excavation for stones. Although little change has taken place to the sites since 1995, some recent disturbance in

the form of excessive trampling by livestock was noted on a number of sites not under ESA agreement.

### **The Sperrins**

A total of 17 monuments occurred within survey squares in the Sperrins ESA. The sites surveyed were extremely varied and comprise: kilns, standing stones, chambered graves and lazy-beds. Past disturbance included: reseeding, livestock trampling, tree-planting and rabbit infestation. A number of the sites surveyed showed evidence of recent grazing disturbance however this was not sufficient to cause deterioration in condition. Dumping and trampling at a kiln on a non-participant farm has been severe enough to result in reclassification from “some remains” to “slight remains”. There was also recent livestock damage to lazy beds on one other site.

### **Slieve Gullion**

No historic monuments were recorded within landscape survey squares in the Slieve Gullion ESA.

## 4.0. CONCLUSIONS

Data were compared between the years 1995 and 1998 to determine changes in the distribution and abundance of land cover elements with respect to the ESA scheme. By looking at the ESA as a whole and at ESA participant farms, estimates were made on the effect of the ESA scheme on various land cover elements. This was facilitated using the GIS system ArcView.

The results indicated a continued rise in ESA scheme participation with the consequent increase in areas of threatened habitat under the protection of the scheme.

Lengths and numbers of boundaries increased in all ESAs except Slieve Gullion and this increase was mainly due to increases in fences. Dry stone walls increased in the Mourne & Slieve Croob and the Sperrins ESAs. Some boundary removal (mainly hedges) was noted in all ESAs except the Antrim Coast Glens & Rathlin and this removal occurred almost exclusively on non-ESA farms with the exception of West Fermanagh & Erne Lakeland ESA where some removal was noted on an ESA participant farm. Estimates of complete stock-proof boundaries increased in the Mourne & Slieve Croob, West Fermanagh and Erne Lakeland and Sperrins ESAs. Levels of boundary management increased in all ESAs except Slieve Gullion over the three year period. West Fermanagh & Erne Lakeland ESA had the highest proportions of unmanaged overgrown boundaries/hedges. Boundary management is not necessarily ideal for conservation management as in many cases this involved excessive flailing. Hedges classified as unmanaged or overgrown often provided a more diverse species rich habitat and may therefore be more appropriate to conservation aims. Boundaries with species poor ground flora increased in both the Sperrins and Slieve Gullion indicating a possible need for the review of boundary management in these areas. No significant changes were noted on heather moorland between years, with areas of wet and dry heath remaining at 1995 levels. Areas of heather moorland under ESA agreement increased considerably over the three year period.

Estimates of improved grassland increased in the Sperrins ESA although this change was from unimproved species poor grassland. Areas of grassland classified as unimproved species rich increased whilst those classified as unimproved species poor decreased in all ESAs except the Antrim Coast Glens & Rathlin. Although not significant at this stage, this may be the beginning of future trends.

Areas of all woodland types remained the same over the three year period. Areas under ESA agreement increased and there were some positive indicators such as new planting of mixed woods in the Antrim Coast Glens & Rathlin ESA.

Incidences of inappropriate waste disposal increased in the West Fermanagh & Erne Lakeland and in the Sperrins ESAs.

There were no significant changes in the numbers of derelict traditional buildings although there was an increase in all ESAs showing a possible trend. Newly restored traditional buildings were recorded in the Mourne & Slieve Croob ESA, the West Fermanagh & Erne Lakeland ESA and the Sperrins ESA.

The current landscape has evolved through centuries of management. Farm intensification since the second world war has led to major changes in the type and distribution of landscape elements, the most visible of which are the changes in field boundary structure and the plantation of monoculture crops. The Northern Ireland countryside is currently in a period of rapid land use change and there is now a much greater potential for altering the face of the landscape than ever before.

Landscape monitoring after three years has provided a broad evaluation of the ESA scheme.

Monitoring has indicated that practices such as field boundary removal, drainage and reseeded are continuing within the ESA boundaries. These changes have, however, been mainly limited to farms not participating in the ESA scheme. The ESA scheme, therefore, appears instrumental in maintaining the characteristic landscape of each ESA by encouraging farmers to maintain major landscape elements and preserve vulnerable habitat.

