A LANDSCAPE ECOLOGICAL STUDY OF THE MOURNE AONB

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Preface

In March 1986, the Department of Environmental Studies was asked by the Countryside and Wildlife Branch of the Department of the Environment for Northern Ireland, to carry out a landscape ecological study of the Mourne AONB. An interim report (Cooper and Murray 1986a) summarising progress and preliminary qualitative results was presented in August 1986.

A review of regional resource survey techniques (Cooper 1986a) was also presented to the Countryside and Wildlife Branch in June 1986. It outlined work being carried out in the Department of Environmental Studies, on a Northern Ireland multivariate land classification and its relevance to the Mourne survey. The review was followed in September 1986 by a report (Cooper 1986b) describing a land classification of the Mourne AONB and summarising the results of a validation exercise designed to test the efficiency of the classification as a sample stratification for ecological survey.

In September 1986 a poster paper (Cooper and Murray 1986b) was prepared for the Northern Ireland conference on Environmental Impact Assessment (NICEIA) at the University of Ulster (Jordanstown). This summarised the methods used in the Mourne survey and the application of the technique for monitoring land use change.

The work described in our final report owes much to Joyce Forsythe who assisted with the data analysis and preparation and Jennifer Larkin who typed the manuscript.

Alan Cooper and Ronald Murray.

Summary

1. A landscape ecological study of the Mourne AONB describing its ecological characteristics and landscape features was carried out in the Summer of 1986. Interest was centred mainly on the way in which the appearance of the landscape related to land use in general and to current farming practice in particular.

2. A multivariate classification of kilometre squares in the AONB was used to derive six land classes or sampling strata as a basis for field work. The land classes were derived from landscape features recorded from Geological and Ordnance Survey maps, using a computer programme that placed similar grid squares in the same land class. The classification represented a general transition from low elevation coastal squares (land class 1) to upland/mountain terrain (land class 6).

From each land class, 10 random kilometre squares were selected for field survey. Within each of them, land use, linear features and seminatural vegetation from one random 25 ha square were recorded under one of the following categories:

a) Seminatural vegetation: type, structure, main species and management.
b) Agriculture: crops, animal stock and farming practice.
c) Field boundaries: hedge type and management, walls, fences and ditches.
d) Topography and ground features: attributes related to dereliction, recreation, urban and rural development, hydrology and geomorphology.

The method of field recording was standardised. Comparative surveys can therefore be carried out at some future time, for example, to monitor changes in landscape quality or to test the effectiveness of countryside conservation.

3. The results of the survey have been used to calculate the area of different land uses and the number and lengths of different boundary types in the AONB. These data provide a common framework within which management and planning decisions can be made.

4. Agricultural grasslands predominated at low elevations with seminatural vegetation in the uplands. There was little seminatural vegetation at low elevations except for fragmentary habitats along the coast and on unproductive farmland.

5. There were few examples of native deciduous woodland. Other types of woodland/scrub occurred mainly at lower elevations but despite having a small area it was of considerable landscape value. There was much scope for its conservation management. Suitable sites included seminatural scrub colonising neglected farmland, farm parcels on unproductive land, riversides, streamsides, and felled conifer plantations. Fencing to prevent access by farm stock and replanting with native hardwood trees are appropriate but not where this would be to the detriment of associated open habitats such as wetland or heath.

Prominent large blocks of mature conifer plantations occurred at the lowland-upland transition and in the uplands. There is a potential for further plantation on marginal or neglected farmland which could be detrimental to seminatural vegetation or landscape quality.

Broadleaf plantations at low elevation and woodland associated with farm buildings had a large proportion of mature trees. There was usually little regeneration. Priority should be given to a tree planting programme if this resource is not to be depleted. Tree planting would also help to soften the abrupt urban-rural fringe associated with recent housing development.

6. Coastal vegetation was often of high ecological interest but was frequently threatened by rubbish dumping, landfill and recreation damage. Species-rich grassland inland, particularly at the wetter sites intergrading to fen, peaty flushes and bog, were at risk from landfill and agricultural intensification. Very few unimproved, species-rich grasslands were found.

7. The lowland-upland transition contained much hill pasture, bracken and gorse heath. The invasion of scrub on neglected farmland and seminatural vegetation was frequently recorded. In contrast, detrimental effects of burning and overgrazing were also noted on hill pasture and heath.

There was reclamation of seminatural vegetation taking place at the lowland-upland transition. The effects included loss of traditional field patterns and wildlife habitats. Control of reclamation projects is particularly necessary for the conservation of lowland heath to the south of the Mourne Mountains.

8. At higher elevations, mat-grass hill pasture was common over Silurian rocks and around Slieve Croob. Management to increase the ericaceous component of this vegetation by controlling stocking densities and burning, would increase its landscape and wildlife value. In the mountains, wet heath predominated along with peaty flush and bog. Here, sheep grazing and recreation pressure in the form of trampling were associated with vegetation damage and erosion.

9. Agriculture was dominated by sheep and beef cattle production. Farm enterprises contrasted greatly in their size and efficiency. Neglected farms were juxtaposed with intensive farmland, particularly at the lowland-upland transition where reclamation leading to larger field sizes highlighted the contrasts.

10. Field sizes were generally small, with boundaries consisting of mainly hedgebanks, dry stone walls or wire fences. The removal of traditional field boundaries and their replacement with wire fences was a key factor in landscape change. Less obvious was the extent to which boundary neglect was also involved. There were a great many gappy or ruined hedgebanks and walls which had lost their agricultural function and are, therefore, in danger of being lost. Overgrown hedges, however, contributed greatly to the wooded appearance of the landscape, particularly where they supported small trees. The removal of these boundaries has consequences for landscape conservation.

Landscape quality is strongly dependent on the extent to which traditional boundaries can be restored and maintained. Estimates of the total length of derelict hedges and associated banks indicate the enormity of this task. Similar numbers of derelict walls were recorded. Their structure had often been ruined by the erection of wire fences.

The ecological value of hedges was limited but priority should be given to preventing the damage or loss of species-rich hazel/oak and ditched willow hedges. Banks associated with hedges along roads frequently had species-rich seminatural grassland.

11. Rubbish dumping on farms, often as landfill, was unsightly and a threat to seminatural vegetation, particularly wetland. There was also a large number of abandoned farm buildings. These were frequently derelict, acting as dumps for old machinery and abandoned vehicles or as shelter for farm stock. Many were screened behind farm trees which had often begun to regenerate naturally.

12. Urban development occurred mainly at the urban-rural fringe. Small plots on agricultural land or unproductive farmland with seminatural vegetation were favoured for housing in the country. Vernacular designs were infrequent.

13. Recreation pressure was recorded mainly in the coastal zone or in the mountains,except for forest trails and way-marked paths through enclosed farmland. Field boundaries were generally an effective barrier to casual recreation. Closure of farm tracks leading to abandoned buildings further restricted recreation in predominantly farmed land.

14. The distribution of ecological resources and landscape features showed large differences between the computer-mapped land classes. Land class 1, for example, had a diverse seminatural vegetation associated with its complex coastal topography. This contrasted with intensively cultivated farmland and urban areas. The pressures on the environment were from coastal recreation and on the small areas of wetland and woodland/scrub associated with farmland.

Land class 2 was also intensively farmed. There was generally little wildlife interest except for fragments of wetland. On farms, there was much scope for positive conservation such as habitat creation and tree planting.

Environmental constraints associated with elevation limited agriculture in land class 3. There was a correspondingly higher proportion of seminatural vegetation of mainly hill pasture and heath. Tall, often neglected hedges and riverside woodland were features contributing to the wooded appearance of the landscape.

The higher elevation, steeply sloping land class 4 was centred on Slieve Croob and the North Mournes. It supported a relatively large area of scrubby woodland on neglected farmland and a high proportion of derelict hedges and walls. The amount of seminatural vegetation was large but bracken and scrub were frequently invasive on hill pasture and heath. Conifer plantation was fairly common. This land class was identified as one in which the potential for extensive landscape change was greatest.

Land class 5 had the highest cover of conifer plantation. Agricultural reclamation was frequently observed. The visual prominance of the land class highlighted these features. The Mourne mountains were represented by land class 6 where land use was primarily for the rough grazing of sheep and for recreation.

15. The current major types of land use, landscape features and ecological resources present in different parts of the AONB have been described. The ways in which they are changing have also been indicated. The main conclusions are that agricultural intensification at low elevations and a decline in agriculture at higher elevations, were the main threats influencing changes in field boundaries and seminatural vegetation. The disruption of field patterns by reclamation and inappropriate management of heath vegetation were particularly noticable, together with the loss of fragmentary habitats on farms.

Ways of modifying the influence of intensive farming and of increasing the contribution of small landowners to positive landscape management and wildlife conservation should be sought if the present landscape quality and wildlife diversity are to be maintained.

1. Introduction

1.1 General aims

The main aim of the project was to carry out a quantitative appraisal and inventory of the landscape ecological characteristics of the Mourne Area of Outstanding Natural Beauty, which could be used for management, planning and environmental monitoring purposes. Of particular interest, were resources not previously recorded in a systematic manner.

1.2 Specific objectives

These were to:

1. Describe the major elements of landscape variation within the boundary of the Mourne AONB.
2. Carry out a field survey of ecological resources within landscape types.
3. Determine the ecological characteristics, land use attributes and linear features relating to agriculture, seminatural vegetation and field boundaries and to indicate their distribution at a local level.
4. Prepare a data base and map archive of ecological resources which would be of value in monitoring ecological and land use change.
5. Investigate the interaction between farming practice, landscape features and ecological resources and make recommendations on resource management designed to maintain the landscape and wildlife interest of the area.

1.3 Study area

The Mourne AONB is located in the Southeast of Northern Ireland and is bounded by the Irish sea on its eastern side and by Carlingford Lough to the South (Fig. 1). It comprises approximately 6080 hectares of land of which a central granite core, the Mourne Mountains, rises to 850m. A second area of mountain centred on Slieve Croob in the North, rises to 534m. The mountains are dissected by valleys and except in some coastal areas, intergrade to farmed lowlands.

The AONB was first designated in 1966. The boundaries were reviewed in 1986 and the area redesignated in December of that year. A major extension of the boundary included Slieve Croob. The AONB has 9 localities which have or will have designation as either a National Nature Reserve, Forest Nature Reserve or Area of Scientific Interest (Department of the Environment for Northern Ireland, 1986a)

1.4 Approaches to survey and analysis

In order to carry out field survey over such a large area as the Mourne AONB within the time available, a minimum effective approach to the work was taken. This was based on a stratified random sampling programme and employed a land classification technique developed by the Institute of Terrestrial Ecology at Merlewood (Bunce and Smith 1978). A standardised methodology designed to reduce personal judgement to a minimum was also favoured, thereby facilitating future monitoring work. The main value of the resulting data base is that it provides information on the amounts and distribution of resources in the AONB. This can be used as a common framework within which management and planning decisions, involving different major land users, can be made.

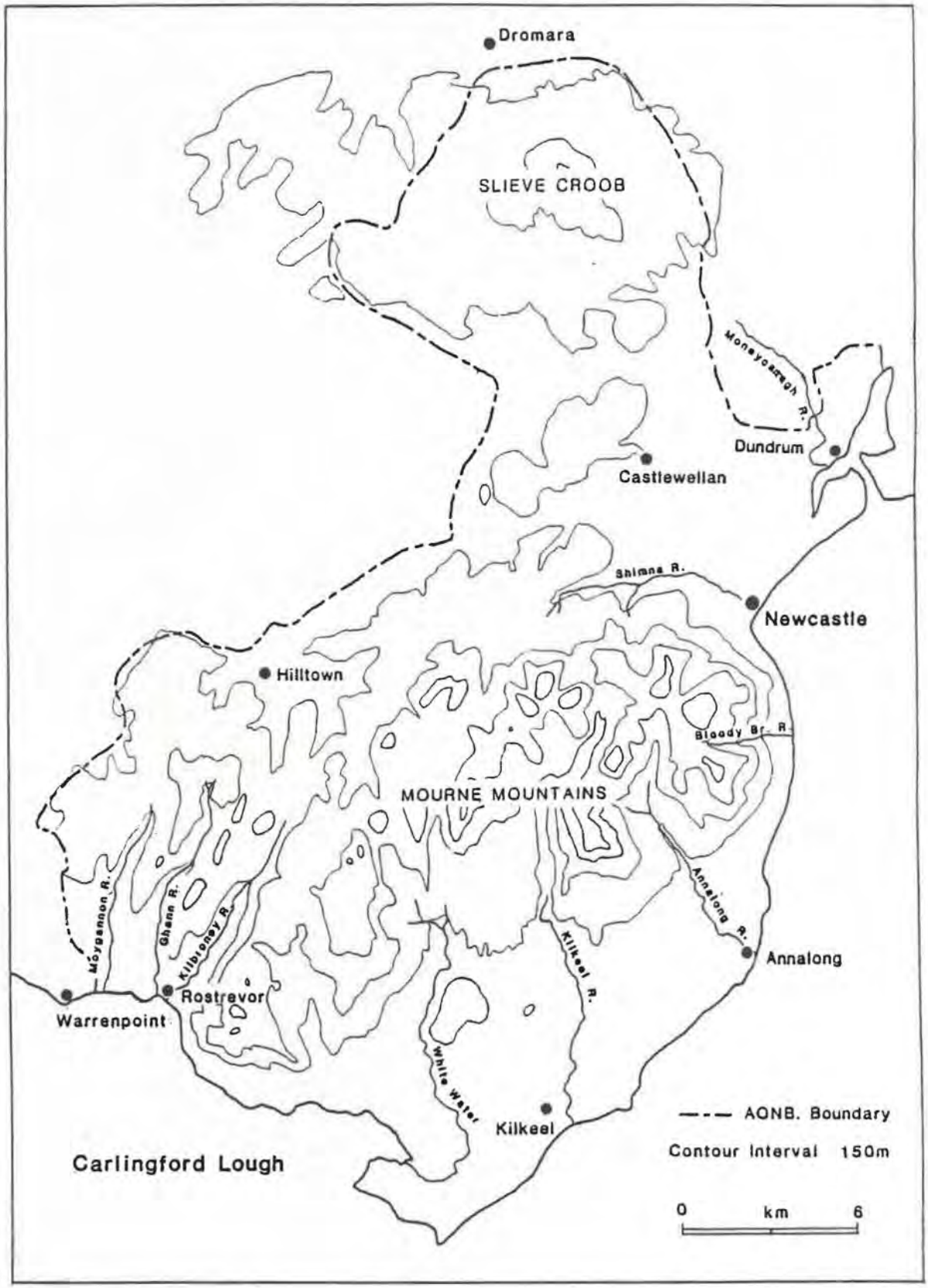


Fig. 1 Map of the Mourne AONB. The boundary shown (— - —) was provisional at the beginning of the study.

2. The Mourne Land Classification

A multivariate land classification of the Mourne AONB was carried out (Cooper 1986b) using the Merlewood technique. Ordnance Survey grid squares were classified into groups called land classes using the numerical classification procedure, two-way indicator species analysis (Hill 1979). Squares in each land class share certain characteristics relating to their topography, climate, land use and geology. These attributes are recorded from easily available maps and are employed by the classification to successively separate a set of sample squares into smaller classes.

The land classes can be used as strata which can subsequently be sampled randomly for field characters such as specific ecological resources or landscape features. If these data are averaged for each land class and the area of each land class is known, estimates of the distribution of total resources can be made.

2.1 Grid size

The scale of landscape variation in the Mournes is such that a kilometre square grid size obscures the boundaries of landforms, land uses and ecosystems. A classification at this scale also tends to exaggerate some transitional land types, delimiting them with arbitrary combinations of map characteristics which cut across natural boundaries.

Consideration was therefore given to classifying at a scale of 25ha squares. Since this would have involved the ultimate classification of over 2,000 squares, it was rejected as being inappropriate for the size of the AONB.

The drawback of a large grid size in relation to the scale of landscape variation does not affect estimates of total resources which are surveyed in the field. It does, however, determine the coarseness of the pattern of land class distribution and therefore predictions of the distribution of estimated resources over the whole of the study area.

2.2 Sample placement and size

An outline of the boundary of the Mourne AONB (Department of the Environment for Northern Ireland 1986b) was superimposed onto a 1:50,000 O.S. map of the region. Any kilometre square with 25% or more of its area inside the boundary was considered for numerical classification.

One in every four kilometre grid squares and subsequently one in every 16 of the squares, were sampled in a regular manner, for their map attributes. This gave a total of 180 squares (35%).

2.3 Choice of map attributes

The criteria used for selecting map attributes were related to:

(a) Successive refinement of observations and experience with existing land classifications.

(b) Inclusion of an adequate range of information to produce a generalised summary of the environment.

(c) Balance of the number of attributes related to topography, land use artefacts and geology.

The selection procedure considered only those attributes which had appeared as indicator attributes in previous land classifications in Britain and Northern Ireland. Where there was doubt as to the suitability of an attribute, positive discrimination was applied.

This method of attribute selection was conceived in order to reduce the time taken to implement land classification, a drawback of the technique.

2.4 Recording map attributes

A total of 48 map characteristics (Table 1) were recorded directly onto standardised data sheets. They were taken from Ordnance Survey (1:50,000) and Geological Survey (1:250,000) maps. Areas were measured with a plastic film template divided into scaled 4ha grid squares. For the purpose of numerical classification of the grid squares, variables were converted to attribute (presence/absence) form by subdividing the range of values equally.

Categories of slope were those employed by Gardiner and Radford (1980).

Data were stored in the University of Ulster's DEC VAX computer, in files compatible with the Cornell Ecology Suite (Gauch 1982). In comparison with the Northern Ireland Land Classification (Cooper 1986a) climatic and soil attributes were not used for the Mourne land classification due to the small scale of the maps containing the primary data. Recording attributes in surrounding squares was considered for the most part to be too time-consuming in relation to their contribution to the classification. Uncommon map characteristics were recorded by frequency rather than in quantitative form. Tourist information symbols, public buildings and antiquities were recorded as single attributes.

2.5 Multivariate classification of sample squares

Classification into land classes was carried out with two-way indicator species analysis (TWINSPAN) classification (Hill 1979). Hierarchical division of the 180 sample squares was stopped if any group with less than 20 members was produced. The attribute characteristics of the six land classes were summarised with the computer program DATAEDIT (Singer 1980).

The first division of the TWINSPAN classification of the 180 sample squares (Fig. 2) split the high elevation land classes 5 & 6 from those in which artefacts of habitation and agriculture were common (1-4).

Land classes 1-4 were separated on the basis of attributes associated firstly with the coast and secondly with elevation. Land classes 3 & 4 occurred at higher elevations whereas land classes 1 & 2 were respectively, coastal and inland low elevation types (Tables 2 & 3). The classification represents a general transition from low elevation coastal sites (land class 1) to upland/mountain terrain (land class 6).

Following computer classification of the 180 sample squares, the remaining 442 squares were allocated to land classes using the dichotomous key. The land class composition of the AONB is shown in Fig. 3. There were a total of 622km squares in the AONB (Table 4). Sea occupied 18.2% of land

class 1. Over 25% of the area was composed of mountainous land class 6. The upland land class 5 and coastal land class 1 were the least represented.

2.6 Description of land classes

Land Class 1

A low-elevation class of the coastal region where sea, sandy, muddy or to a lesser extent, rocky shores occur. Most of the land lies below the 50m contour and is sometimes very flat and featureless. Rivers are fairly common. Where steep slopes occur, they are usually short. There is a dense transport network in which primary roads are very frequent. Urban development is strongly associated with this land class, mainly in and around Kilkeel, Newcastle and Newry. Acidic brown earth soils over Silurian shale are usually found except in the South where some Carboniferous limestone is present.

Land Class 2

It occurs at two main centres to the North and South of the Mourne mountains. Most of the land is between the 50m and 150m contours but a large proportion also lies below 50m. Slopes are usually slight to moderate and often lead to distant low elevation hills and river valley bottoms.

In common with land class 1, there is a dense transport network in which primary and secondary roads are frequent but there is also a high density of tertiary and minor roads. The large number of buildings which occur have a mainly rural setting, frequently associated with small villages. Sites of antiquities are quite common. Acid brown earths over Silurian shale predominate in a largely intensively farmed landscape.

Land Class 3

A widely dispersed lowland type lying mostly between the 50m and 150m contours but with a high frequency of land above 250m. Steep slopes are quite common, being backed by moderately high elevation foot hills. Branched rivers with their associated valley bottoms are relatively frequent.

The roads are predominantly tertiary and minor and there is a large number of associated rural buildings. As with land class 2, there is an association with small villages.

Acid brown earth soils over mostly Silurian shale but also granites and basic intrusive rocks are common. The higher slopes are often planted with coniferous woodland.

Land Class 4

This occurs mainly in the northern foothills of the Mourne mountains and around Slieve Croob. Most of the land is between the 150m and 250m contours but elevations down to 50m and as high as 500m are also recorded frequently. Hill tops with associated steeply sloping escarpments and small streams are common features.

The transport network is made up, for the most part of tertiary and minor roads and there is a high density of rural buildings. This land class has the highest number of sites of antiquity.