Changes in landscape character occur through social and economic change and the consequent change in land cover elements through changes in land use. These changes are therefore slow to occur and continued monitoring over an extended period of time should further highlight the effects of environmental protection initiatives in maintaining valuable land cover elements and vulnerable habitats.

## 5.0. REFERENCES

**Cooper, A. (1986).** *The Northern Ireland Land Classification.* Report to the Countryside and Wildlife Branch. Department of the Environment, Northern Ireland (DOENI), University of Ulster.

**Cochrane W. G. (1977).** *Sampling Techniques.* 3rd Edition. Wiley, New York.

**Hegarty C. A., McFerran D. M., Cameron, A. & McAdam J. H. (1994).** *Environmentally Sensitive Areas in Northern Ireland.* Biological Monitoring Report Year One- 1993.

**Hegarty C. A., McFerran D. M., Cameron A. & McAdam J. H. (1995).** *Environmentally Sensitive Areas in Northern Ireland.* Biological Monitoring Report Year Two- 1994.

**Millsopp C. A., Cameron A. & McAdam J. H. (1997).** *Landscape Monitoring of Environmentally Sensitive Areas in Northern Ireland.* SummaryReport 1997.

**Murray R., McCann T. & Cooper A. (1992).** *A Land Classification and Landscape Ecological Study of Northern Ireland.* Report to the Environment Service, DOE (NI). University of Ulster.

## **6.0.**

# **APPENDICES**

**APPENDIX 1:** Map of Northern Ireland showing each ESA and the distribution of the 25 hectare sample squares.

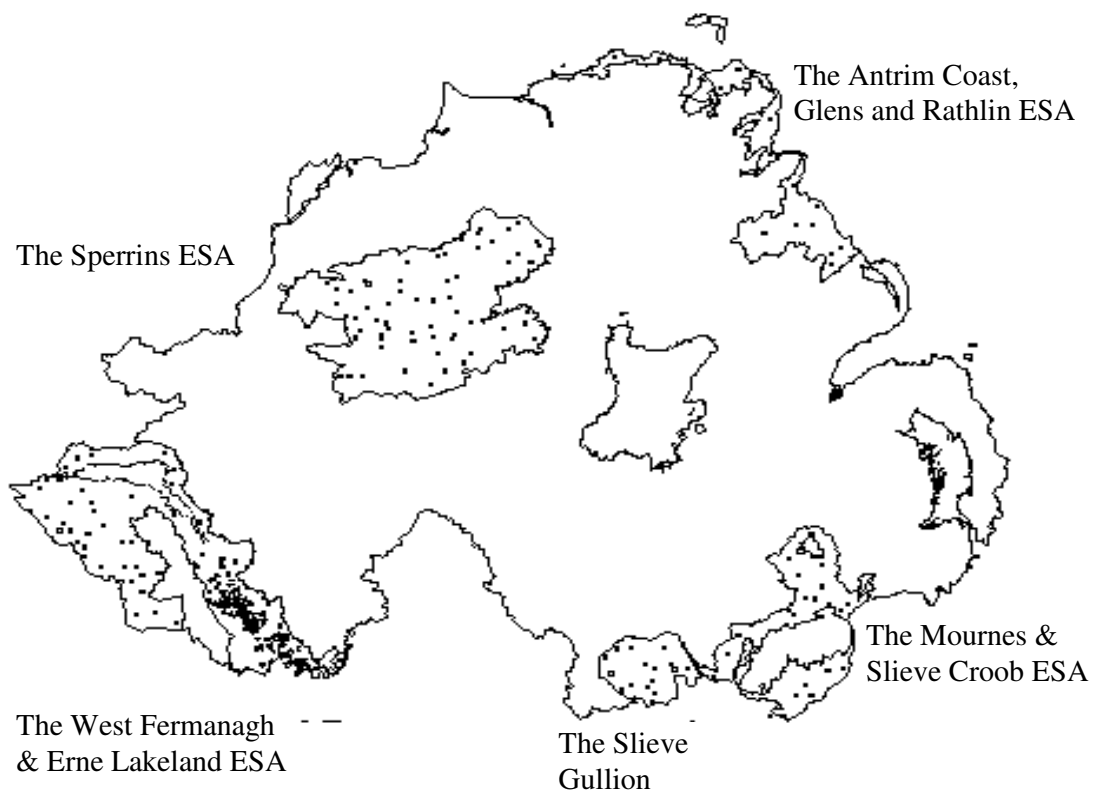
**APPENDIX 2:** An example of a 25 hectare square used to map land cover.

**APPENDIX 3:** Field recording sheets and code descriptors.



## APPENDIX 1

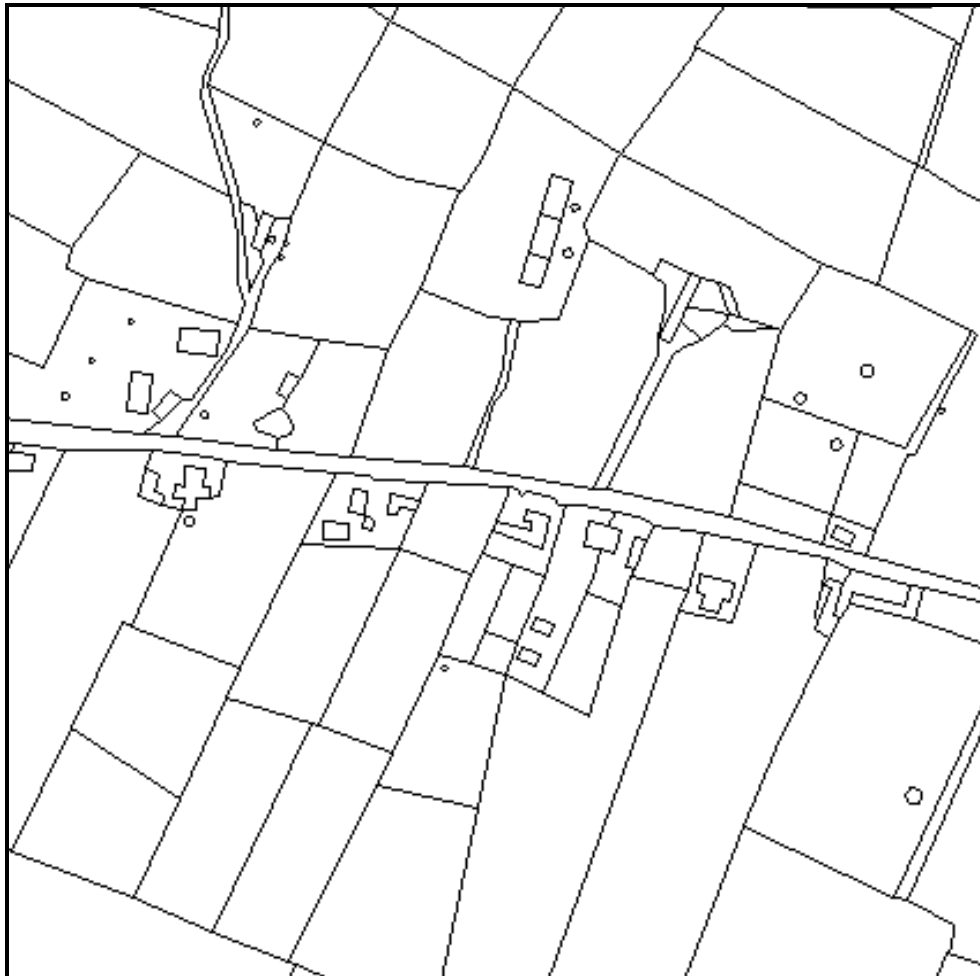
Map of Northern Ireland showing each ESA and the distribution of the 25 hectare sample squares



## APPENDIX 2

An example of a 25 hectare square used to map land cover

Mournes & Slieve Croob  
Grid reference: J360325  
Sheet 255



## APPENDIX 3

Field recording sheets and code descriptors:

# GRASSLAND

## HABITAT

1. Hay meadow 2. Wet grassland 3. Unimproved 4. Improved 5. Limestone 6. Crops 7. Garden 8. Paddock

**VEGETATION TYPE**

1. Species -rich    2. Species-poor

**VEGETATION SUB-TYPE**

1. HAY MEADOW      1a. Species-rich damp   1b. Species-rich dry   2a. Species-poor   2b. Overgrazed  
3. UNIMPROVED      2a Weed infested (docken, thistle, nettles)   3. Bent/fescue hill pasture   4. Rough grazing  
                                 (Rush/Molinia upland)   5. Rush dominated  
4. IMPROVED      2a. Weed infested (docken, thistle, nettles)  
5. LIMESTONE   3 Mat grass dominated  
6. CROPS      1. Barley   2. Wheat   3. Potatoes   4. Oats   5. Turnips