There is a high diversity of rock types in which Silurian shale predominates and there is a particularly high frequency of Granodiorite. These rocks are overlain mainly by acid brown earth soils derived from granite and shale. Drumlin gleys and peaty podzols also occur.

Land Class 5

A very steeply sloping land class in which high elevations are usually recorded. About half of the land occurs between the 150m and 250m contours but large areas between 250m and 500m are also found. The Mourne mountains rise steeply and suddenly from this land class, frequently from low elevations.

Small, branched streams and rivers are common. Roads are mainly tertiary and minor but are not very frequent. This is reflected in the very low density of buildings. The relatively high frequency of unfenced roads is due mainly to the cover of coniferous forest plantations.

Shale and granitic rocks both occur but acidic brown earths derived from granite and peaty podzols are the most frequent soils.

Land Class 6

This is a high elevation type which describes the Mourne mountains. The land is almost always over 250m and a considerable proportion is greater than 500m in elevation. Mountain slopes are often very steep and are frequently associated with cliffs. Many streams and small rivers spring from within the land class, often running to reservoirs and loughs. There are few roads and very few buildings. Paths and tracks are a common feature even relative to the rest of the land classes.

Granites with peaty podzols predominate but shales are still frequent, often associated with acidic brown earth soils.

Table 1 Map attributes and variables recorded for the Mourne land classification.

Code	Attribute name
1	Sea (+)
2	Sea, sand, mud or flat rock in surrounding square (+)
3	Sand, shingle or mud (+)
4	Flat rock (+)
5	Cliff or quarry (+)
6	Land between 0-50m (%)
7	Land between 51-150m (%)
8	Land between 151-250m (%)
9	Land between 251-500m (%)
10	Land > 500m (%)
11	Highest point (m)
12	Lowest point (m)
13	Length of slope (m)
14	Gradient of slope (m/m)
15	Aspect (NE,SE, SW, NW)
16	Height of hill behind slope (m)
17	Distance to hill behind slope (m)
18	Distance to valley bottom (m)
19	Contour top (+)
20	Spring (+)
21	Stream (+)
22	Single line river (+)
23	Double line river (+)
24	Waterway junction (+)
25	Inland water body (+)
26	Inland water body in surrounding square (+)
27	Wood (ha)
28	Red road (+)
29	Brown road (+)
30	Yellow road >4m (+)
31	Yellow road, rural (+)
32	White road, rural (+)
33	White road, urban (+)
34	White road, urban in surrounding square (+)
35	Path, track or walk (+)
36	Unfenced road (+)
37	Number of road forks
38	Tourist information/recreation facility (+)
39	Antiquity (+)
40	Public building (+)
41	Number of buildings
42	Silurian shale
43	Carboniferous limestone
44	Granodiorite
45	Granite
46	Diorite, Monzorite etc.
47	Dolerite and Basalt
48	Felsite etc.

Fig. 2 TWINSPAN hierarchy of the 6 Mourne land classes derived from 180 sample squares. The numbers of squares in each land class are given. At each successive division, attributes on the left of the dichotomous key, score-1 when present in a square whilst attributes to the right score + 1. The total score for the square is then compared with the threshold score for the division. This determines the direction that further dichotomy takes.

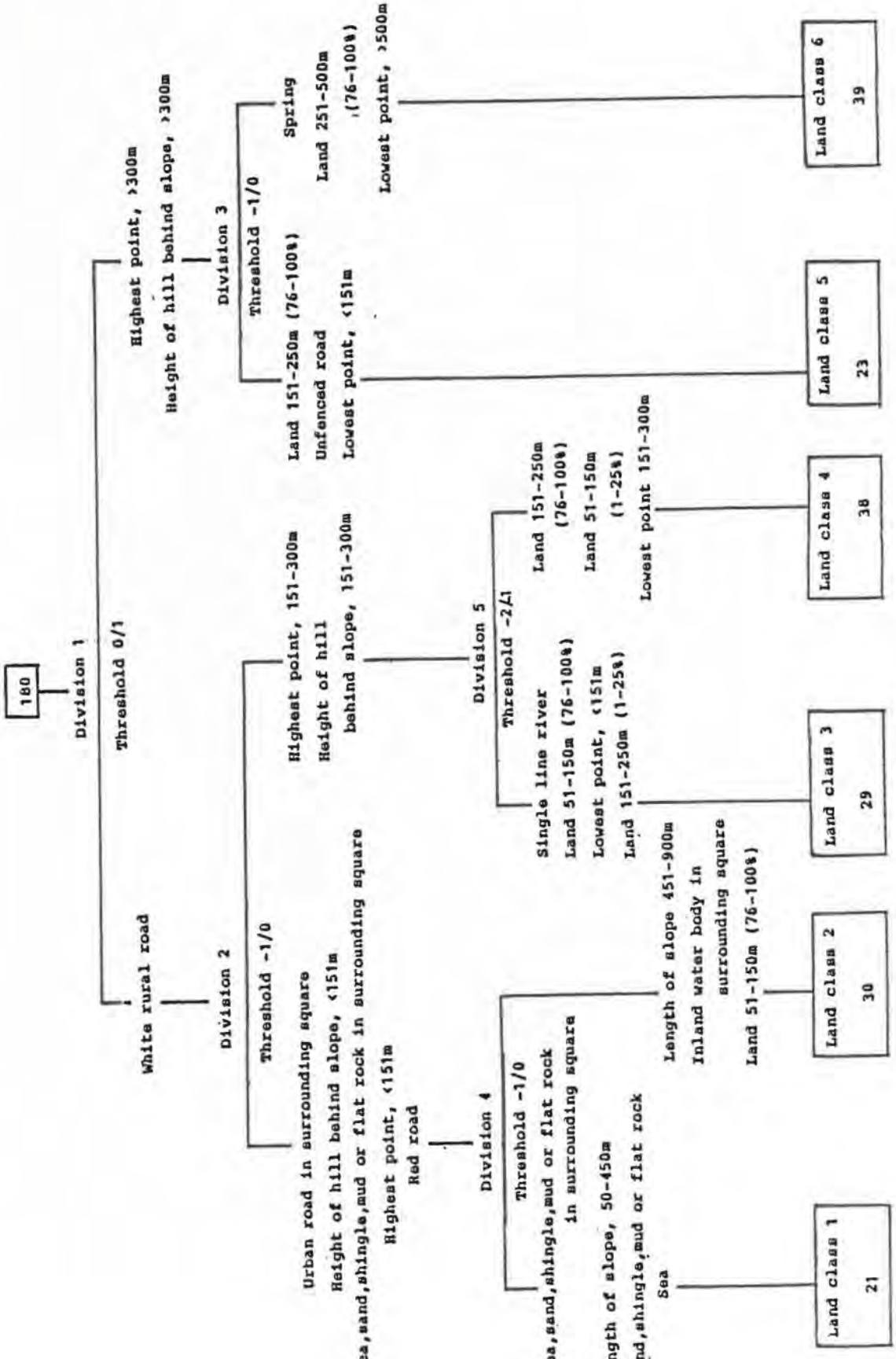


Table 2 The frequency of map attributes in the 6 Mourne land classes. Soil attributes were not used to produce the classification.

Code	Attribute name	Mourne Land Class Number 1	2	3	4	5	6
1	Sea	52	-	-	-	-	-
2	Sea & Sand etc., flat rock in surrounding sq.	95	27	3	-	4	-
3	Sand, shingle or mud	62	13	-	-	-	-
4	Flat rock	29	-	-	-	-	-
5	Cliff & quarry	5	-	14	11	13	36
6	Land between 0-50m	95	67	21	-	4	-
7	Land between 51-150m	24	80	100	61	57	-
8	Land between 151-250m	20	7	97	97	100	36
9	Land between 251-500m	-	-	21	53	87	97
10	Land > 500m	-	-	-	-	4	56
11	Contour top	29	57	41	68	30	59
12	Spring	10	10	21	34	22	69
13	Stream	62	63	62	79	78	92
14	Single line river	43	30	48	11	48	36
15	Double line river	24	-	10	3	-	-
16	Waterway junction	24	7	38	8	35	26
17	Inland water body	5	20	-	13	22	15
18	Inl. water body in surr.sq.	5	53	24	37	26	54
19	Wood	14	23	28	16	48	15
20	Red road	62	40	10	5	-	-
21	Brown road	14	27	17	26	-	10
22	Yellow road >4m	62	87	76	66	30	5
23	Yellow road <4m	33	57	55	71	35	10
24	White road, rural	71	97	86	95	35	8
25	White road, urban	48	13	7	-	-	-
26	White road, urb. in surrounding sq.	76	63	34	16	13	-
27	Path, track or walk	47	47	59	53	61	74
28	Unfenced road	57	37	34	34	48	10
29	Tourist information/ recreation facility	43	13	14	5	4	3
30	Antiquity	-	17	14	21	4	3
31	Public building	38	20	17	11	4	-
32	Silurian shale	100	97	86	79	52	46
33	Carboniferous limestone	10	-	-	-	-	-
34	Granodiorite	-	7	21	42	13	3
35	Granite	19	3	28	5	61	85
36	Diorite, Monzorite etc.	-	-	-	3	13	-
37	Dolerite and Basalt	33	3	24	32	35	38
38	Felsite etc.	5	-	14	18	-	23
39	Peaty podzols (Mt. and hill)	-	-	4	21	70	85
40	Acid brown earths (Rolling Granite)	5	3	52	53	74	31
41	Acid brown earths (Rolling Shale)	100	97	72	42	17	3
42	Gleys (Drumlin)	-	3	7	26	4	-
43	Acid brown earths (Drumlin)	-	-	-	5	-	-

Table 3 The mean values of map variables in the 6 Mourne land classes.

		Mourne Land Class Number					
Code	Attribute	1	2	3	4	5	6
1	Land between 0-50 (%)	65	35	8	-	-	-
2	Land between 51-150m (%)	5	64	68	12	10	-
3	Land between 151-250m (%)	3	-	21	77	50	11
4	Land between 251-500m (%)	-	-	2	9	38	66
5	Land > 500m (%)	-	-	-	-	-	23
6	Highest point (m)	52	88	202	250	377	529
7	Lowest point (m)	4	41	87	152	155	299
8	Mean elevation (m)	28	65	145	201	266	414
9	Length of slope (m)	336	693	774	759	980	919
10	Gradient of slope (degrees)	9	6	9	8	15	14
11	Ht. hill behind slope(m)	125	118	262	279	456	548
12	Distance to hill behind slope (m)	601	541	511	243	532	222
13	Distance to valley bottom (m)	61	271	209	147	132	258
14	Wood (ha)	0.8	2.2	9.0	4.6	15.2	2.6
15	Number of road forks	0.5	2.1	1.9	1.4	1.0	0.1
16	Number of buildings	25	19	20	17	6	1

Table 4 The number of kilometre squares in the 6 land classes. Figures in brackets indicate a percentage. Only squares with > 25% of their area inside the AONB have been included.

Land Class	Number (km^2)	%
1	77	(12.4)
2	104	(16.7)
3	99	(15.9)
4	140	(22.5)
5	41	(6.6)
6	161	(25.9)
AONB	622	(100)

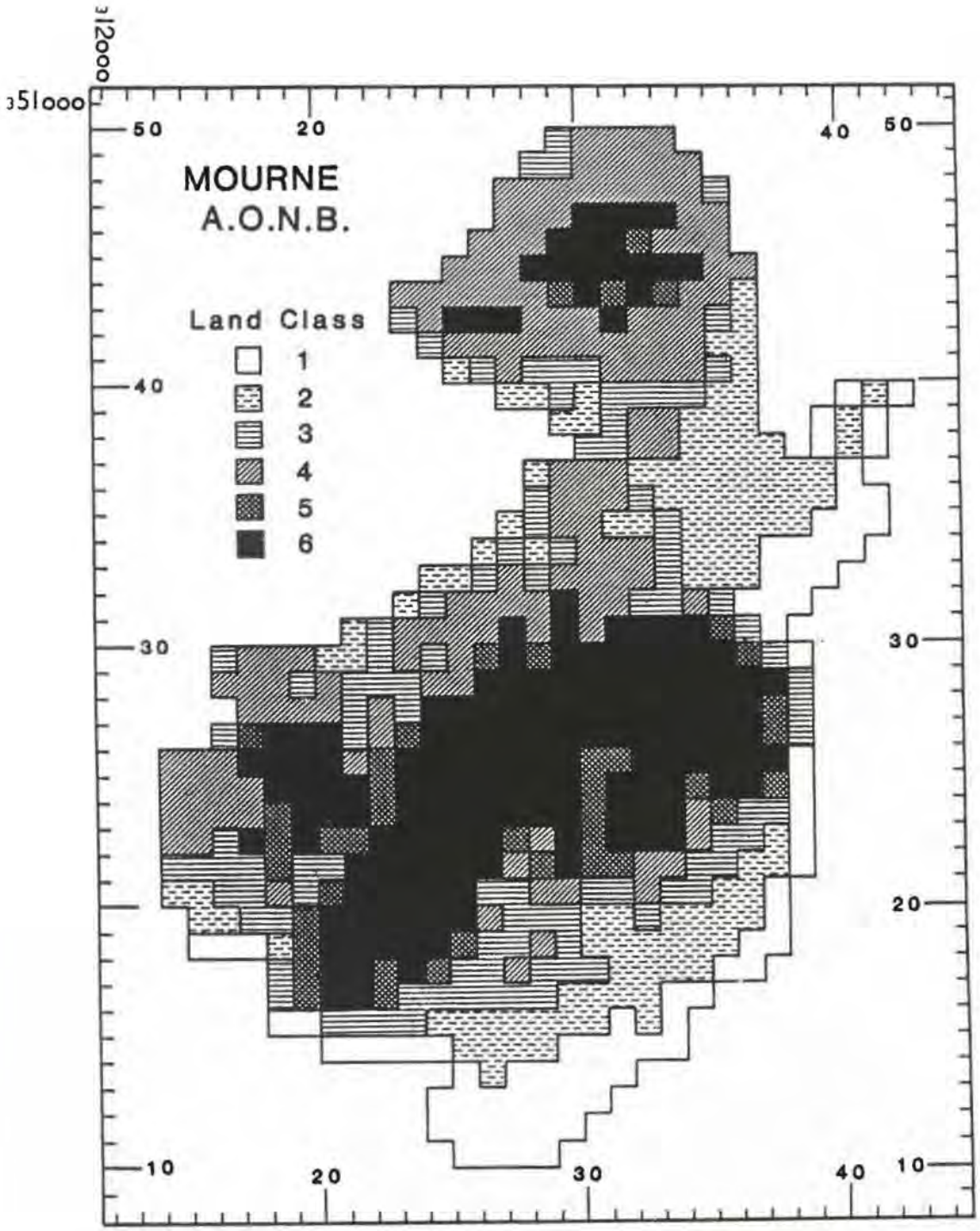


Fig. 3 The distribution of the 6 land classes in the Mourne AONB.

3. The Study Area in Regional Perspective

The Northern Ireland land classification divided the province into 23 land classes, representing the major landscape types (Cooper 1986a). The 1km grid square classification was based on a wide range of physical environmental characteristics related to climate, physiography, settlement artefacts, soils and geology. It therefore gave a more integrated assessment of variability than, for example landform/terrain analysis or land use capability maps which are prepared from a single group of characteristics determined from reconnaissance survey.

Seven land classes (1,2,3,13,14,17 & 23) occupied 87.7% of the Mourne AONB (Table 5). The high elevation land classes 17 & 23 were associated mainly with the Mournes (Fig. 4). Also showing a local distribution centred on the Southeast of the province was the coastal land class 1 (Fig. 4). Of the lowland/upland transitional land classes 13-14, the former showed a local affinity for the Mournes.

These land classes define the characteristic landscape types in the Mourne AONB. They occurred in association, at frequencies which are unique in Northern Ireland.

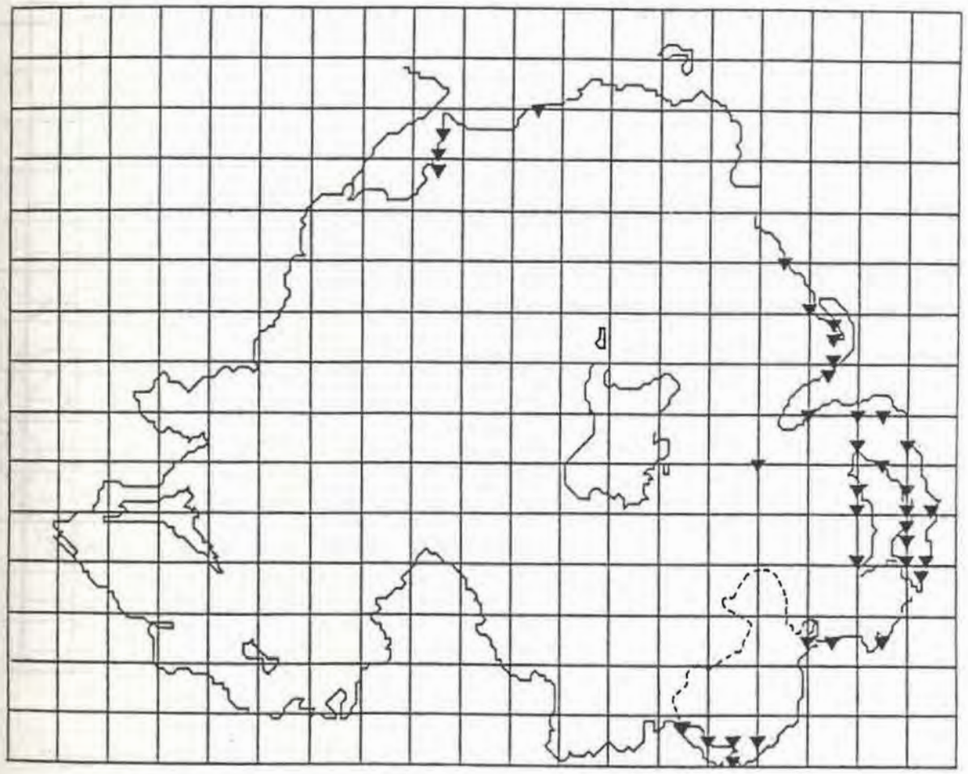
Table 5 Frequency of the Northern Ireland land classes in the Mourne AONB. All kilometre squares through which the AONB passes have been included.

Northern Ireland Land Class	Number of Squares	Frequency in the Mourne AONB	Frequency in Northern Ireland land Classification
1	109	17.2	5.2
2	54	8.5	3.0
3	34	5.4	7.9
4	8	1.3	4.0
5	-	-	5.0
6	4	0.6	2.9
7	5	0.8	3.9
8	-	-	3.6
9	2	0.3	3.0
10	3	0.5	5.1
11	2	0.3	4.6
12	-	-	3.0
13	21	3.3	2.9
14	32	5.0	5.4
15	7	1.1	5.6
16	-	-	4.9
17	192	30.2	3.3
18	16	2.5	3.7
19	9	1.4	5.1
20	6	0.9	5.3
21	1	0.2	5.3
22	15	2.4	4.9
23	115	18.1	3.3
Total 19	635		

Fig. 4 Maps showing the distribution of land classes 1, 17 and 23 of the Northern Ireland land classification. The dashed line represents the the boundary of the Mourne AONB.

Land Class 1

A lowland class which lies mainly below the 61m contour. It is coastal, generally close to intertidal sand or mud and is found particularly around the sea loughs. The climate is correspondingly mild and windy. Topography is fairly flat but short steep slopes are common, usually associated with either drumlins or coastal terraces. Often the land is backed by higher elevations inland. It is quite heavily urbanised but even where it has a rural, maritime landscape, access from principal roads and footpaths is easy. Soils are predominantly acid brown earths derived from glacial or sedimentary deposits.