**MANAGEMENT** 1. Weed control 2. Rush Topping 3. Reseed 7. Silage 8. Hay 10 Ploughed

**DRAINAGE** 3.Drainage -open new 4. Drainage -open old 5.Closed drainage

**GRAZING** 6. Grazed

**ANIMALS** 1. Store cattle 2. Dairy cattle 3. Suckler cattle 4. Sheep 5. Calves 6. Donkey 7. Pony 8. Goats 9. Poultry

[illegible]

# HEATHER

## GENERAL DESCRIPTION

1. Blanket bog 2. Raised bog 3. Peat hag 4. Erosion/bare peat 6. Heath

## HEATHER TYPE

1. Wet heath

## 2. Dry heath

**SUBTYPE** 1 Typical wet heath 2. Grassy wet heath 3. Typical dry heath 4. Grassy dry heath with bilberry

## MANAGEMENT

**BURNING** 1. Burning recent <1yr a. Accidental b. management practice

2. Past burning a. Accidental b. management practice

**PEAT** 3. Hand cutting - present 4. Hand cutting - past 5. Mechanised peat cutting - present

**CUTTING** 6. Mechanised peat cutting - past 10. Mechanised peat cutting past & present

11. Hand cutting past & present 12. Hand & Mechanised peat cutting

**DRAINAGE**    7. Open drainage - new   8. Open drainage - past   9. Closed drainage

**GRAZING**      1. Grazed 2. Ungrazed

**ANIMALS** 1. Store cattle 2. Dairy cattle 3. Suckler cattle 4. Sheep 5. Calves 6. Donkey 7. Pony 8. Goats

9. Suckler cattle & sheep 10. Pony, Donkey & sheep 11. Donkey & Goats

[illegible]

# WOODLAND

**TYPE**

1. Broadleaf woodland seminatural 2. Broadleaf - planted  
3. Coniferous woodland seminatural 4. Coniferous woodland - planted  
5. Mixed wood -seminatural 6. Mixed wood - planted  
7. Dense scrub 8. Scattered scrub 9. Gorse scrub  
10. Parkland 11. Scattered isolated trees 12. Line of trees 13. Fen carr 14. Orchard  
15. New wood 16. Dead Tree

## LANDSCAPE 1. Location of woods

1. Riverside      2. Lakeside      3. Field parcel      4. Farm buildings      5. Road side      6. Cosat

## LANDSCAPE 2. Topography

1. Flat    2. Sloping    3. Steep    4. Hill top    5. Escarpment    6. Valley bottom

## STRUCTURE

1. Wood height 0-1m      2. 1-3m      3. 3-10m      4. >10m

**TREE & SHRUB TYPE**

1. Mature Deciduous woods 2. Alder/Willow woods 3. Mixed species woods 4. Scrub a. mixed b. blackthorn c. hawthorn d. hazel e. Gorse f. Willow g. Holly h. Birch i. Rowan. 5. Conifer Wood 6. Apple.

**GROUND FLORA TYPE**

1. Species-rich a. dry b. wet 2. Species-poor 3. Grass dominated 4. Overgrown woods 5. Heath 6. Bare ground

## SOILS

1. Waterlogged peat 2. Drained peat 3. Wet mineral 4. Drained mineral 5. Chalk/limestone

**MANAGEMENT** 1. Unmanaged 2. Managed

## MANAGEMENT TYPE

1. Thinning 2. Coppicing 3. Fenced 4. Felling 5. Planting 6. Amenity 7. Other 8. Burned 9. Weed Control

**GRAZING:** 1. Grazed 2. Ungrazed

## ANIMALS

1. Store cattle 2. Dairy cattle 3. Suckler cattle 4. Sheep 5. Calves 6. Donkey 7. Pony 8. Goats  
9. Birds 10. Rabbits 11. Hares 12. Badgers 13. Other 14. Sheep & Cattle 15. Pony & Donkey 16. Poultry 17. Suckler cattle  
& Pony 18. Suckler cattle & sheep 19. Store cattle & sheep 20. Sheep, Pony & Donkey