Constant attributes (80-100%)

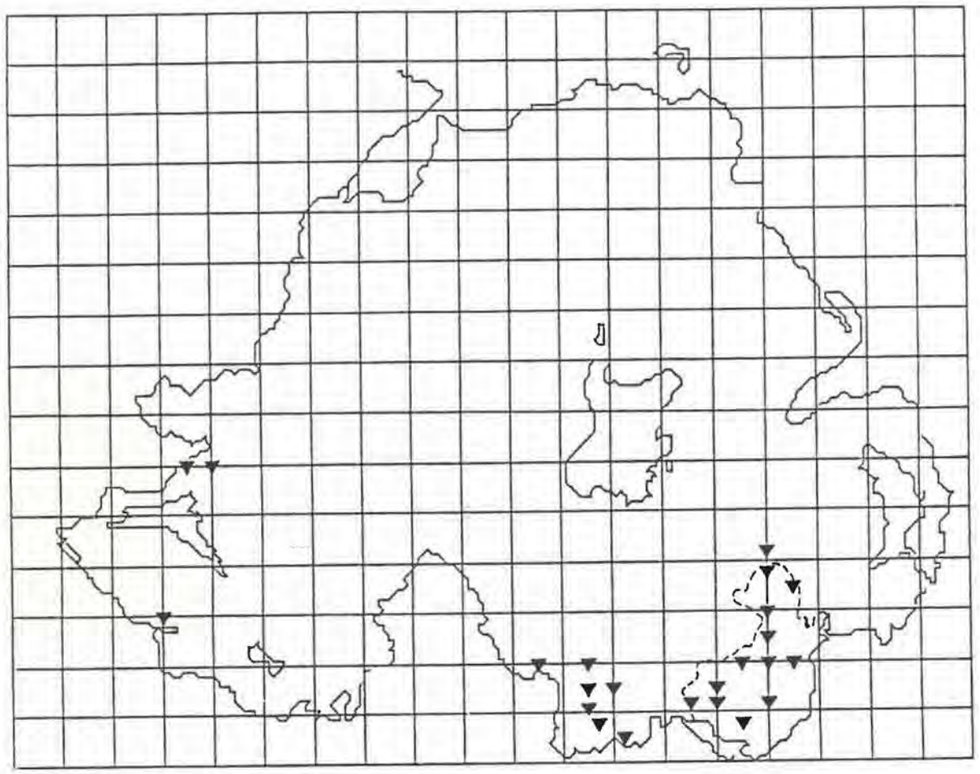
Land 0-61m in surrounding squares
Mean annual number of days with sleet or snow, <20
Mean annual number of days with gales, >10
Minor road
Mean distance to west coast, >160km
Mean maximum January temperature, >6.5°C
Highest point, 0-152m
Mean minimum January temperature, >1.5°C
Intertidal sand/mud in surrounding squares
Mean annual number of days with air frost

Attributes at the ultimate TWINSPAN dichotomy

Intertidal sand/mud in surrounding square
Sea in surrounding squares

Land Class 17

This is an upland land class of the Mourne Mountains and Armagh hills. It is very steeply sloping and lies mainly between the 152m-244m contours but land >244m is very frequent. The escarpments which mould the topography are generally backed by mountain summits. Springs and small, branched streams are common and any freshwater bodies are generally storage reservoirs. For an upland type it has a high density of buildings, often greater than lowland classes but there is a relatively poorer road network. Rough grazing is very common and a comparatively large proportion of the land is ccupied by conifer plantation. Soils are mainly acid brown earths and there is some hill peat.



Constant attributes (80-100%)

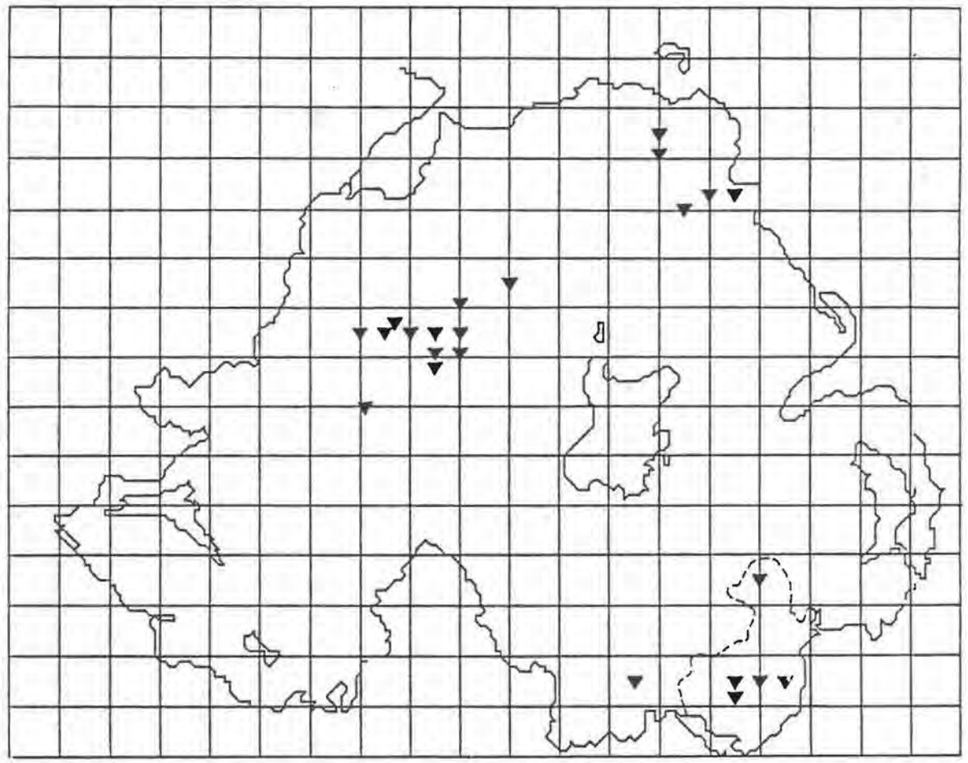
Land 153-244m in surrounding squares
Minor road
Mean distance to north coast, >100km
Highest point, 153-305m
Land 62-152m in surrounding squares
Mean annual number days with air frost, 40-60
Mean maximum January temperature, 6.0°-6.5°C
Mean maximum July temperature, >18.5°C
Gradient, 6.1°-17.0°

Attributes at ultimate TWINSPAN dichotomy

Mean maximum July temperature, >18.5°C
Acid brown earths (Granite or rhyolite glacial till)
Gradient, 6.1-17.0°
Silurian shales
Mean maximum January temperature, 6.0°-6.5°C
Land >244m, 1-25 ha

Land Class 23

The land class is confined to the highest elevations and summits of the Sperrin and Mourne Mountains and the Antrim Hills. Slopes are very steep and extensive, sometimes with cliffs. Unbranched streams are a common feature, often springing from within the land class, but otherwise freshwater bodies do not occur. Despite the topography, unfenced minor roads do occur and the highest frequency of footpaths except for the coastal land class 1 are recorded here. Rough grazing is extremely frequent and there is some afforestation with conifers. The soils are usually peaty podzols, peaty gleys or blanket peats.



Constant attributes (80-100%)

Land >244m in surrounding squares
Highest point >305m
Height of hill behind slope, >305m
Mean annual rainfall, >1200mm
Gradient, 6.1°-17°
Land >244m, 76-100 ha
Rough grazing

Attributes at ultimate TWINSPAN dichotomy

Height of hill behind slope, >305m

4. Field Survey

4.1 Sampling strategy

Full cover survey of the ecology of the area was not pursued in view of its size, the time available to complete the work and the wide range of land use and ecological resources to be assessed.

The Mourne land classification provided the basis for a stratified random sampling programme. Stratification of the AONB into land classes was itself thought to be essential for descriptive and summary purposes, given the wide range of landscape characteristics found in the area.

4.2 Efficiency of the land classes as sampling strata

A desk study to examine the efficiency of the Mourne land classification as a sampling stratification for ecological survey was carried out using vegetation mapping symbols on 1:10,000 Ordnance Survey maps. This exercise showed that the land classes contained uniquely contrasting types of vegetation which were related to their physical environmental characteristics (Cooper 1986b).

Similar work with the Northern Ireland land classification (Cooper, 1986a) also demonstrated a strong correlation (0.90) between the vegetation of each land class and its physical attributes. This was somewhat weaker, however than for the Mourne land classification (0.92) and accordingly the Mourne land classification was selected as a stratification for field survey.

4.3 Sampling methods

From each of the six land classes, 10 random 1km squares were selected. Within each sample square, a random 25ha quarter square was chosen for field survey (Appendix 1). The number of sample squares selected was a compromise between the time available for field survey, the type of resource being studied and the accuracy required by the work. The optimum sampling strategy for estimating land use was investigated by examining the distribution of vegetation mapping symbols in sample kilometre squares of 1:10,000 Ordnance Survey maps.

The mean density of bracken and rough grassland in each Mourne land class was plotted against increasing sample size (Fig. 5). These two vegetation types had contrasting frequency and cover values in the land classes. Beyond a sample number of 10 there was generally little change in mean symbol density. It is likely therefore, that field survey of land classes for other common ecological resources based on a sample size of 10, will estimate their abundance with a level of precision and accuracy which is acceptable, given the constraints of the objectives and resources available to complete the work.

A 25ha sampling unit size was selected so that field survey of two squares could be carried out in a single day. Given the scale of variation in the Mournes and the heterogeneity of land use and linear features, field mapping of larger areas would have had to be undertaken at the expense of a reduction in the total number of squares sampled from each land class.

4.4 Procedure for recording land use and linear features

The attributes present in each 25ha sample square were recorded directly onto field data sheets (Appendix 2) which consisted of a checklist of coded attributes together with a 1:10,000 scale map. A guide to the field recording procedure and standardised descriptions of the attributes is given in Appendix 3.

Land use and linear features were recorded as an area, length or qualitative attribute under the following categories:

(a) Woodland/seminatural vegetation; type, structure, main species and management.

(b) Agriculture; crops, animal stock and farming practice.

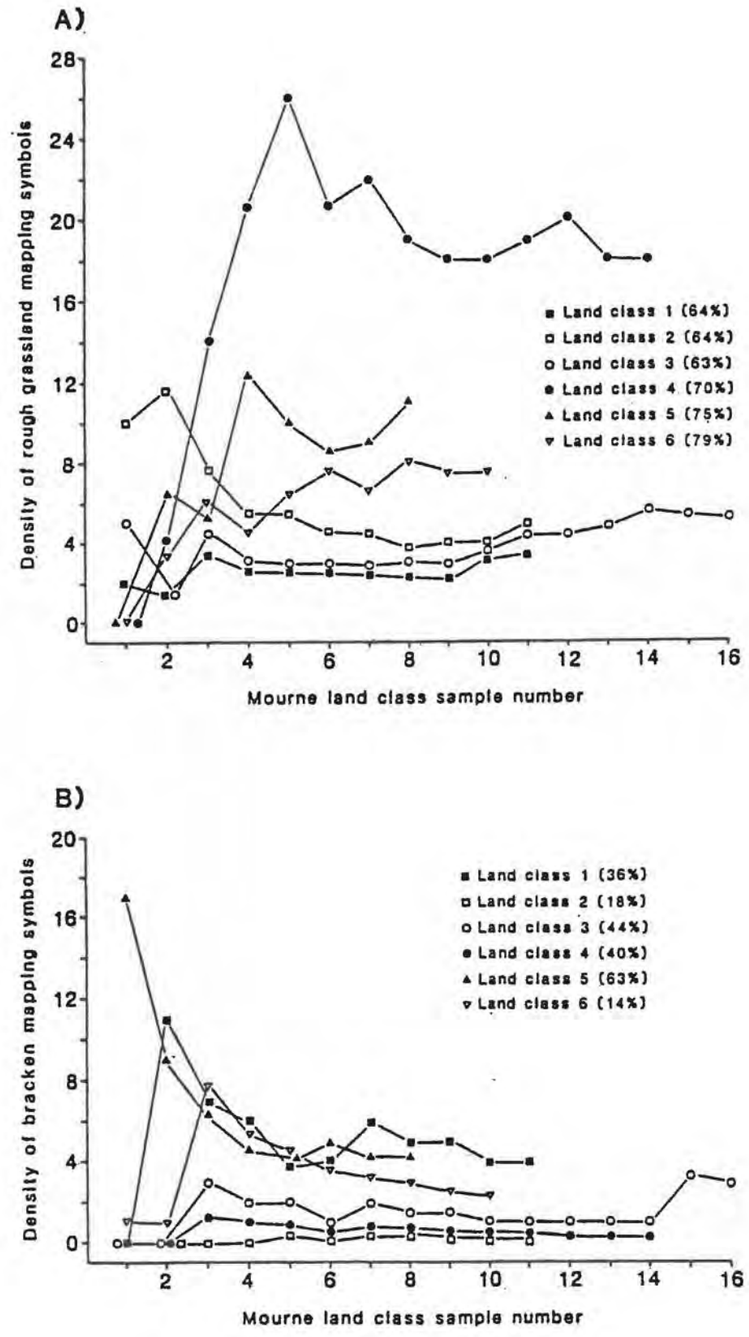
(c) Field boundaries; hedge type and management, walls, fences and ditches.

(d) Topography and ground features; attributes related to hydrology and geomorphology, dereliction, urban and rural development and recreation.

Field boundaries were recorded onto 1:10,000 O.S. maps of the AONB together with new boundaries constructed and these removed since 1973-1980 when cartographic field survey was carried out. The mean survey date for these maps was 1977. Heterogeneous boundaries (usually with any single component <10m) associated with urban development, domestic buildings or farmsteads were excluded.

Common names of species are used in the text. A list of these is found in Appendix 4 together with their botanical names. Nomenclature follows Webb (1977).

Fig. 5 The mean density of (a) rough grassland and (b) bracken Ordnance Survey mapping symbols in sample kilometre squares from the 6 Mourne land classes. The frequency of mapping symbols in each land class is given in brackets.



5. Collation and Analysis of Field Data

Subsequent to the field survey, parcels of land and linear features were subjectively classified into similar types (Appendix 5) based on the coded attributes recorded on the field data sheets and experience gained in the field. This was carried out to simplify presentation and analysis.

Categories derived from vegetation and land use surveys outside the Mournes were not used since it was found that they were not generally relevant. This was the case particularly with the upland vegetation, flushed vegetation and wet grasslands, where the communities recorded differed from existing phytosociological classifications (White 1982).

A hierarchical classification of boundaries based mainly on their structure was constructed to present the results of the field boundary survey. A total of 19 simplified types were delimited (Appendix 5). Boundary data are given as numbers, lengths and percentage lengths in each land class. Also presented are the predicted lengths of each boundary type in the land classes and the AONB as a whole. Data were collated separately for boundaries which were associated with ditches, managed boundaries and species composition.

The land uses, landscape features and boundary types used in the report are described in terms of the codes recorded on the field data sheets, in Appendix 5. Results are presented as mean values for the six land classes. Each mean is derived from the sample squares. This value provides anestimate of resources and allows comparison between land classes.

It should be remembered that not all sample squares will have the same amount of resource if they are examined in the field. In many cases, none will be present. Land class means should be read therefore, in conjunction with the predicted frequency with which the resource occurs in the sample squares. Means for land class 1 are calculated after excluding the area of each sample square occupied by sea.

The predicted total of each land use, landscape feature and boundary type in the land classes and the AONB as a whole has been calculated by multiplying the mean value with the number of 1km squares in each land class. Predictions are for the 622 kilometre squares comprising 608 km^2 of land inside the AONB boundary. Certain assumptions have been made in analysing the data and calculating areas. An arbitrary width of 1m was given to narrow land parcels such as species-rich wet grassland bordering streams, or fen associated with ditches. A width of 5m was similarly assigned to lines of trees. The area of farm trees was calculated so as to include buildings and land to which the resource related.

Some land parcels contained mosaics of different vegetation types. Where the scale of mosaic pattern was relatively large and could be estimated in the field, the land parcel area was divided between them. In cases where the proportions of different vegetation could not be estimated, rules of preference in ascribing parcels to categories were instituted. The main instances of priority ranking were:

1. Species-rich wet grassland took preference over other grassland types.
2. Fen took preference over species-rich wet grassland
3. Farm trees were given preference over lines of trees.

6. Map Archive and Data Base

The field data sheets are stored in the form of an archive with the University of Ulster and the Department of the Environment for Northern Ireland (Appendix 6). A data base also lies with the University of Ulster as a series of computer files. Selected information has been stored on an IBM-PC, using on the software package dBASE III. Retrieval of data is possible using any code or combination of codes recorded on the field data sheets.

7. Ecological Resources, Land Use and Landscape Attributes

Descriptions of the vegetation types presented in this section are given in Appendix 5. Agricultural grasslands had a predicted cover of 37.6% of the AONB (Fig. 6). They consisted mainly of perennial ryegrass swards (27.5% of the AONB) with Italian/perennial ryegrass (3.2%) and mixed species grassland (6.9%) as minor components. Most of the grassland occurred in the lower elevation land classes 1-3 and the improved parts of land classes 4 & 5 (Figs. 7-8). Arable crops and fallow land (4.0%) and urban areas (1.4%) were found mainly in land classes 1-3.

Excluding woodland and scrub, seminatural vegetation occupied 40.6% of the landscape, mainly in the higher elevation land classes 4-6. It was composed primarily of heath and hill pasture (32.3% of the AONB). There was also a minor wetland element. Little seminatural vegetation occurred in the lower elevation land classes 1-3. What was present consisted mostly of coastal plant communities and wetland (2.2%).

Conifer plantation was the most common type of woodland (7.5% of the AONB) with deciduous woodland and scrub occupying 3.4% of the landscape. Only 1.9% of the AONB was seminatural woodland. Whereas the conifer plantation occurred primarily in the transitional lowland/upland and upland land classes 4-6, broadleaf woodland and scrub was more characteristic of lower elevations and was entirely absent from land class 6.

Land other than that falling within specific named categories accounted for 5.5% of the AONB. It consisted mainly of buildings and domestic gardens not related to urban centres, bodies of water such as lakes and reservoirs and roads.

7.1 Woodland

Summaries of woodland distribution in the land classes are given in Tables 6-8. The predicted woodland cover in the AONB was 6595ha (10.9%). The greatest proportion was conifer plantation (4532ha), recorded mainly as large blocks. This contrasted with seminatural broadleaf woodland/scrub (1134ha)

which consisted mainly of small farm parcels and which represents a considerable landscape resource. Broadleaf plantation/demesne woodland (461ha), trees associated with farm buildings (401ha) and riverside woodland (369ha) were less common but achieved prominence in certain landscape types. Lines of trees and fen carr had a very small cover, but fen carr was of local ecological significance.

7.1.1 Seminatural broadleaf woodland/scrub

Only 1.9% of the AONB was covered with this vegetation type. Most plots were small. The highest cover occurred in land classes 1 & 4.

1. Field parcels

Woodland away from rivers, but excluding fen carr, accounted for 1.2% of the AONB. Most parcels comprised immature trees or scrub, often with gorse. Their wildlife conservation value was generally low except in the sense that there was little present.

Land classes 1 and 4 had the greatest percentage cover. Land class 4 contained 60.6% (446ha) of the resource. Woodland was associated in land class 1, with the coast and in land class 4 , with a relatively unmanaged hill landscape. Land classes 2 & 3, with little of the resource, were fairly intensively managed for agriculture.

Alder, ash, rowan, sycamore and willow were common throughout. Hawthorn, gorse or blackthorn often occurred as single species dominants or as an understorey. Birch and hazel were frequent in land classes 3 & 4. Hawthorn was most frequent in land classes 3-5. Introduced species, in particular sycamore, were common. Ground floras were species-poor and often dominated by grasses.

2. Riverside woodland

This covered only 0.6% of the AONB. It was associated with steep stream and river banks as a linear feature and was most common in land class 3. Alder, ash, hazel, sycamore and willow were frequent. There was a richer ground flora than in the field parcels due mainly to the inaccessibility of

many of the sites to farm animals. Gorse was common in land class 1 and hawthorn in land classes 3-5. Alder was particularly frequent in land classes 3 & 5. Hazel occurred in land classes 2-4.

Along with fen carr it had a locally high wildlife conservation value, having probably a continuous history as woodland since it established.

3. Fen Carr

A small number of fen carr fragments were found mainly in land classes 1 and 2. Willow and alder were the dominant trees. The ground flora was of ecological interest comprising wetland species. This was partly due to the fact that they had standing water and were therefore often fenced to prevent access by grazing animals. Some were polluted by organic effluent or rubbish.

7.1.2 Conifer plantation

Plantations accounted for 7.5% of the area of the AONB. They were found in all land classes but were a particular feature of land classes 3-6 on hillsides and wet peat. Sitka spruce, lodgepole pine, Norway spruce,larch and Scots pine were the most common planted species. In land class 1, larch and Scots pine had been planted on steep mountain slopes near the coast. The visual impact of these plantations was great with large blocks of uniformly aged stands dominated by one or two species. Boundaries with neighbouring land were often straight with limited planting of deciduous trees to ameliorate their starkness.

In one sample square from land class 5, Norway spruce and larch had been felled, leaving scattered Scots pine over heath. This showed superficial similarity to native Scottish pine woods and had left an aesthetically pleasing landscape when contrasted with one recently clear-felled plantation.

7.1.3. Broadleaf plantation and demesne woodland

This was found only in land classes 1 & 2. Ash, beech, oak, Scots pine and sycamore were the most frequent trees, usually found as mature individuals. Rhododendron was frequently recorded, along with a large number

of introduced species occurring as mature specimens.

Regeneration of ash, beech, oak and sycamore was recorded but was not ubiquitous.

7.1.4 Trees associated with farm buildings

Planted for shelter or amenity, such groups of trees were found on most working farmsteads. Ash, Scots pine and sycamore were commonplace. Beech was particularly frequent in those parts of land class 5 which were being farmed. There were a large number of other native and introduced broadleaf and conifer species.

Little evidence of new planting was recorded. Recently built farm houses and structures were not usually planted with trees. When associated with derelict farm buildings, regeneration generally occurred along with invasion by other native trees and shrubs.

Farm trees did not contribute greatly to the landscape in the uplands/mountains since most of land class 5 and all of land class 6 were above the limits of lowland agriculture.

7.1.5 Isolated/groups of scattered trees

Such trees were generally associated with some land use artefact which no longer served a useful function. Most of the species recorded were native, mainly ash and hawthorn. They were more frequent in land class 4 along the lines of former hedges or with derelict farm structures.

7.1.6 Lines of trees

These were found on farms in land classes 1-4 usually as planted shelterbelt. Common tree species were alder, ash, beech and sycamore. There were some lines of conifers. Alder occurred along ditches or watercourses, particularly in land class 3 as a derelict seminatural feature.

Their function was mainly shelter at higher elevation but in land classes 1 & 2 they had been planted for their contribution to the landscape.

7.1.7 Trees at the urban-rural fringe

Garden trees, lines of trees associated with boundaries, isolated trees and groups of scattered trees at the urban-rural fringe played an important role in softening the abrupt transition between country, village and town. They were particularly common in rural villages where strong contrasts were recorded, between the older parts with their scatter of large deciduous trees and the newer developments with no plantings.

In urban areas of land class 1, fewer trees were recorded at the urban-rural fringe. Here there was a larger proportion of exotic species, mainly conifers (Table 10).

7.2 Seminatural vegetation

The predicted cover of seminatural vegetation in the AONB was 24,709ha (40.6% of AONB). Tables 9 & 10 summarise its distribution in the land classes.

7.2.1 Maritime vegetation

Fragments of eroding salt marsh and sand dune, shingle ridge, strand line and maritime cliff vegetation were recorded only in land class 1 along with the more usual strand vegetation. Whilst these communities occupied only a small area, they were ecologically interesting and contained a high diversity of species.

Strand communities often had sea radish and at Mullartown Point the oyster-plant occurred on a shingle ridge within a sample square. At this site, material had been removed from the stone ridge as part of farm operations.

7.2.2 Seminatural grassland

1. Species-rich dry grassland

The predicted total area of species-rich dry grassland was only 1.0% of the AONB. In land class 1 it was found as fragments along the coast and coastal terrace, isolated from improvement by its topography and inaccessibility. An example of species-rich calcareous grassland with some

maritime influence was recorded at Mullartown point.

In land classes 1-3, species-rich dry grassland occurred along roadside verges and field banks. Steep banks along non-wooded rivers were sites for this type of vegetation mainly in land class 3. In land class 4, the thin, dry rocky soils of steep slopes occasionally had small areas of species-rich grassland. These areas were often being invaded by gorse or bracken. In land classes 3 & 4, much of the resource was associated with unimproved pasture.

2. Species-rich wet grassland

There were few examples of enclosed pasture still supporting species-rich wet grassland (1.2% of AONB). Those which were found were associated with either interdrumlin hollows or river valley bottoms mainly in land class 3. Their wildlife conservation value was high for the locality. Wet field bottoms and roadside and farm ditches were generally species-rich when compared with nearby agricultural grassland. Such areas were quite common.

In land class 4, species-rich wet grassland was confined to small fields as flushed grassland or associated with derelict drainage ditches.

7.2.3 Fen

Fen vegetation (0.1% of the AONB) intergrading to peaty flushes and bog was frequent but not extensive. It was found even on some of the most intensively farmed land, both as linear features such as ditches and as small parcels. This degree of fragmentation was associated with a reduced species diversity.

Marsh vegetation was present in some slow moving streams and deeper ditches in land classes 1-4. Some ditches were polluted with organic effluent. Streams and river banks were often canalised and devoid of marsh vegetation. In wet field bottoms and hollows, land fill and rubbish dumping was frequent.

7.2.4 Bent/fescue hill pasture

Hill pasture with brown bent and fescue as dominants, sometimes with Yorkshire fog and sweet vernal-grass, accounted for 1.9% of the AONB. It was mainly a feature of the steep rocky hills and thin soils of land class 4 where it occupied 1019ha (87.5% of the total resource). Sheep were the main type of farm stock but rabbits were often sited. Invasion by bracken, European gorse, dwarf gorse and other shrubs was recorded particularly in land class 4 but also in land classes 3 & 5.

7.2.5 Bracken

Bracken occupied 1.7% of the AONB. It was recorded mainly in land classes 3-5. Land class 4 contained 68.4% of the total bracken cover in the AONB. Clearance by herbicide treatment was recorded only on one farm.

7.2.6 Mat-grass hill pasture

In land classes 4 & 5, bent/fescue hill pasture graded into hill pasture dominated by mat-grass. The amount of this vegetation in the AONB was 7.7%. Along with wet heath and ericaceous heath, it was a major component of the uplands. It occupied 27.9% of land class 6 mainly on soils derived from Silurian rocks. This land class contained 95.5% of the mat-grass hill pasture in the AONB. Grazing was almost exclusively by sheep.

The presence of other, more palatable grasses such as brown bent and fescue, links the vegetation to hill pasture whilst the presence of other secondary elements often as mosaics, links it to ericaceous heath, bog and poor fen communities. Rushes and bracken were sometimes present as minor components. Interactions of slope, drainage, soil nutrient status and grazing intensity determined proportions.

7.2.7 Gorse heath

Gorse heath occupied 3.5% of the AONB. Dwarf gorse was frequently dominant but European gorse also occurred. Gorse heath was present in each land class except land class 6. It was most extensive in land class 4

(11.1%) of the land class area) where it is a characteristic vegetation of the lowland-upland transitional zone in the AONB. Most (72.7%) of the predicted area of gorse heath was found in land class 4.

Frequently it occurred as a mosaic with other vegetation types, notably hill pasture in land class 4 and with peaty flush, wet heath and bog in the other land classes. Often associated with gorse heath was bracken, particularly in land classes 3 & 4. A predicted area of 2.3% of the AONB was covered with this mosaic. Rabbit infestation was frequent.

7.2.8 Ericaceous heath

The total cover of ericaceous heath in the AONB was 12.1%. It was the most common vegetation type in the mountains, occurring mainly in land classes 5 & 6 (87.2% of the resource occurred in land class 6). Significant stands were occasionally recorded in land class 4. Dominants included ling heather, bell-heather or bilberry, these being characteristic species of the better-drained upland soils and steep slopes. Minor components of wet heath and peaty flush were often associated. Bilberry was found on boulder scree whereas ling heather occurred on dry peat over granite often with erosion features such as bare rock or gravel between. Ericaceous heath had a high landscape and wildlife conservation value where it occurred as extensive stands.

7.2.9 Wet heath

This mainly occurred on thin wet peats, often on steep slopes, in land classes 5 & 6. It occupied 7.1% of the AONB of which 76% occurred in land class 6. Common species were purple moor-grass and deer-grass in association with ling-heather, bell-heather, cross-leaved heath and mat-grass.

Low elevation heaths on the South side of the Mourne mountains were floristically and ecologically complex. They were often overgrazed and burnt. Many of them had a high content of purple moor-grass and gorse. An interesting feature was the occurrence together of dwarf gorse and bog-rush.

These heaths have a wildlife conservation value and contribute greatly to landscape diversity.

7.2.10 Bog and peaty flush

Deep waterlogged peats carrying a bog vegetation of purple moor-grass, cotton-grass and bog-moss occurred mainly in land classes 5 & 6. They were largely confined, in the uplands, to flatter valley bottoms and plateaus. These areas showed evidence of past or current peat extraction. Peat hags and erosion were frequent. Whilst peat cutting and damage by walkers contributed to peat erosion, trampling damage by sheep was extensive.

The other main component of this vegetation type, peaty flush, was generally dominated by sharp-flowered rush, with soft-flowered rush at lower elevations. Here the flushes were more nutrient-rich and had a higher number of poor fen plant species.

Bog and peaty flush covered 2.0% of the AONB of which 69.2% occurred in land class 6.

7.3 Agricultural land

Statistical profiles of agricultural land use in the six land classes are given in Tables 11 & 12.

7.3.1 Grassland

The proportion of agricultural grassland in the AONB was 37.6%. The percentage area of land given over to grassland however was much higher in some parts. Land classes 2 & 3 for example, comprised 64.8% and 60.4% of agricultural grassland respectively. Perennial ryegrass swards were the major component. Timothy and white clover were the species most often found in association with perennial ryegrass.

Italian/perennial ryegrass swards, mainly used for silage, was sown on the better ground of land classes 1 & 2 and also in land class 5 following reclamation.

Older, less intensively managed mixed species grasslands were most

abundant in land classes 3 & 4 (14.7% and 10.9% of the land class area respectively). They generally contained less timothy and more crested dogstail than ryegrass swards. Mixed species grassland on drier soils at lower elevations, comprising predominantly crested dogstail, brown bent and some fescue, was a feature of land classes 3 & 4. In wetter areas, creeping bent, rough-stalked meadow-grass and wetland herbs were more common. Poorer swards contained brown bent, sweet vernal-grass and Yorkshire fog, particularly at higher elevations where they formed a continuum with hill pasture.

7.3.2 Farm stock

More than three times as many sheep (132,634) than cattle (43,392) were found in the AONB. Cattle were grazed mainly in land classes 1-4 and on improved parts of land class 5 but were absent from land class 6 (Tables 13 & 14). Sheep were present in all land classes with the greatest concentration in land classes 3 & 4.

There was a comparatively low overall stocking density of sheep in land class 6. They were mainly found grazing on mat-grass hill pastures in large numbers, rather than on ericaceous heath.

7.3.3 Arable crops

Arable farming accounted for 3.5% of the AONB. It occurred mainly in the lower elevation land classes 1 & 2 (Tables 11 & 12). Land class 2 for example, supported 56% of arable farming in the AONB. Barley was the main crop whilst others recorded included potatoes and less frequently oats, wheat, brassicas and turnips.

Barley was grown in each of the land classes 1-5 but occurred mostly in land classes 1 & 2. Other arable crops contributed in only a minor way to agricultural productivity, primarily on the better parts of land class 2.

Fallow land was related primarily to the level of agricultural activity in the AONB. A relatively large proportion of the fallow land (32.5%)

occurred in land class 5 where it was mainly associated with reclamation projects.

7.3.4 Farming enterprises and landscape features

Many active farms in land classes 1, 2 & 3 seemed to be full-time intensive enterprises, making productive use of the land. Arable farming was mainly restricted to the low elevation land classes.

Stock farming in the region was a mixture of suckling herds, beef cattle and in the uplands, sheep. Dairy enterprises were few in number.

In any given sample square, several contrasting farm types were usually found, with land use and farming intensity dependent on the enterprise. For instance, neglected farms or land parcels with invasive gorse or bracken could occur next to intensively farmed, productive land from which boundaries had been removed. The juxtaposition of modern farm enterprises with less intensively managed land provided starkly contrasting landscape types.

Much land was rented as outfarms. Whilst home farms were often small by modern standards, many farmers rented or owned outfarms to maintain economic viability. It was on outfarmed land that much landscape change was detected. This involved mainly grassland improvement.

Most reclamation and changes in land use was occurring in the uplands of land classes 4 & 5, rather than on the more stable farms of the lower elevation land classes 1, 2 & 3. The effect that upland reclamation was having on the landscape and its ecological resources was great, leading to changes from heath covered hill tops to enclosed farmland, mainly grassland. Examples are to be seen in the river valleys of the Rostrevor region and the South side of the Mourne mountains.

7.4 Dereliction

Common on farms were abandoned motor vehicles and rubbish (Tables 15 & 16). Much of this was generated by the farms themselves rather than outside sources.

Rubbish dumping was mainly a feature of land classes 1 & 2 where it often

assumed the status of landfill in wet hollows and ditches with a seminatural vegetation. Abandoned vehicles were particularly frequent in land class 3. They were generally dumped either near derelict buildings or into areas which supported seminatural vegetation or waste land. Such sites were frequently close to streams and rivers.

A large number of uninhabited farm, and to lesser extent, residential buildings were present in the landscape. They were sometimes used for storing hay and materials or for sheltering farm animals but were generally in a poor and derelict condition. They were frequent in land classes 1-5. Land class 4 contained a particularly large number.

Invasive bracken and gorse on abandoned farmland was common in land class 4. There was little evidence of their control, except for occasional signs of burning. Abandoned lazy beds were recorded in both hill pasture and heath vegetation indicating reversion from past cultivation.

7.5 Urban land

Urban land (1.4% of the AONB) was mainly coastal. It was a significant feature of land class 1 (Tables 17 & 18) where it occupied 10.3% of the land class. Land Class 1 contained 78.5% of the total urban land in the AONB. Also recorded, were frequent new houses being built at town boundaries and on agricultural land in the countryside. They occurred mainly in land classes 1 & 2 but also in the lowland/upland transitional and upland land classes 3-5. Building sites were often on small plots of land occupied by seminatural vegetation or neglected agricultural land.

7.6 Recreation and landscape ecology

Littered footpaths and roadside vegetation damaged by trampling and vehicle tyres were features of the coastal sections of land class 1. Public access to the coast was convenient but limited to a relatively small number of entry points. This has led to strong pressure on the associated seminatural vegetation. In the vicinity of tourist facilities such as caravan sites, the effects were particularly noticeable. Access by motor cyclists to the shore was recorded in places. Around urban areas, damage to farm boundaries was evident.

Sea-borne domestic rubbish was common on the sea strand. The dumping of domestic refuse and landfill at coastal sites in land class 1 was often seen. Garden escapes had often colonised sea cliff and strand communities near urban areas and cottages. The practice of dumping rubbish into gorse scrub at the bottom of gardens was noted and even the extension of garden plots.

Land class 2 was relatively unaffected by recreation. Fishing appeared to be the main impact. The land was predominantly agricultural, with little opportunity for public access. Land class 3 was also fairly well farmed. Only forest trails and a car park giving access to the mountains were recorded.

In land class 4 the only evidence of recreation activity was the presence of way-marked forest trails and artefacts of shooting. The land was generally well fenced to retain sheep. To gain access to the hills it was usually necessary to walk through working farms. Narrow roads and lack of parking space contributed to the isolation of the low hills characteristic of this land class.

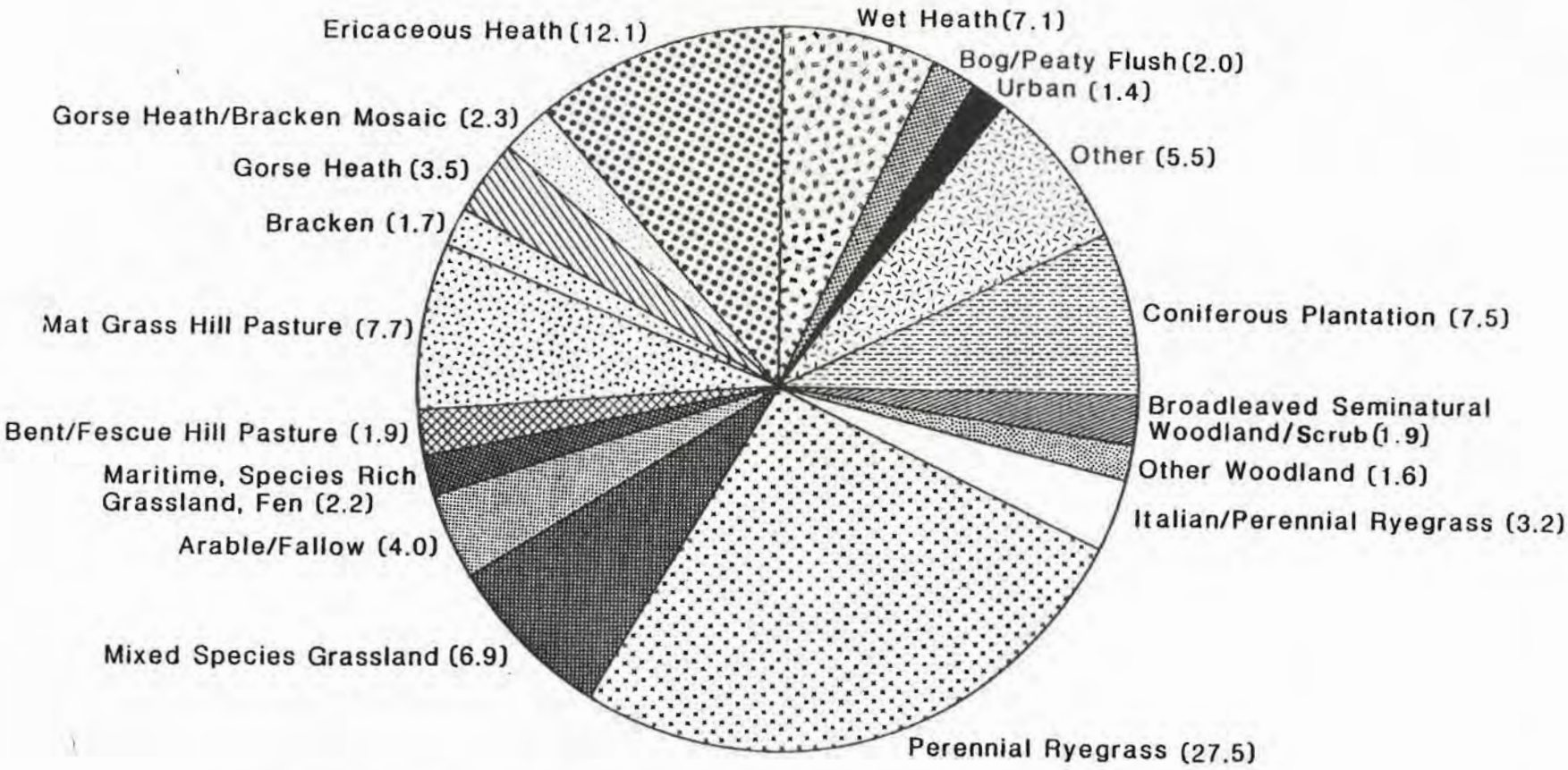


Fig. 6 The relative abundance of landscape ecological resources in the Mourne AONB. Figures in brackets represent a percentage of the total area.

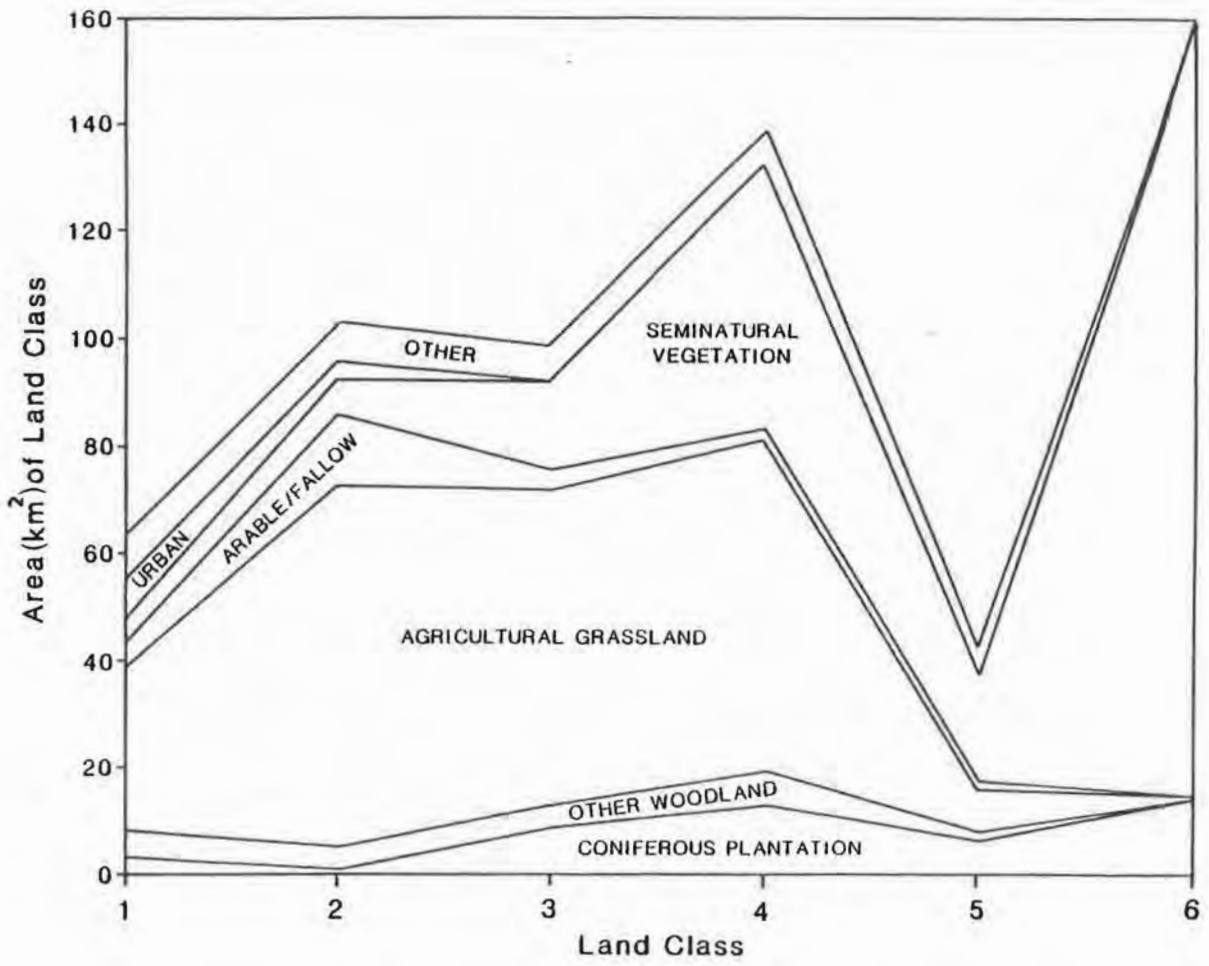


Fig. 7 The area (Km^2) of landscape ecological resources in the 6 land classes.