[illegible]

## BOUNDARIES

## TYPE

1. Hedgebank 2. Hedgerow 3. Hedge on a wall 4. Earthbank 5. Dry stone wall (new)  
6. Dry stone wall (old). 7. Ruined dry stone wall 8.. Mortar/brick/concrete wall 9.Fence 14. River Boundary  
15. Stream 16. Ditch

**FENCE TYPE:** 9. Sheep wire fence 10. Cattle wire fence (strands of wire) 11. Wooden fences 15. Chain link/ DoE Road fence 16. Electric fence 17. Palettes 18. Corrugated Tin 19. Hen wire 20. Sheep & cattle wire

**TRADITIONAL GATE/GATE POST** 12. Traditional gateposts 13. Traditional gates 14. Gates & Posts 15. Wooden Gates

**SUBTYPE:** 1. New boundary      2. Townland boundary

**STRUCTURE 1:** 1. Boundary with gaps 2. Boundary with filled gaps 3. Complete boundary

## STRUCTURE 2

Hedge height	1. <1.0m	2. 1.1-2.0m	3. 2.1-3.0m.	4. 3.1-4.0m	5. >4.1m
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Hedge width	1. <1.0m	2. 1.1-2.0m	3. 2.1-3.0m	4. >3.1m
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Ditch width	1. <0.5m	2. 0.6-1.0m	3. 1.1-2.0m	4. >2.0m
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	1. <10%	2. 11-30%	3. 31-50%	4. 51-70%	5. >71%
Gaps in hedge					

## Hedge shape

1. Box shaped 2. 'A' shaped 3. Flat "A" shaped 4. Row of stumps 5. Overgrown row of tree or shrubs  
6. Scattered trees or shrubs 7. Laid hedge 8. Box with trees 9. Flat A with trees 10. Sides only flailed

**Ditch** 1. River 2. Stream 3. Other permanently wet ditch 4. Seasonally wet ditch

**MANAGEMENT:** 1. Unmanaged 2. Managed (a). <2years (b). 2-5years (c). >5years

**MECHANISM** 1. Hand cut 2. Flail cutter 3. Circular saw 4. Burnt 5. Circular saw & flail cutter

[illegible]

# BOUNDARIES

## VEGETATION TYPE

### TREE AND SHRUB TYPE

1. Gorse/ Bramble/Rowan
2. Willow/Alder/Hazel
3. Blackthorn/ Hazel/Hawthorn/Holly
4. Hawthorn/Ash hedge
5. Hawthorn/Rose hedges
6. Castlewellan Gold
7. Garden species Privet/Fuschia/Cotoneaster/Snowberry
8. Deciduous mature trees Elm/Oak/Beech
9. Conifer

**GROUND FLORA TYPE**

1. **Species- poor hedges:** a. Bramble/Nettle/grassy b. Daisy /sweet vernal grass  
2. **Species-rich hedges:**a. Shady hedges ivy/primrose b. Upland species-rich hedges - foxglove/ bilberry/sweet vernal grass

[illegible]

## BUILDINGS/AMENITIES

## URBAN

1. Urban area 2. New urban area 3. Industrial area 4. New industrial area

## BUILDINGS

1. Bungalow 2. House 3. Shed 5. New domestic building a. Bungalow b. House 6. New agricultural building 7. New industrial building 8. Sheep pen