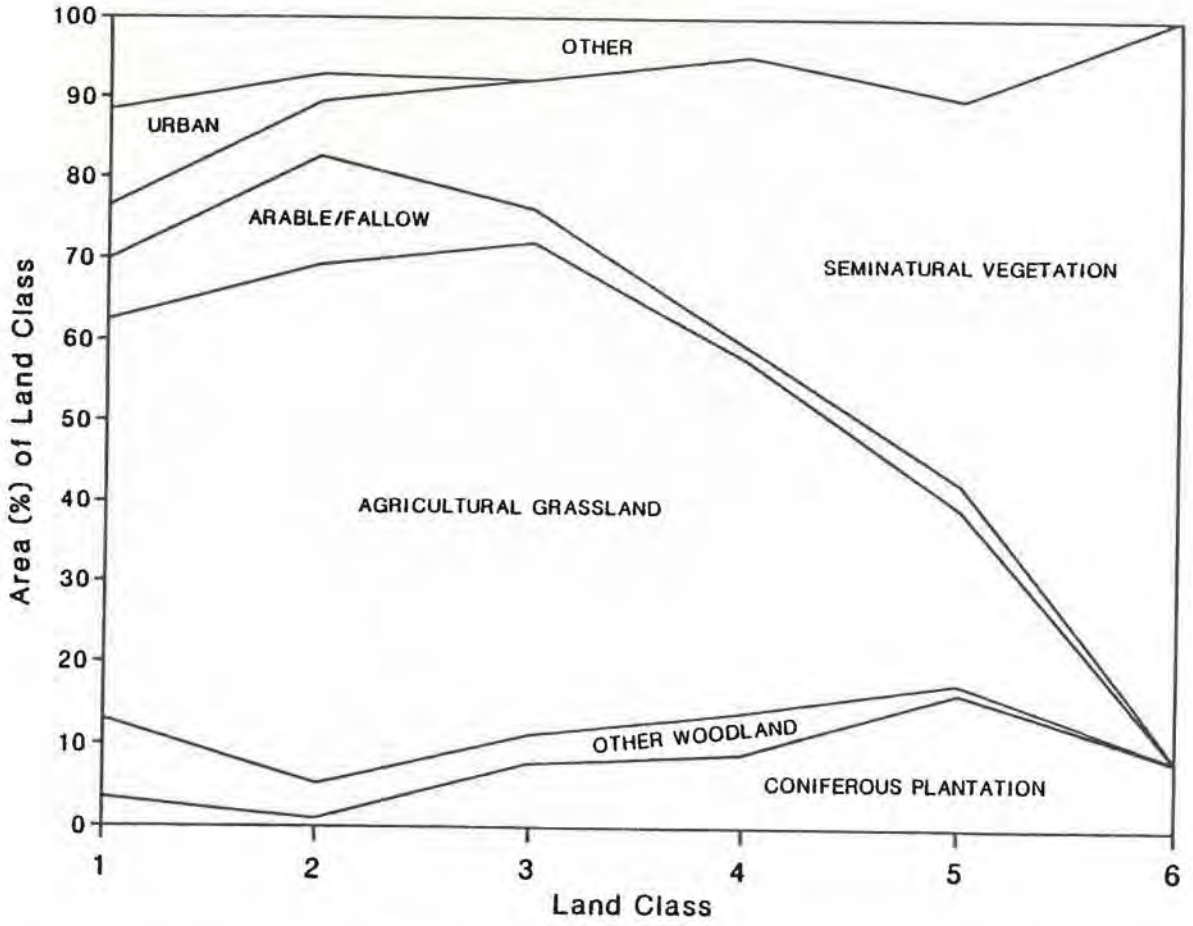


Fig. 8 The area (%) of landscape ecological resources in the 6 land classes.

Table 6 Percentage mean area of woodland in the 6 land classes. The percentage frequency of 25ha squares in which woodland occurs is shown in brackets.

Woodland	Land Class 1	2	3	4	5	6	AONB
Seminatural broadleaf woodland /scrub							
Field parcels	2.4 (40)	0.3 (20)	0.8 (70)	3.2 (60)	0.8 (10)	0 (0)	1.2 (36)
Riverside	0.9 (20)	0.9 (40)	1.3 (80)	0.6 (40)	0.05 (20)	0 (0)	0.6 (32)
Fen carr	0.3 (20)	0.1 (20)	0.02 (10)	0 (0)	0 (0)	0 (0)	0.04 (7)
Combined	3.5 (70)	1.2 (70)	2.1 (80)	3.8 (70)	0.8 (30)	0 (0)	1.9 (51)
Coniferous plantation	3.8 (10)	0.3 (10)	8.5 (10)	9.1 (10)	16.6 (40)	9.1 (10)	7.5 (12)
Broadleaf plantation and demesne woodland	4.4 (10)	1.7 (20)	0 (0)	0 (0)	0 (0)	0 (0)	0.8 (5)
Trees associated with farm buildings	0.7 (60)	1.2 (70)	1.0 (80)	0.8 (80)	0.3 (40)	0 (0)	0.7 (53)
Isolated trees and groups of scattered trees [1]	- (30)	- (30)	- (20)	- (60)	- (30)	- (0)	- (27)
Lines of trees	0.3 (60)	0.2 (60)	0.2 (40)	0.1 (40)	0 (0)	0 (0)	0.1 (33)
Total	12.7 (100)	4.6 (100)	11.8 (100)	13.8 (100)	17.7 (80)	9.1 (10)	10.9 (75)

[1] Figures not calculatable

Table 7 The predicted area (ha) of woodland in the 6 land classes. Figures in brackets indicate a percentage. The area of woodland as a percentage of the AONB is shown in brackets below.

WOODLAND

Land Class	Seminatural b/l woodland /scrub -field parcels	Seminatural b/l woodland/scrub -riverside	Fen carr	Seminatural woodland combined	Coniferous plantation	Broadleaf plantation /demesne woodland	Trees associated with farm buildings	Lines of trees	Total
1	148 (20.1)	55 (14.9)	21 (72.4)	224 (19.8)	239 (5.3)	280 (60.7)	43 (10.7)	16 (23.9)	802 (12.2)
2	28 (3.8)	95 (25.7)	6 (20.7)	129 (11.4)	33 (0.7)	181 (39.3)	130 (32.4)	16 (23.9)	489 (7.4)
3	81 (11.0)	129 (35.0)	2 (6.9)	212 (18.7)	837 (18.5)	0 (0)	103 (25.7)	21 (31.3)	1173 (17.8)
4	446 (60.6)	88 (23.8)	0 (0)	534 (47.1)	1275 (28.1)	0 (0)	115 (28.7)	14 (20.9)	1938 (29.4)
5	33 (4.5)	2 (0.5)	0 (0)	35 (3.1)	682 (15.0)	0 (0)	10 (2.5)	0 (0)	727 (11.0)
6	0 (0)	0 (0)	0 (0)	0 (0)	1466 (32.3)	0 (0)	0 (0)	0 (0)	1466 (22.2)
AONB	736 (100)	369 (100)	29 (100)	1134 (100)	4532 (100)	461 (100)	401 (100)	67 (100)	6595 (100)
% of AONB	(1.2)	(0.6)	(0.04)	(1.9)	(7.5)	(0.8)	(0.7)	(0.1)	(10.9)

Table 8 Percentage frequency in woodland parcels of the most common tree and shrub species in the 6 land classes.

SEMINATURAL BROADLEAF WOODLAND

Land Class	Alder	Ash	Beech	Birch	Blackthorn	Elder	Gorse	Hawthorn	Hazel	Holly	Oak	Rowan	Sycamore	Willow
	Field Parcels													
1	0	33	17	0	17	0	83	17	0	0	17	17	0	0
2	66	33	0	0	0	0	66	0	0	0	0	33	66	33
3	15	54	0	8	23	0	69	69	38	0	0	0	0	0
4	0	14	0	21	50	0	36	50	43	21	0	21	14	7
5	0	0	0	0	0	0	0	100	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AONB	10	30	2	13	33	0	54	49	33	10	2	15	12	6
	Riverside													
1	17	50	0	0	33	33	100	17	0	0	0	17	33	17
2	20	40	10	0	20	0	10	0	30	0	10	0	60	50
3	67	58	0	0	0	8	17	33	33	0	0	8	33	42
4	0	40	0	20	20	0	0	40	20	0	0	0	20	20
5	66	66	0	0	66	0	0	66	0	0	0	33	66	33
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AONB	33	48	3	4	17	7	25	24	21	0	3	6	40	39
	Fen Carr													
1	75	0	0	0	0	0	25	0	0	0	0	0	0	100
2	50	0	0	0	0	0	0	0	0	0	0	0	0	50
3	100	0	0	0	0	0	100	0	0	0	0	0	0	100
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AONB	71	0	0	0	0	0	29	0	0	0	0	0	0	83
	Seminatural broadleaf woodland (combined)													
1	25	31	6	0	19	13	75	13	0	0	6	13	13	31
2	33	33	7	0	13	0	20	0	20	0	7	7	53	47
3	42	54	10	4	19	0	46	46	23	0	0	4	15	23
4	0	21	0	21	42	0	26	47	37	16	0	16	16	11
5	50	50	0	0	50	0	0	75	0	0	0	25	50	25
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AONB	24	36	2	8	24	3	39	35	25	5	2	10	23	26

Coniferous plantation

Land Class	Larch	Lodgepole pine	Norway spruce	Scots pine	Sitka spruce
1	100	0	0	100	0
2	33	33	0	0	33
3	0	0	100	0	0
4	0	0	100	100	100
5	13	37	31	38	13
6	0	50	50	0	100
AONB	15	30	41	27	38

Broadleaf plantation and demesne woodland

Land Class	Ash	Beech	Elm	Eucalypt	Horse chestnut	Larch	Oak	Rhododendron	Scots pine	Sycamore	Sweet chestnut
1	50	75	0	25	25	25	75	50	50	75	0
2	28	100	43	0	0	0	57	14	28	14	14
3	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0
AONB	35	93	30	7	7	7	63	25	35	32	10

Trees associated with farm buildings

Land Class	Alder	Ash	Beech	Cypress	Elder	Elm	Gean	Gorse	Hawthorn	Hazel	Horse chestnut	Larch	Lime	Lodgepole pine	Monkey puzzle	Oak	Rowan	Scots pine	Sitka spruce	Sycamore	Willow
1	0	45	0	9	9	9	9	9	0	9	0	0	0	0	0	0	0	27	0	55	0
2	0	57	7	0	7	7	7	0	0	0	0	0	7	0	0	7	7	36	0	57	0
3	14	55	14	5	9	0	0	0	5	0	5	14	0	5	5	0	0	27	5	59	5
4	7	71	7	0	0	0	0	0	7	0	0	0	0	0	0	7	7	21	0	71	7
5	13	63	38	13	13	13	0	0	13	0	0	0	0	0	0	0	0	0	13	75	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AONB	7	59	10	3	6	3	3	1	4	1	1	4	2	1	1	4	4	26	2	62	4

Isolated trees and groups of scattered trees

Land Class	Alder	Ash	Beech	Blackthorn	Gean	Hawthorn	Holly	Larch	Lime	Rowan	Sycamore
1	0	50	0	0	25	25	0	0	25	0	0
2	0	50	0	0	0	0	0	0	25	0	25
3	50	0	50	0	0	50	0	0	0	0	0
4	0	42	0	8	0	42	8	8	0	0	25
5	0	33	0	0	0	66	0	0	0	33	0
6	0	0	0	0	0	0	0	0	0	0	0
AONB	4	41	4	5	3	35	5	5	7	2	19

Lines of trees

Land Class	Alder	Ash	Beech	Birch	Corsican pine	Cypress	Elm	Hawthorn	Hazel	Horse chestnut	Larch	Oak	Rowan	Scots pine	Sycamore
1	11	33	22	0	11	11	11	0	0	0	0	22	0	11	23
2	22	11	22	0	0	11	11	11	0	0	0	11	0	0	33
3	50	62	13	13	0	0	0	38	13	0	0	0	13	0	38
4	0	40	0	0	0	0	0	0	20	20	40	0	0	20	60
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
AONB	22	36	15	3	3	6	6	13	8	4	9	8	3	7	40

Table 9 Percentage mean area of seminatural vegetation in the 6 land classes. The percentage frequency of 25ha squares in which seminatural vegetation occurs is shown in brackets.

Seminatural vegetation	Land Class						
	1	2	3	4	5	6	AONB
Maritime vegetation	0.9 (50)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0.1 (6)
Species-rich dry grassland	2.1 (70)	0.9 (40)	2.9 (50)	0.4 (20)	0.3 (20)	0 (0)	1.0 (29)
Species-rich wet grassland	1.0 (30)	1.78 (60)	3.7 (60)	0.6 (80)	0.1 (20)	0 (0)	1.2 (43)
Fen	0.4 (50)	0.1 (80)	0.1 (60)	0.1 (40)	0.1 (20)	0 (0)	0.1 (39)
Bent/fescue hill pasture	0 (0)	0.3 (10)	0.7 (30)	7.3 (60)	1.2 (40)	0 (0)	1.9 (23)
Mat grass hill pasture	0 (0)	0 (0)	0 (0)	0.1 (10)	4.8 (30)	27.9 (50)	7.7 (15)
Bracken							
Continuous	0.05 (10)	0.02 (10)	0.4 (40)	1.4 (40)	0.3 (30)	0 (0)	0.4 (18)
Scattered	0.4 (30)	0 (0)	1.8 (30)	3.7 (60)	1.3 (20)	0 (0)	1.3 (23)
Combined	0.5 (30)	0.02 (10)	2.2 (50)	5.1 (60)	1.6 (40)	0 (0)	1.7 (30)
Gorse heath							
Continuous	0.3 (10)	0.1 (30)	0.4 (20)	2.3 (30)	0 (0)	0 (0)	0.6 (15)
Scattered	0 (0)	1.2 (30)	3.7 (40)	8.8 (30)	0.5 (20)	0 (0)	2.9 (19)
Combined	0.3 (10)	1.3 (40)	4.1 (50)	11.1 (50)	0.5 (20)	0 (0)	3.5 (27)
Gorse heath/bracken mosaic	0.5 (10)	0.5 (20)	2.6 (10)	7.7 (40)	0 (0)	0 (0)	2.3 (13)
Ericaceous heath	0 (0)	0 (0)	0 (0)	2.0 (20)	16.4 (50)	39.8 (50)	12.1 (21)
Wet heath	0 (0)	1.6 (20)	0.2 (10)	0.7 (10)	18.4 (70)	20.2 (70)	7.1 (30)
Bog/peaty flush	0.6 (10)	0.2 (10)	0.1 (30)	1.0 (40)	4.0 (60)	5.2 (80)	2.0 (34)
Total	7.1 (90)	8.0 (90)	23.0 (100)	52.3 (100)	49.5 (100)	93.1 (100)	40.6 (97)

Table 10 The predicted area (ha) of seminatural vegetation in the 6 land classes. Figures in brackets indicate a percentage. The area of seminatural vegetation as a percentage of AONB is shown in brackets below.

SEMINATURAL VEGETATION

Land Class	Maritime vegetation	Species-rich dry grassland	Species-rich wet grassland	Fen	Bent/fescue hill pasture	Mat grass hill pasture	Bracken Continuous	Bracken Scattered	Bracken Combined	Gorse heath Continuous	Gorse heath Scattered	Gorse heath Combined	Gorse heath/bracken mosaic	Ericaceous heath	Wet heath	Bog/peaty flush	Total
1	60 (100)	130 (22.3)	61 (8.6)	26 (37.7)	0 (0)	0 (0)	4 (1.5)	27 (3.4)	31 (3.0)	20 (5.1)	0 (0)	20 (0.9)	33 (2.3)	0 (0)	0 (0)	39 (3.3)	400 (1.6)
2	0 (0)	96 (16.5)	185 (26.2)	14 (20.1)	31 (2.7)	0 (0)	2 (0.8)	0 (0)	2 (0.2)	8 (2.0)	127 (7.3)	135 (6.3)	50 (3.5)	0 (0)	165 (3.8)	16 (1.3)	694 (2.8)
3	0 (0)	291 (50.0)	371 (52.5)	15 (21.4)	67 (5.7)	0 (0)	39 (15.4)	177 (22.4)	216 (20.7)	41 (10.7)	363 (20.9)	404 (19.0)	253 (18.0)	0 (0)	16 (0.4)	8 (0.7)	1641 (6.6)
4	0 (0)	53 (9.0)	86 (12.2)	12 (17.2)	1019 (87.5)	13 (0.3)	195 (77.1)	519 (65.5)	714 (68.4)	316 (82.1)	1229 (70.6)	1545 (72.7)	1071 (76.1)	273 (3.7)	92 (2.1)	129 (10.7)	5007 (20.3)
5	0 (0)	13 (2.1)	4 (0.6)	3 (3.6)	47 (4.0)	197 (4.2)	13 (5.2)	68 (8.6)	81 (7.8)	0 (0)	22 (1.3)	22 (1.0)	0 (0)	671 (9.1)	756 (17.6)	178 (14.8)	1972 (8.0)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	4492 (95.5)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	6412 (87.2)	3260 (76.0)	831 (69.2)	14995 (60.7)
AONB	60 (100)	583 (100)	707 (100)	70 (100)	1164 (100)	4702 (100)	253 (100)	791 (100)	1044 (100)	385 (100)	1741 (100)	2124 (100)	1407 (100)	7356 (100)	4289 (100)	1201 (100)	24709 (100)
% of AONB	(0.1)	(1.0)	(1.2)	(0.1)	(1.9)	(7.7)	(0.4)	(1.3)	(1.7)	(0.6)	(2.9)	(3.5)	(2.3)	(12.1)	(7.1)	(2.0)	(40.6)

Table 11 Percentage mean area of agricultural land in the 6 land classes. The percentage frequency of 25ha squares in which agricultural land occurs is shown in brackets.

Agricultural Land	Land Class						
	1	2	3	4	5	6	AONB
Grassland							
Italian/perennial ryegrass	8.8 (30)	10.7 (60)	1.1 (10)	0.2 (10)	4.4 (20)	0 (0)	3.2 (19)
Perennial ryegrass	34.7 (90)	48.1 (100)	44.5 (100)	32.9 (90)	12.3 (60)	0 (0)	27.5 (68)
Mixed species	6.2 (40)	6.0 (80)	14.7 (90)	10.9 (90)	4.9 (30)	0 (0)	6.9 (55)
Combined	49.7 (90)	64.8 (100)	60.3 (100)	44.0 (100)	21.6 (60)	0 (0)	37.6 (70)
Arable Crops							
Barley	5.6 (50)	7.4 (80)	1.8 (40)	0.6 (20)	0.2 (10)	0 (0)	2.3 (31)
Other cereals (wheat, oats)	0.4 (20)	2.0 (10)	0.7 (40)	0 (0)	0.1 (10)	0 (0)	0.5 (11)
Potatoes	0.7 (30)	2.3 (50)	1.0 (30)	0 (0)	0 (0)	0 (0)	0.6 (17)
Other vegetables (brassicas, turnips)	0.3 (10)	0.2 (20)	0.01 (10)	0.6 (20)	0 (0)	0 (0)	0.2 (11)
Combined	7.0 (70)	11.9 (80)	3.5 (60)	1.2 (30)	0.3 (20)	0 (0)	3.5 (40)
Fallow	0.4 (20)	1.6 (10)	0.3 (10)	0 (0)	2.6 (20)	0 (0)	0.5 (7)
Total	57.1 (90)	78.3 (100)	64.1 (100)	45.2 (100)	24.5 (60)	0 (0)	41.8 (70)

Table 12 The predicted area (ha) of agricultural land in the 6 land classes. Figures in brackets indicate a percentage. The area of agricultural land as a percentage of the AONB is shown in brackets below.

	AGRICULTURAL LAND										
	Italian/perennial ryegrass	Perennial ryegrass	Mixed species	Grassland (combined)	Barley	Other cereals (wheat, oats)	Potatoes	Other vegetables (brassicas, turnips)	Arable Crops (combined)	Fallow	Total
1	556 (28.2)	2187 (13.1)	392 (9.3)	3135 (13.7)	352 (25.5)	22 (7.3)	44 (11.4)	16 (12.4)	434 (19.7)	23 (7.1)	3592 (14.1)
2	1108 (56.2)	5003 (30.0)	620 (14.8)	6731 (29.4)	765 (55.3)	205 (67.4)	244 (62.9)	19 (14.8)	1233 (56.0)	170 (52.7)	8134 (32.0)
3	105 (5.3)	4404 (26.4)	1457 (34.7)	5966 (26.1)	179 (12.9)	73 (24.0)	100 (25.7)	6 (4.9)	358 (16.3)	29 (9.0)	6353 (25.0)
4	22 (1.1)	4600 (27.6)	1528 (36.4)	6150 (26.9)	78 (5.7)	0 (0)	0 (0)	87 (67.9)	165 (7.5)	0 (0)	6315 (24.9)
5	179 (9.1)	502 (3.0)	199 (4.7)	880 (3.8)	8 (0.6)	4 (1.3)	0 (0)	0 (0)	12 (0.6)	105 (32.5)	997 (3.9)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)
AONB	1970 (100)	16696 (100)	4196 (100)	22862 (100)	1382 (100)	304 (100)	388 (100)	128 (100)	2202 (100)	323 (100)	25389 (100)
% of AONB	(3.2)	(27.5)	(6.9)	(37.6)	(2.3)	(0.5)	(0.6)	(0.2)	(3.5)	(0.5)	(41.8)

Table 13 The mean number of farm animals per square kilometre in the 6 land classes.

Farm Animals	Land Class						
	1	2	3	4	5	6	AONB
Cattle	133	91	128	72	69	0	71
Sheep	174	180	366	322	143	97	218

Table 14 The predicted number of farm animals in the 6 land classes. The percentage number is shown in brackets.

Land Class	Cattle	Sheep
1	8347 (19.2)	10965 (8.3)
2	9360 (21.6)	18803 (14.2)
3	12712 (29.3)	36274 (27.3)
4	10136 (23.4)	45136 (34.0)
5	2837 (6.5)	5871 (4.4)
6	0 (0)	15585 (11.8)
AONB	43392 (100)	132634 (100)

Table 15 The mean number of sites of dereliction per square kilometre in the 6 land classes. The percentage frequency of 25ha squares in which the type of dereliction occurs is shown in brackets.

Dereliction	Land Class						
	1	2	3	4	5	6	AONB
Sites of abandoned vehicles	2 (20)	3 (40)	6 (70)	2 (30)	1 (20)	<1 (10)	2 (29)
Sites of ruined buildings	4 (60)	4 (70)	5 (60)	7 (80)	4 (50)	0 (0)	4 (50)
Sites of disposed rubbish	6 (70)	5 (60)	2 (50)	3 (50)	<1 (10)	0 (0)	2 (38)

Table 16 The predicted number of sites of dereliction in the 6 land classes. The percentage number is shown in brackets.

DERELICTION

Land Class	Sites of abandoned vehicles	Sites of ruined buildings	Sites of disposed rubbish
1	92 (6.9)	277 (11.9)	370 (24.4)
2	333 (24.8)	416 (17.9)	541 (35.7)
3	594 (44.3)	515 (22.2)	238 (15.7)
4	224 (16.7)	952 (41.0)	350 (23.1)
5	33 (2.5)	164 (7.1)	16 (1.1)
6	64 (4.8)	0 (0)	0 (0)
AONB	1340 (100)	2324 (100)	1514 (100)

Table 17 Percentage mean area of urban land/building in the 6 land classes. The percentage frequency of 25ha squares in which they occur is shown in brackets.

Urban	Land Class						
	1	2	3	4	5	6	AONB
Urban land	10.3 (30)	1.7 (30)	0 (0)	0 (0)	0 (0)	0 (0)	1.4 (9)
Sites of new urban/domestic building	1.8 (50)	1.1 (50)	0.3 (10)	0.2 (10)	0.05 (10)	0 (0)	0.5 (19)

Table 18 The predicted area (ha) of urban land and sites of new urban land/domestic building in the 6 land classes. Brackets indicate a percentage. The area as a percentage of the AONB is shown in brackets below.

Land Class	Urban land	Sites of new urban/domestic building
1	652 (78.5)	112 (40.1)
2	178 (21.5)	112 (39.9)
3	0 (0)	27 (9.7)
4	0 (0)	27 (9.7)
5	0 (0)	2 (0.7)
6	0 (0)	0 (0)
Total	830 (100)	279 (100)
% of AONB area	(1.4)	(0.5)

7.7 Field boundaries

Field size, calculated for 30 random fields from land classes 1-5, was small in the Mournes (Table 19). Land class 1 had a greater mean field size than land classes 3 or 4. This is partly related to the improvement of agricultural land. Mean field size and the standard deviation from the mean was greatest in land class 2. This is also partly a function of agricultural improvement and is related to the presence of large fields associated with estate farmland.

A classification of boundary types is given in Fig. 9. Descriptions are given in Appendix 5. Boundary names and numbers are presented in Table 20. A summary of the number and length of boundary types in the land classes is given in Table 21. The predicted mean length of boundaries in the AONB is presented in Table 22.

There was a mean number of 151 field boundaries km^{-2} and a mean length of 14.7 kilometres km^{-2} in the AONB. The mean length of wall km^{-2} was 6.0km (40.7% of the total boundary length), as compared with 6.3km (43.2%) for hedges. Fences accounted for a mean length km^{-2} of 1.7km (11.8%). A further 0.6km^{-2} (4.2%) of boundaries had been removed.

There was a similar length of neglected and maintained dry stone wall in the AONB. This represents about 1823km of neglected wall in the AONB. The proportion, however, varied between the land classes.

Many hedgebanks (2517.7km) were in a neglected state. Banks composed mainly of lines of hawthorn with numerous gaps accounted for 71.9% of hedgebank length. A similar profile of lack of maintenance was recorded for hedgerows.

Hedges and walls were accompanied by wire fences along 37% of their total. Where this occurred it was usually to the detriment of traditional boundary maintenance.

Field boundaries were a negligible part of the landscape in land class 6 but were integral to land classes 1-5. In the lower elevation land classes 1-3 they were also an important wildlife habitat.

7.7.1 Removed boundaries

Removal of field boundries has been primarily for the purpose of increasing field size, and was usually coincident with reclamation or reseeding. A total of 4.2% of field boundary length had been removed since 1977 (the mean date of cartographic field survey). This figure however, is probably an underestimate if it is assumed that some wire fences, which comprise 11.8% of boundary length, have replaced traditional stone walls and hedges.

Removal was recorded in land classes 1-5 but the percentage loss was greatest in land classes 2, 3 & 5. The relatively high loss from land class 5 was associated with agricultural reclamation. There was generally a relationship between agricultural activity in the land classes and boundary removal.

7.7.2 Hedgebanks

There was considerable variation in the structure of hedgebanks between land classes, with different proportions of earth banks, earth and stone banks or banks faced with dry stone. Complete hedgebanks were usually stockproof, comprising only 10.5% of hedgebank length. This figure indicates the limited functional role of hedgebanks on farmland. Hedgebanks with gaps comprised a further 17.5% and hedgebanks with scattered shrubs accounting for 71.9% of the total hedgebank length.

A particularly large number of hedgebanks with scattered shrubs occurred in land class 3. This hedge type was diagnostic of hedge neglect and dereliction. Land class 2 had the smallest proportion due to the more managed nature of the farmed environment and the high frequency of dry stone walls in this land class.

Most hedgebanks which had scattered shrubs were associated with wire fencing (65.9% of AONB length). There is a high probability that these field boundaries will lose their shrub species as the originally planted

individuals mature and die or are felled and grubbed out.

Gaps in hedgebanks had often been filled with felled shrubs, large stones, strands of barbed wire and other objects. Hedge laying was not recorded. A large proportion of hedges were overgrown and there were very few signs of management except near farm buildings and roads (Table 26). Mechanical trimming to a flat top, replacement with wooden fences or concrete block walls around farm buildings or trimming to an angled side along metalled roads were recorded. In instances of hedge management, tree saplings had usually been trimmed.

Trees associated with hedgebanks were a common feature giving the landscape a wooded appearance. This belies the trend to hedge loss. The wooded appearance was often due mainly to the neglect of hedges rather than any intended management for hedge trees.

7.7.3 Hedgerows

There were few hedgerows in the AONB (4% of total length). There was an association of the better hedges with buildings and new or replacement boundaries, whereas those made up of scattered shrubs (usually hawthorn) were often derelict hedgebanks which had lost their structure.

7.7.4 Dry stone walls

This boundary type was a particular feature of land classes 2 & 4. In land class 2, 32.5% of the total boundary length was maintained dry stone wall, a high proportion of which occurred in the Mourne coastal plain. This compares with the low proportions of maintained walls in land classes 4 & 5 (14.6% and 10.7% of their total boundary length respectively).

The degree to which walls were maintained was correlated with elevation. In land classes 1-3 there were more maintained than neglected walls but this trend was reversed in land classes 4-6.

Simple dry stone walls are relatively easily constructed and maintained but are not permanently stockproof and must be repaired fairly frequently, if

they are not to degenerate to walls with gaps or become ruined. Colonisation by gorse can occur at this stage.

Local variation in soil parent material, topography, drainage and tradition governed the distribution and structure of simple versus more complex dry stone walls. Complex walls are much more stockproof but more difficult to repair. If neglected, they can become reduced to piles of stones and earth which can become colonised by a variety of shrubs and small trees. Even when maintained, invasion by woody species occurs. This can lead to disruption of the wall fabric by root and stem growth. At this stage, the wall can be managed as a hedge or can develop into lines of small trees if neglected.

Stockproofing with wire fences was common, with posts often being driven into the centre of the wall. This hastens further dereliction. Along metalled roads and farm tracks the walls were often built onto or into a high bank.

7.7.5 Mortar walls

The few that were found were associated with bridges, houses and farm buildings mainly in the lower elevation land classes 1-3.

7.7.6 Post and rail fences

Most of the small number of boundaries in land class 6 were post and wire fences. There was a greater percentage length of fences in land classes 1 & 5 compared with land classes 2, 3 & 4. Fences were most frequently found along farm drives and as a replacement boundary in agricultural reclamation and improvement.

Around the boundary perimeter of farms, they were almost universal, regardless of the structure of walls or hedges. This is considered to be a contributing factor to the degradation of traditional boundaries and has long term implications for the management of ecologically interesting hedges. Where fence posts are driven into walls, damage invariably occurs. New boundaries were almost always of wire fences except in land class 2 where new

dry stone walls were being built in the Mourne coastal plain.

7.7.7 Ditches

Ditches were mainly associated with hedges rather than walls and could occur on either one or both sides (Table 23). Their frequency in any land class was related to soil drainage characteristics.

Land class 2, for example, had the lowest number and proportion of ditches whereas the more poorly drained land class 1 and the higher elevation land class 5 had the highest.

Overgrown hedges often shaded the ditch flora. Many ditches were open to trampling and grazing by farm animals. Their efficiency as field drains was correspondingly reduced. Only on intensively farmed land were ditches actively maintained. Both types of management lead to an impoverished flora.

7.7.8 Shrub and tree species associated with field boundaries

Hawthorn and gorse were the most common hedge shrubs (Table 24). Hawthorn was the more frequent of the two. It was mainly found growing on or from the side of hedgebanks. Gorse also occurred mainly on hedgebanks, often regenerating on derelict field boundaries from which other trees or shrubs had been lost. In hedges, hawthorn had often acquired the status of a small tree. Blackthorn hedges and those with holly and rowan were mainly found in land classes 2-4. Other native species such as beech and elm were minor hedge components in the AONB. They were mainly confined to land classes 1-3. A small number of hedges with species such as privet and fuchsia were recorded around derelict buildings.

Trees and saplings >5m were present in 33.8% of hedgebanks compared with 12.2% of dry stone walls (Table 25). Although they were relatively common in hedgerows (30.3%), there was a small number only of this boundary type. Few trees were associated with mortar walls or post and rail fencing.

Land class 3 had the greatest number of boundaries km^{-2} with trees (73). Land class 1 had the least number (19) and the lowest percentage of boundaries with trees (11.9%).

The main trees recorded in boundaries, were ash and sycamore. They were ubiquitous. The highest frequency of ash was in land class 3 and sycamore in land class 5. Ash was regenerating in many hedges particularly where they were unmanaged or neglected.

The most ecologically interesting hedges were those with either hazel or oak. They occurred infrequently in land classes 1-4, often associated with a ditch and bank and were relatively rich in other shrub and tree species.

Willow and alder were fairly common components of hedges, again showing an association with ditches. It was usually the ditch flora however which carried the greatest ecological interest. Alder occurred mainly as a small tree rather than a hedge shrub.

7.7.9 Boundary structure, condition and management

Many boundaries served little agricultural function and were often in a neglected condition. For example, neglected hedgebank, with more than 10% gaps comprised 28.2% of field boundaries. Hedgebanks made stockproof with wire fencing comprised 18.7% of boundaries. It is likely that since the main functional component of these boundaries is the wire fence, the hedges will deterioriate further and will be grubbed out if they begin to interfere with farm operations. This may occur if positive management to maintain them by replanting and hedge laying is not carried out. The extent of the problem is widespread with some farms having stockproof boundaries only around their perimeter.

The number of hedges showing signs of recent management, was small (Table 26), representing only 10.5% of hedges in the AONB. There was no evidence of hedge laying as a management technique to maintain a stockproof boundary.

Land class 1 had the largest number of managed hedges due partly to the trimming/flailing of hedges along roads. There was very little hedge

management in any of the other land classes. There was a general trend for comparable hedges with wire fences to be less managed than those without.

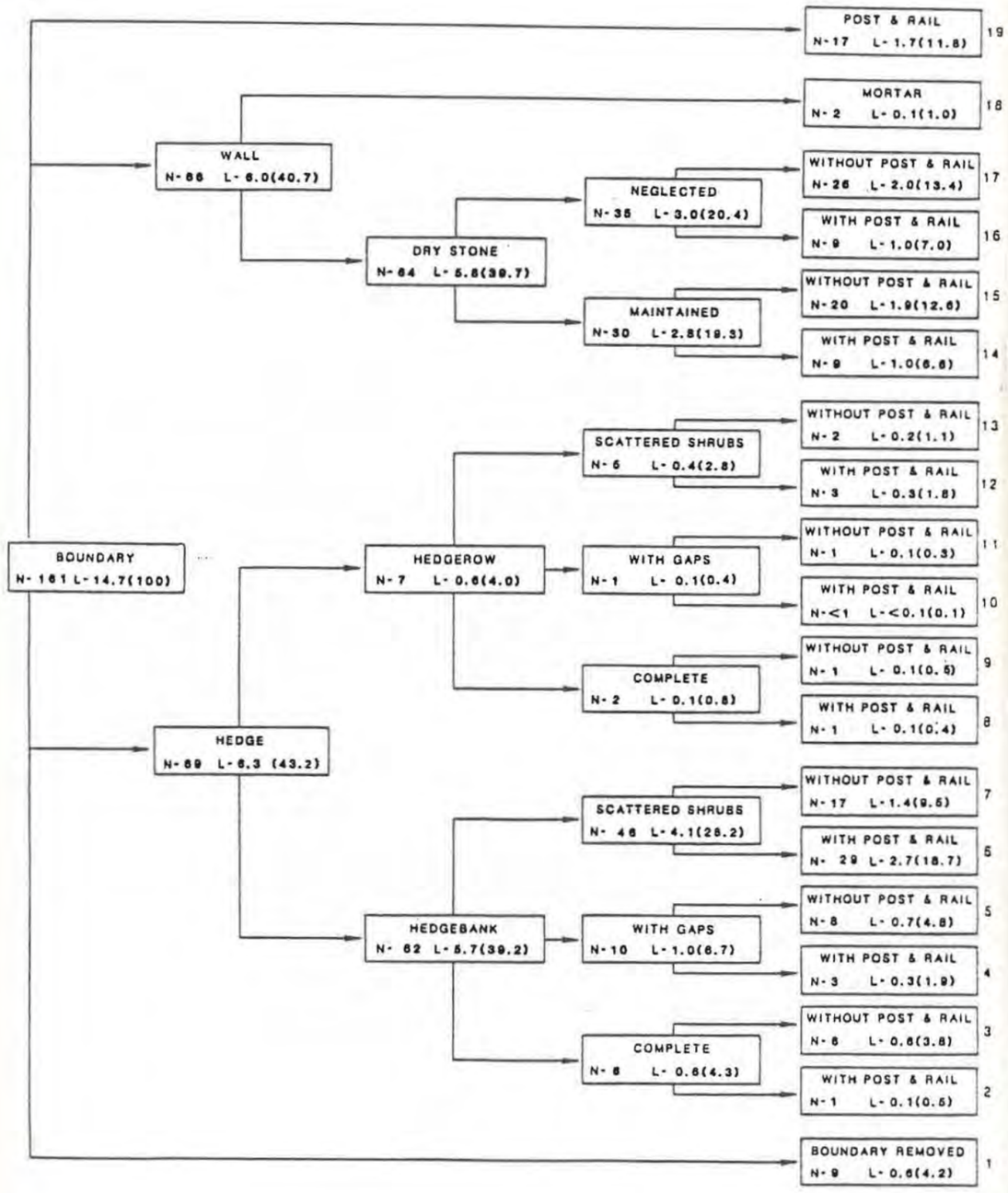
Neglected dry stone walls made up 20.4% of the field boundaries and 7.0% of these had been strengthened with wire fencing. Hedgerows were infrequent but of the 2.9% neglected hedgerows recorded, 1.8% had been stockproofed with fencing.

Table 19 Mean field size (km^2) in land classes 1-4. Figures are based on a random sample of 30 fields from each land class. The mainly unenclosed upland land classes 5 and 6 have been excluded from the analysis.

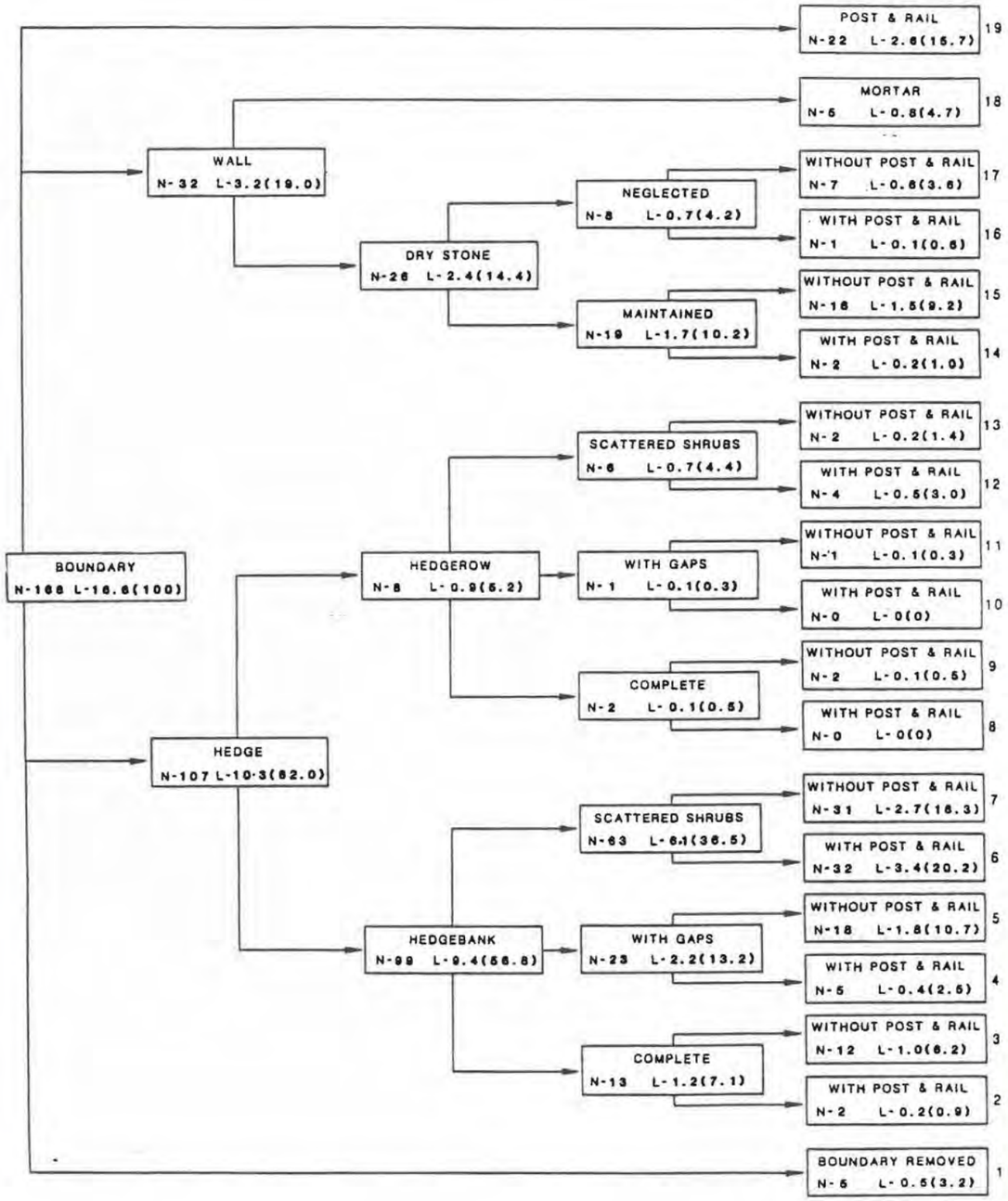
Land Class	Mean	Standard Deviation
1	1.3	+/- 0.9
2	1.7	+/- 2.3
3	1.0	+/- 0.7
4	0.9	+/- 0.9
Total	1.2	+/- 1.4

Fig 9 Hierarchical classification of field boundaries in the 6 land classes. The mean number per square kilometre (N), mean length (km) per square kilometre (L) and percentage mean length (brackets) are shown.