9. Silo 10 Derelict traditional building 11 Derelict modern building 12 Derelict industrial building

13. Septic tank 14. Other buildings (houses/sheds) 16. New school 17. Mobile home 18. Caravan 20. DOE water service

21. Lookout tower 23. Big bale silage 24. Peat bags 25. Foot bridge 26. Cattle grid

## ROADS

1. A class 2. B class 3. Minor 4. Disused road 5. New road

## LANES

1. New concrete lane 2. New unsurfaced lane 3. Surfaced lane 4. Unsurfaced lane 5. Disused lane 6. Track

## AMENITIES

21. Recreation trails 22. Managed footpath 23. Amenity grassland 24. Caravan park/camping

25. Car park/layby 26. Roadside verge 27. Fishing 28. Hide 29. Horse jumps 30. Horse paddock 31. Garden 32. Horse cart

33 Shooting range 34 Animal farm pens 35. Golf course 36 Pylon/Transformer

## MINERAL WORKING

29. Used hard rock quarry 30. Disused hard rock quarry 31. Used soft rock quarry 32. Disused soft rock quarry

## GEOLOGY/LANDFORM

33. Sea cliff 34. Inland Cliff 35. Scree 36 Rock outcrops 37 Surface boulders 38 Canalised river bank

39 Moraine 40 Sink hole 41 Caves 42 Limestone pavement 43 Gorge

FAUNA 44 Rabbit warren 45 Fox hole 46 Badger set

## WASTE DISPOSAL/DISTURBANCE

47 Domestic rubbish 48 Industrial rubbish 49 Farm rubbish 50 Other rubbish 51 Litter 52 Spoil

53 Land fill 54 Bare/disturbed ground 55 Land erosion 56 Abandoned vehicles 57 Pollution

58. Concrete standing 59. Hedge cuttings 60. Old farm machinery 61. Midden 62. Excavation 63. Dead animals 64. Black plastic silage bags 65. Skip 67. Sand 68. Blocks 69. Feeding trough

**WATER** 1. Pond 2. Lake

[illegible]



# HISTORIC MONUMENTS

## PERIOD

01 Neolithic 02 Bronze 03 Early Christian 04 Medieval 05 Pre-famine

## SITE TYPE

01 Cairn  
02 Cashel  
03 Castle  
04 Church  
05 Crannog  
06 Grave  
07 Megalith  
08 Midden Site  
09 Motte  
10 Ringbarrow  
11 Sandhill  
12 Souterrain  
13 Standing stone  
14. Rath  
15. Kiln  
16. Lazy beds

## CONDITION

01 Well preserved 02 Substantial Remains 03 Some Remains 04 Slight Remains 05 No visible Remains  
06 Destroyed 07 Excavated

## FORM

1 Earthwork 2. Drystone structure 3. Orthostatic structure 4. Underground structure  
5. Megalithic structure 6. Buried structure

## PAST DAMAGE on site

1 No 2. Yes

## RECENT DAMAGE

1. No 2. Yes

## TYPES OF DAMAGE ON SITE

1. Cultivation 2. Livestock 3. Farm Improvement 4. Buildings 5. Vandalism 6. Dumping  
7. Field Clearance 8. Tree planting 9. Tree removal 10. Rabbit burrowing 11. Reseeding  
12. Badger Activity 13. Unsupervised Improvements - Landscaping, Tidying-up etc. 14. Cultivation 15. Overgrown

## TYPE OF ENCLOSURE

1 Wooden Fence 2. Chain link fence 3. Barbed wire fence 4. Additional Ditch 5. Stone wall

PARC	PERIOD	TYPE	COND	FORM	PAST DAMAGE	PRES. DAMAGE	TYPE DAMAGE	ENCLOSURE

## OTHER VEGETATION TYPES

## COASTAL

1. Intertidal - saline muds and muddy sand with species such as glasswort.
2. Saltmarsh - common species include saltmarsh grass, scurvy grass and sea aster, plantain and sea rush
3. Shingle gravel /ridge - only record if vegetation present
4. Strandline - only record if vegetation present
5. Fore-dune - unstable new dunes probably dominated by marram grass
6. Dune grassland - stable dunes colonised by grasses and forbs. Bent/fescue common
7. Dune heath - stable dunes colonised by ericaceous shrubs
8. Dune scrub - stable dunes colonised by scrub woodland
9. Cliff vegetation - only if an abundance of vegetation
- 10 Dune slack vegetation - occurs in wet dune hollows
11. Reed beds - stands of common reed usually associated with lakeside water margin interface.
12. Freshwater vegetation - openwater veg. - yellow water lily , pondweed
13. Swamp - veg. of waterlogged mineral soils other than reedbeds - bulrush, marsh horsetail, common spikerush, lesser water plantain & sedges
14. Fen: Some inland parcells : sedges, yellow flag, forgetme not, creeping jenny, marsh horsetail, marsh penny wort, bogbean found on low lying peaty ground behind reedbeds and swamp zone at lake margins.

**BRACKEN/ TALL HERB /FERN/ OTHER**

- 1 Bracken continuous
2. Bracken scattered
3. Ruderal
4. Crevice/ledge vegetation

[illegible]