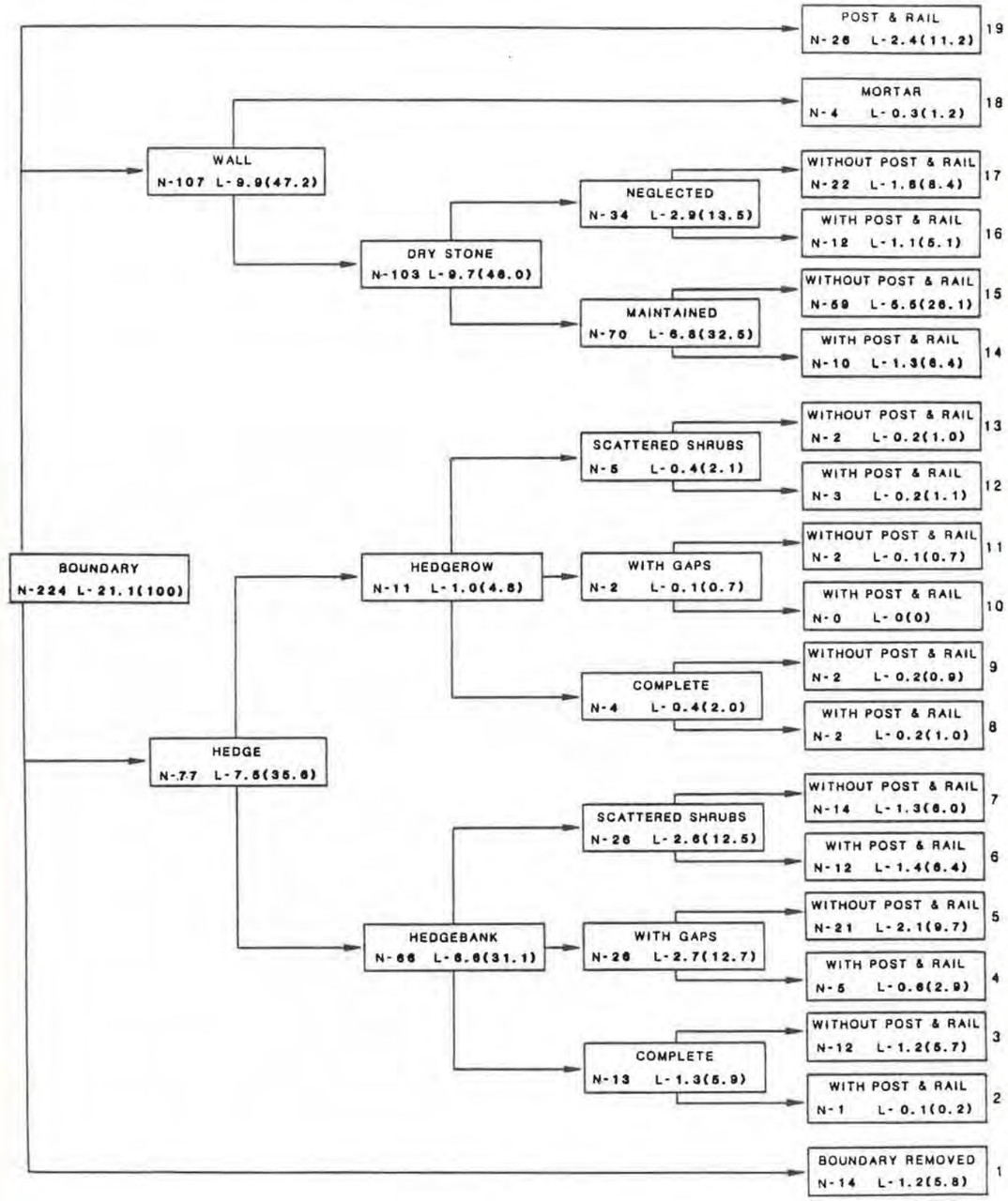
AONB



LAND CLASS 1



LAND CLASS 2



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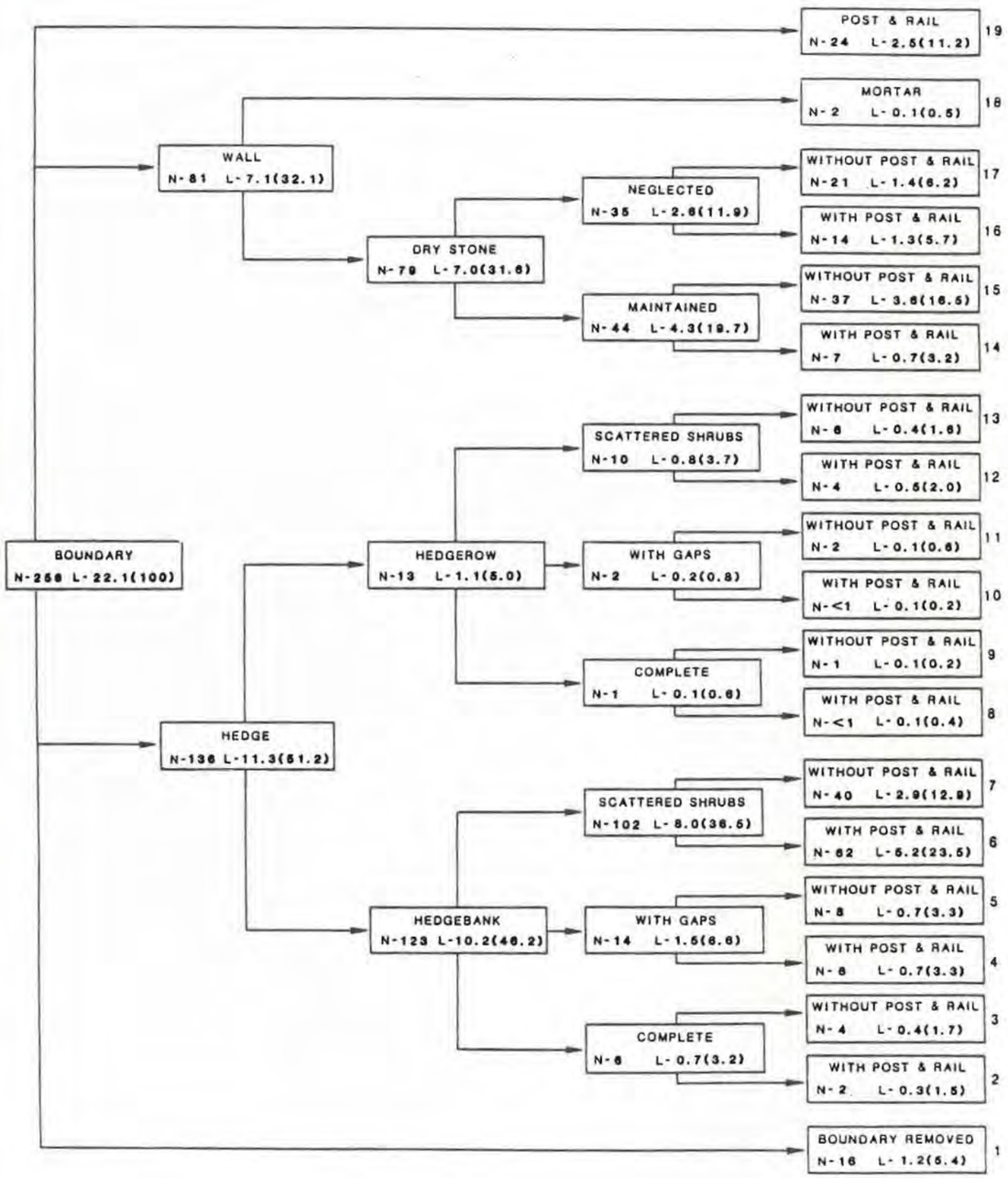

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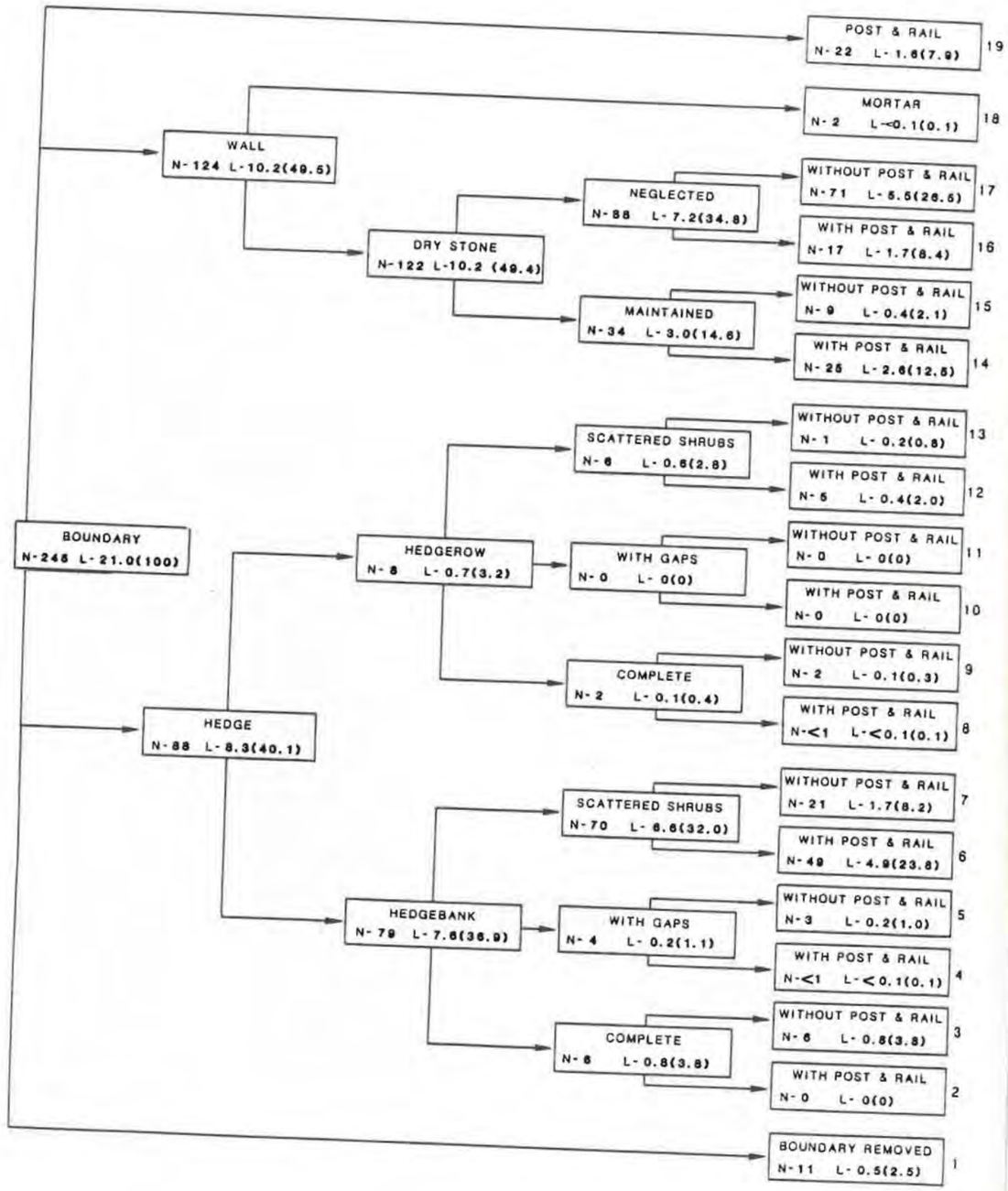

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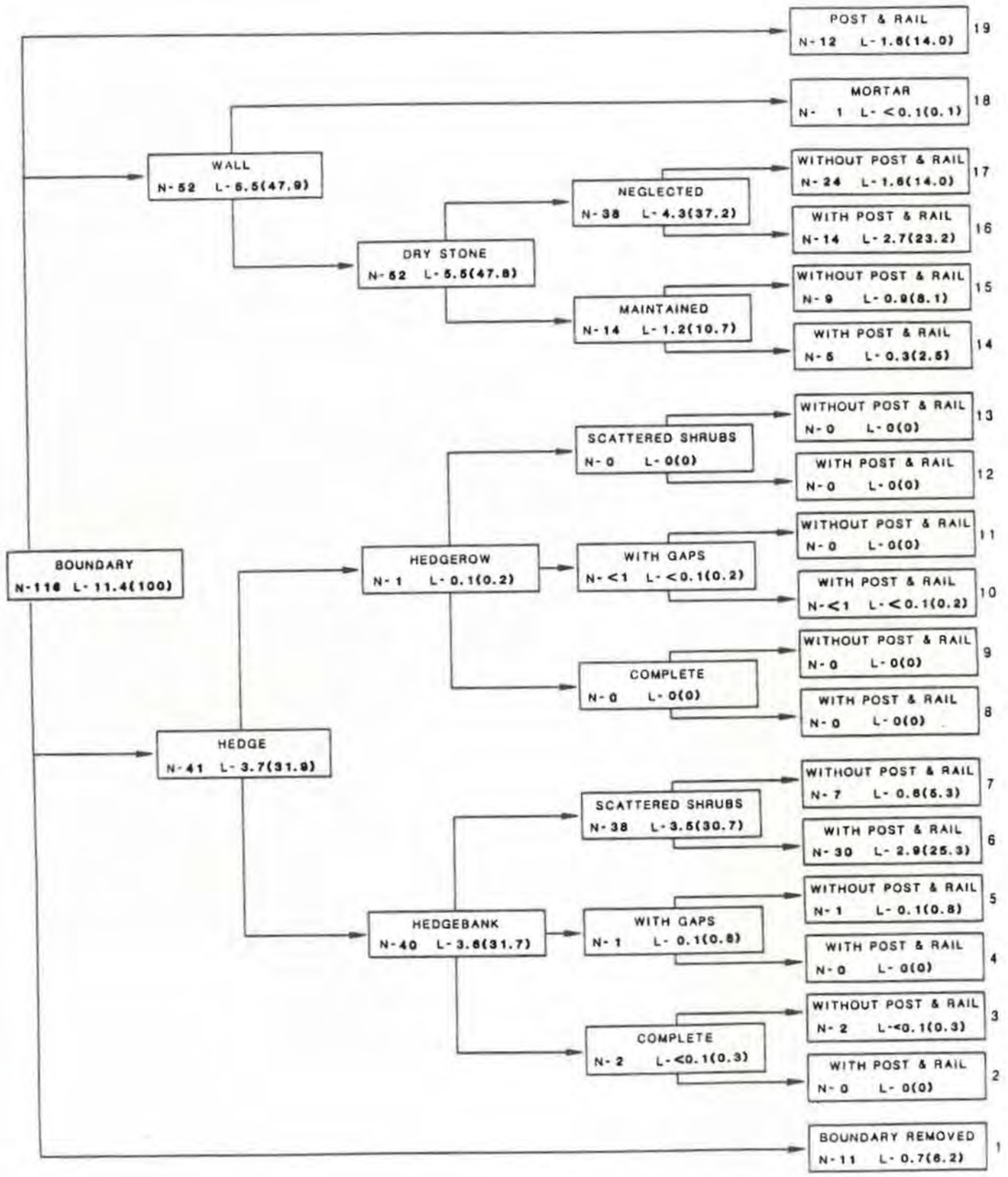


LAND CLASS 6

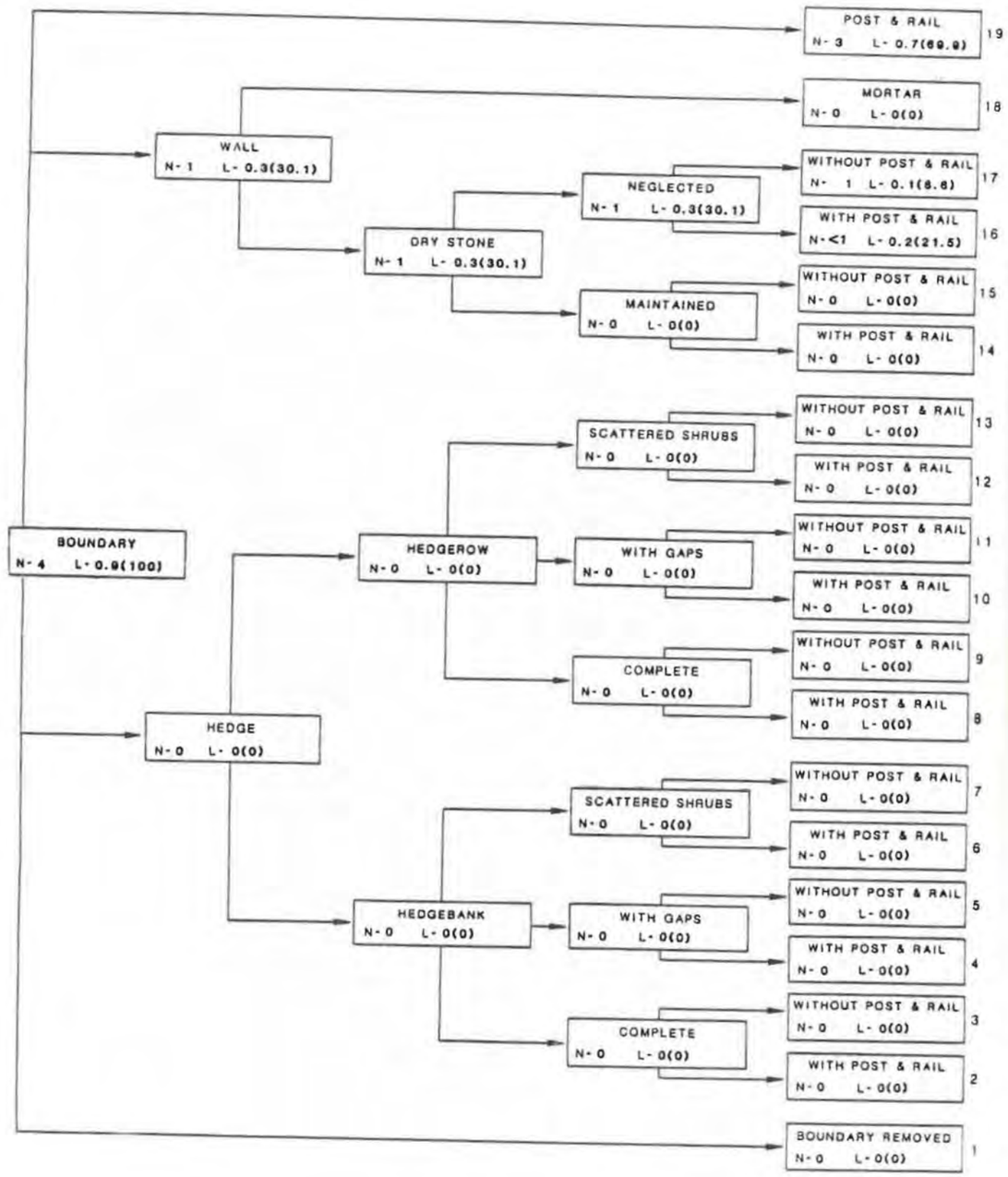


Table 20 List of boundary types in the Mourne AONB.

Boundary Type	
1	Boundary removed.
2	Complete hedgebank with post/rail fence
3	Complete hedgebank
4	Hedgebank with gaps and post/rail fence
5	Hedgebank with gaps
6	Hedgebank with scattered shrubs and post/rail fence
7	Hedgebank with scattered shrubs
8	Complete hedgerow with post/rail fence
9	Complete hedgerow
10	Hedgerow with gaps and post/rail fence
11	Hedgerow with gaps
12	Hedgerow with scattered shrubs and post/rail fence
13	Hedgerow with scattered shrubs
14	Maintained dry stone wall with post/rail fence
15	Maintained dry stone wall
16	Neglected dry stone wall with post/rail fence
17	Neglected dry stone wall
18	Mortar wall
19	Post and rail fence

Table 21 The mean number per square kilometre (N) and mean length (km) per square kilometre (L) of field boundaries in the 6 land classes. The percentage mean length of boundary is shown in brackets.

Boundary Type	Land Class						
	1	2	3	4	5	6	AONB
1	N=5 L=0.5(3.2)	14 1.2(5.8)	16 1.2(5.4)	11 0.5(2.5)	11 0.7(6.2)	0 0(0)	9 0.6(4.2)
2	N=2 L=0.2(0.9)	1 0.1(0.2)	2 0.3(1.5)	0 0(0)	0 0(0)	0 0(0)	1 0.1(0.5)
3	N=12 L=1.0(6.2)	12 1.2(5.7)	4 0.4(1.7)	6 0.8(3.8)	2 <0.1(0.3)	0 0(0)	6 0.6(3.8)
4	N=5 L=0.4(2.5)	5 0.6(2.9)	6 0.7(3.3)	<1 <0.1(0.1)	0 0(0)	0 0(0)	3 0.3(1.9)
5	N=18 L=1.8(10.7)	21 2.1(9.7)	8 0.7(3.3)	3 0.2(1.0)	1 0.1(0.8)	0 0(0)	8 0.7(4.8)
6	N=32 L=3.4(20.2)	12 1.4(6.4)	62 5.2(23.5)	49 4.9(23.8)	30 2.9(25.3)	0 0(0)	29 2.7(18.7)
7	N=31 L=2.7(16.3)	14 1.3(6.0)	40 2.9(12.9)	21 1.7(8.2)	7 0.6(5.3)	0 0(0)	17 1.4(9.5)
8	N=0 L=0(0)	2 0.2(1.0)	<1 0.1(0.4)	<1 <0.1(0.1)	0 (0)	0 0(0)	1 0.1(0.4)
9	N=2 L=1.0(0.5)	2 0.2(0.9)	1 0.1(0.2)	2 0.1(0.3)	0 0(0)	0 0(0)	1 0.1(0.5)
10	N=0 L=0(0)	0 0(0)	<1 0.1(0.2)	0 0(0)	<1 <0.1(0.2)	0 0(0)	<1 <0.1(0.1)
11	N=1 L=0.1(0.3)	2 0.1(0.7)	2 0.1(0.6)	0 0(0)	0 0(0)	0 0(0)	1 0.1(0.3)
12	N=4 L=0.5(3)	3 0.2(1.1)	4 0.5(2.0)	5 0.4(2.0)	0 0(0)	0 0(0)	3 0.3(1.8)
13	N=2 L=0.2(1.4)	2 0.2(1.0)	6 0.4(1.6)	1 0.2(0.8)	0 0(0)	0 0(0)	2 0.2(1.1)
14	N=2 L=0.2(1.0)	10 1.3(6.4)	7 0.7(3.2)	25 2.6(12.5)	5 0.3(2.5)	0 0(0)	9 1.0(6.6)
15	N=16 L=1.5(9.2)	59 5.5(26.1)	37 3.6(16.5)	9 0.4(2.1)	9 0.9(8.1)	0 0(0)	20 1.9(12.6)
16	N=1 L=0.1(0.6)	12 1.1(5.1)	14 1.3(5.7)	17 1.7(8.4)	14 2.7(23.2)	<1 0.2(21.5)	9 1.0(7.00
17	N=7 L=0.6(3.6)	22 1.8(8.4)	21 1.4(6.2)	71 5.5(26.5)	24 1.6(14.0)	1 0.1(8.6)	26 2.0(13.4)
18	N=5 L=0.8(4.7)	4 0.3(1.2)	2 0.1(0.5)	2 <0.1(0.1)	1 <0.1(0.1)	0 0(0)	2 0.1(1.0)
19	N=22 L=2.6(15.7)	26 2.4(11.2)	24 2.5(11.2)	22 1.6(7.9)	12 1.6(14.0)	3 0.7(69.9)	17 1.7(11.8)
Total	N=116 L=16.6(100)	224 21.1(100)	256 22.1(100)	245 20.6(100)	116 11.4(100)	4 0.9(100)	161 14.7(100)

Table 22 The predicted mean length of field boundaries (km) in the 6 land classes. Figures in brackets indicate a percentage. Boundary length as a percentage of the total is shown in brackets below.

Land Class	Boundary Type 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	Total
1	33.1 (8.8)	9.2 (20.0)	64.7 (19.1)	26.2 (15.7)	111.6 (26.1)	211.0 (12.6)	170.2 (20.2)	0 (0)	5.4 (13.2)	0 (0)	3.1 (10.1)	30.8 (19.5)	14.6 (15.5)	10.8 (1.8)	96.3 (8.6)	6.2 (1.0)	37.0 (3.1)	49.3 (55.1)	164.8 (15.6)	1044.1 (11.7)
2	125.8 (33.4)	5.2 (11.3)	124.8 (36.8)	65.0 (38.0)	213.2 (49.8)	141.4 (8.5)	132.1 (15.6)	22.9 (71.1)	20.8 (5.1)	0 (0)	14.6 (47.7)	23.9 (15.1)	21.8 (23.1)	139.4 (23.5)	572.0 (50.8)	112.3 (18.0)	184.1 (15.4)	26.0 (29.1)	245.4 (23.3)	2190.2 (24.6)
3	117.8 (31.2)	31.7 (68.7)	37.6 (11.1)	72.3 (43.2)	71.3 (16.7)	513.8 (30.8)	282.2 (33.4)	7.9 (24.7)	5.0 (12.1)	4.0 (82.9)	12.9 (42.2)	44.6 (28.2)	35.6 (37.7)	70.3 (11.9)	359.4 (31.9)	124.7 (20.0)	135.6 (11.3)	10.9 (12.2)	245.5 (23.3)	2183.0 (24.5)
4	71.4 (18.9)	0 (0)	110.6 (32.6)	4.3 (2.6)	28.0 (6.5)	686.0 (41.1)	235.2 (27.9	1.4 (4.4)	9.8 (23.9)	0 (0)	0 (0)	58.8 (37.2)	22.4 (23.7)	359.8 (60.8)	60.2 (5.4)	240.8 (38.5)	763.0 (63.7)	2.8 (3.1))	228.2 (21.7)	2882.6 (32.3)
5	29.1 (7.7)	0 (0)	1.2 (0.4)	0 (0)	3.7 (0.9)	118.9 (7.1)	25.0 (3.0)	0 (0)	0 (0)	0.8 (17.2)	0 (0)	0 (0)	0 (0)	11.9 (2.0)	38.1 (3.4)	108.7 (17.4)	65.6 (5.5)	0.4 (0.5)	65.6 (6.2)	469.0 (5.3)
6	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	32.2 (5.2)	12.9 (1.1)	0 (0)	104.7 (9.9)	149.7 (1.7)
AONB	377.3 (100)	46.1 (100)	338.9 (100)	167.2 (100)	427.8 (100)	1671.1 (100)	844.6 (100)	32.2 (100)	40.9 (100)	4.8 (100)	30.5 (100)	158.1 (100)	94.5 (100)	592.1 (100)	1126.0 (100)	624.9 (100)	1198.2 (100)	89.4 (100)	1054.2 (100)	8918.6 (100)
% of AONB length	(4.2)	(0.5)	(3.8)	(1.9)	(4.8)	(18.7)	(9.5)	(0.4)	(0.5)	(0.1)	(0.3)	(1.8)	(1.1)	(6.6)	(12.6)	(7.0)	(13.4)	(1.0)	(11.8)	(100)

Table 23 The mean number of field boundaries per square kilometre associated with ditches in the 6 land classes. The mean percentage of boundaries with ditches is shown in brackets. A line indicates that a boundary type was not recorded in a land class.

Boundary Type	Land Class						
	1	2	3	4	5	6	AONB
Hedge bank	16 (16.3)	8 (12.1)	17 (14.2)	18 (23.0)	17 (44.5)	-	11 (21.2)
Hedgerow	5 (58.8)	1 (11.1)	2 (12.1)	4 (42.9)	<1 (100)	-	2 (26.5)
Dry stone wall	<1 (1.5)	4 (3.9)	4 (4.6)	4 (3.0)	3 (6.2)	0 (0)	2 (3.7)
Mortar wall	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)	-	0 (0)
Post & rail	1 (6.6)	1 (4.5)	1 (3.4)	2 (7.1)	<1 (3.3)	0 (0)	1 (5.1)
Total	23 (14.3)	14 (6.9)	23 (9.7)	27 (11.5)	21 (20.2)	0 (0)	16 (10.7)

Table 24 The mean number of field boundaries with trees and shrubs per square kilometre in the 6 land classes. The mean percentage of boundaries in the landclass is shown in brackets. Data are given separately for trees and shrubs <5m and >5m in height. Uncommon species are not shown.

	Land Class																					
	1			2			3			4			5			6			AONB		
	Height of trees and shrubs																					
Species	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all
Alder	1 (0.9)	0	1 (0.9)	1 (0.4)	0	1 (0.4)	3 (1.2)	2 (0.7)	4 (1.6)	0	<1 (0.2)	<1 (0.2)	<1 (0.4)	1 (1.1)	1 (1.5)	0	0	0	1 (0.5)	<1 (0.2)	1 (0.7)
Ash	8 (5.2)	3 (2.1)	11 (7.0)	16 (7.8)	16 (7.6)	3 (14.8)	22 (9.5)	28 (11.8)	47 (19.5)	16 (6.6)	11 (4.8)	24 (10.1)	6 (5.7)	8 (8.0)	13 (12.2)	0	0	0	11 (7.4)	11 (7.0)	22 (14.4)
Beech	1 (0.9)	1 (0.6)	2 (1.5)	1 (0.6)	0	1 (0.6)	<1 (0.2)	1 (0.5)	2 (0.7)	0	0	0	0	0	0	0	0	0	<1 (0.3)	<1 (0.2)	1 (0.5)
Blackthorn	1 (0.9)	0 (0.9)	1 (2.8)	6 (2.8)	0	6 (2.8)	11 (4.7)	0	11 (4.7)	8 (3.2)	0	8 (3.2)	2 (1.5)	0	2 (1.5)	0	0	0	5 (3.2)	0	5 (3.2)
Elm	<1 (0.3)	0	<1 (0.3)	<1 (0.2)	1 (0.4)	1 (0.6)	<1 (0.2)	0	<1 (0.2)	<1 (0.2)	0	<1 (0.2)	0	0	0	0	0	0	<1 (0.2)	<1 (0.1)	<1 (0.3)
Gorse	54 (33.7)	0	54 (33.7)	49 (23.1)	0	49 (23.1)	72 (30.1)	0	72 (30.1)	50 (21.5)	0	50 (21.5)	12 (11.0)	0	12 (11.0)	0	0	0	37 (24.2)	0	37 (24.2)
Hawthorn	60 (37.0)	1 (0.3)	61 (37.3)	67 (31.0)	<1 (0.2)	67 (32.0)	92 (38.3)	3 (1.3)	93 (38.6)	74 (31.5)	0	72 (30.8)	26 (25.1)	0	26 (25.1)	0	0	0	51 (33.4)	1 (0.4)	51 (33.6)
Hazel	2 (1.8)	0	2 (1.8)	0	<1 (0.2)	<1 (0.2)	4 (1.7)	0	4 (1.7)	2 (0.7)	<1 (0.2)	2 (0.9)	0	0	0	0	0	0	1 (0.9)	<1 (0.1)	1 (1.0)
Holly	<1 (0.3)	<1 (0.3)	1 (0.6)	2 (1.0)	1 (0.4)	3 (1.3)	2 (0.7)	0	2 (0.7)	3 (1.5)	1 (0.5)	5 (2.0)	<1 (0.4)	0	<1 (0.4)	0	0	0	2 (1.0)	<1 (0.3)	2 (1.3)
Oak	1 (0.6)	0	1 (0.6)	<1 (0.2)	1 (0.4)	1 (0.4)	1 (0.5)	0	1 (0.5)	1 (0.3)	0	1 (0.3)	0	0	0	0	0	0	1 (0.4)	<1 (0.1)	1 (0.5)
Rowan	1 (0.6)	<1 (0.3)	1 (0.9)	3 (1.5)	1 (0.4)	4 (1.9)	2 (0.8)	2 (0.7)	4 (1.5)	4 (1.9)	2 (0.7)	6 (2.6)	1 (1.1)	<1 (0.4)	2 (1.5)	0	0	0	2 (1.4)	1 (0.6)	3 (1.9)
Sycamore	3 (1.8)	4 (2.4)	7 (4.2)	3 (1.5)	5 (2.3)	8 (3.8)	3 (1.3)	3 (1.3)	6 (2.6)	4 (1.5)	6 (2.4)	9 (3.9)	4 (4.2)	6 (5.7)	10 (9.1)	0	0	0	2 (1.6)	3 (2.4)	6 (3.9)
Willow	3 (2.1)	<1 (0.3)	4 (2.4)	4 (2.1)	1 (0.4)	5 (2.5)	4 (1.5)	<1 (0.2)	4 (1.7)	1 (0.5)	1 (0.3)	2 (0.7)	0	0	0	0	0	0	2 (1.3)	<1 (0.2)	2 (1.4)

Table 25 The mean number of field boundaries with trees per square kilometre in the 6 land classes. The mean percentage of boundaries in the land class is shown in brackets. Data are given separately for trees <5m and >5m in height. Gorse, hawthorn and blackthorn were not included.

	Land Class																					
	1			2			3			4			5			6			AONB		
Boundary Type	Height of trees and shrubs																					
	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all	<5m	>5m	all
Hedgebank	12 (12.3)	6 (5.9)	15 (15.3)	18 (26.6)	9 (13.3)	25 (37.6)	34 (27.6)	24 (19.5)	52 (42.0)	16 (20.3)	11 (14.2)	25 (31.4)	8 ((21.0)	10 (25.0)	15 (38.6)	0	0	0	14 (22.6)	9 (15.0)	21 (33.8)
Hedgerow	<1 (6.1)	1 (12.2)	1 (18.3)	2 (14.5)	1 (7.3)	2 (21.8)	5 (40.0)	2 (12.3)	6 (46.2)	2 (30.0)	1 (10.0)	2 (30.0)	0	<1 (40.0)	<1 (40.0)	0	0	0	2 (24.6)	1 (10.1)	2 (30.3)
Drystone wall	2 (7.5)	1 (3.8)	2 (9.4)	9 (8.5)	10 (9.7)	18 (17.1)	7 (8.6)	8 (10.6)	14 (18.2)	5 (3.9)	4 (3.6)	8 (6.6)	2 (3.1)	4 (7.7)	5 (10.0)	0	0	0	4 (6.3)	4 (7.0)	8 (12.2)
Mortar wall	0	0	0	0	<1 (10.0)	<1 (10.0)	0	0	0	0	0	0	0	0	0	0	0	0	0	<1 (3.0)	<1 (3.0)
Post & rail	0	0	0	<1 (1.5)	0	<1 (1.5)	<1 (1.7)	<1 (1.7)	1 (3.4)	1 (5.5)	<1 (1.8)	2 (7.3)	1 (6.7)	0	1 (6.7)	0	0	0	<1 (2.7)	<1 (0.9)	1 (3.6)
Total	15 (9.1)	8 (4.9)	19 (11.9)	28 (13.5)	20 (9.5)	46 (21.7)	46 (19.3)	34 (14.3)	73 (30.2)	24 (10.5)	17 (7.2)	37 (15.8)	11 (10.2)	14 (13.6)	22 (20.4)	0	0	0	20 (13.3)	15 (9.7)	32 (20.8)

Table 26 The mean number per square kilometre of recently managed field boundaries in the 6 land classes. The mean percentage of managed boundaries is shown in brackets. A dashed line indicates that a boundary type was not recorded in a land class.

Boundary Type	Land Class						
	1	2	3	4	5	6	AONB
2 Complete hedgebank/ 8 row and post and rail	<1 (32.7)	1 (37.5)	0 (0)	0 (0)	-	-	<1 (23.2)
3 Complete hedgebank/ 9 row	10 (72.7)	4 (25.7)	2 (38.5)	2 (31.6)	2 (100)	-	3 (39.9)
4 Hedgebank/row 10 with gaps and post and rail	2 (49.0)	0 (0)	1 (18.8)	0 (0)	0 (0)	-	<1 (15.4)
5 Hedgebank/row 11 with gaps	7 (39.2	2 (8.8)	2 (20.0	2 (12.5)	<1 (33.3)	-	2 (21.7)
6 Hedgebank/row 12 with scattered shrubs and post and rail	2 (5.6)	0 (0)	2 (2.5)	1 (1.4)	0 (0)	-	1 (3.2)
7 Hedgebank/row 13 with scattered shrubs	3 (7.5)	0 (0)	<1 (0.9)	<1 (1.8)	1 (11.1)	-	1 (2.6)
Total	24 (22.7)	7 (8.9)	7 (5.3)	5 (5.9)	3 (6.9)	-	6 (10.5)

8. The Distribution of Landscape Resources in the Land Classes

Differences in land use between the land classes can be summarised as trends of decreasing areas of urban land, agricultural land and deciduous woodland and increasing amounts of conifer plantation and seminatural vegetation from land classes 1 to 6. This corresponds to increasing elevation and other related attributes described in section 2.6.

Summary distribution maps of the land classes indicating their main landscape features, are given in Fig. 10.

8.1 Land Class 1

There was a comparatively large area of seminatural broadleaf woodland/scrub. This was associated mainly with the complex topography of the coast. Broadleaf plantation and demesne woodland also had a high cover relative to the other land classes.

Seminatural vegetation occupied 7.1% of the land class. Much of this was coastal. The most ecologically significant communities were those associated with coastal habitats and species-rich grassland.

Agricultural grassland and arable farming covered most of the land class. There was also a relatively large area of urban land and many new building sites. Rubbish dumps were particularly frequent.

The most common boundary types were derelict hedgebanks with lines of hawthorn and wire fences. Hedges were frequently associated with ditches and were more likely to be managed than in other land classes.

8.2 Land Class 2

Woodland was not well represented. Seminatural vegetation occurred only as fragments of usually poorly drained land in an intensively farmed landscape. Such sites were frequently the focus for rubbish dumping.

High quality grassland and crops occupied 78.3% of the land class. Urban land was represented but not to the same extent as in land class 1. Similarily, new building was not so frequent as in land class 1.

Well-maintained dry stone walls particularly in the coastal plain, were a landscape feature. Other common boundary types included wire fences, neglected dry stone walls and hedgebanks with gaps and scattered shrubs. Hedgerow trees, mainly ash, were comparatively frequent.

8.3 Land Class 3

Riverside woodland was a characteristic landscape element of this land class. In contrast to land classes 1 and 2, seminatural vegetation occupied almost a quarter of the land. It was composed mainly of fragments of gorse heath and bracken together with species-rich grassland.

Agriculture was less intensive. There was little arable land and a high proportion of mixed species grassland. The number of ruined or derelict buildings was high and there were many sites with abandoned vehicles.

Derelict hedgebanks consisting of lines of usually overgrown hawthorn were present in large numbers. This land class also supported the greatest number of hedgerow trees. They contributed greatly to the wooded appearance of the landscape. Dry stone walls, often neglected, were fairly frequent, along with wire fences.

8.4 Land Class 4

There was a comparatively high cover of seminatural broadleaf woodland/scrub much of which occurred on neglected farmland. This land class also supported 28.1% of the conifer plantation in the AONB.

Other seminatural vegetation occupied a total of 49.5% of the land class. Bracken and gorse heath were particularly abundant and they were an important landscape element.

In comparison with other land classes, a relatively large proportion of grassland was composed of the mixed species type or of hill pasture. There was little arable land. There were many derelict buildings which were present in most of the sample squares.

Field boundaries of ruined dry stone walls were particularly common along with derelict hedgebanks with lines of overgrown hawthorn. Wire fencing was frequently erected along dry stone walls.

8.5 Land Class 5

This land class had the highest cover of conifer plantation (16.6%) but very little other woodland. About half of the land supported seminatural vegetation, most of which was either ericaceous heath or wet heath with smaller areas of bog and peaty flush.

A comparatively small number of sample squares contained enclosed agricultural land. This occupied only 21.6% of the landscape. Field boundaries were mainly derelict ditched hedgebanks and derelict dry stone walls. Boundary removal linked with the reclamation of seminatural vegetation was common in this land class.

8.6 Land Class 6

Seminatural vegetation composed mainly of ericaceous heath, wet heath and mat-grass hill pasture with some bog and peaty flush, occupied over 90% of the land class. This was interspersed with conifer plantation which occurred over 9.1% of the land class.

There was no enclosed farmland and very few field boundaries.

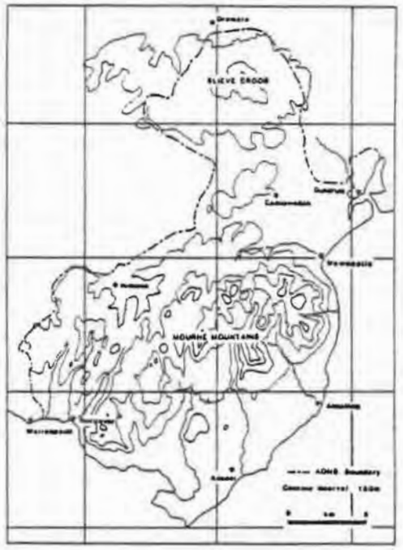
This map has been removed to preserve the confidentiality of the sample square locations.

Fig. 10 Distribution and landscape ecological characteristics of the 6 land classes in the Mourne AONB.

LAND CLASS 1

[redacted]

Topography	
Mean maximum altitude (m)	52
Mean minimum altitude (m)	4
Mean percentage area:	
Land between 0- 50m	65
" " 51-150m	5
" " 151-250m	3
" " 251-500m	-
Land >500m	-
Slope (0)	9
Soils and Geology	
Frequency:	
Peaty podzol	-
Acid brown earth (granite)	5
Acid brown earth (shale)	100
Gley	-
Silurian shale	100
Granite	19
Landscape	
Frequency:	
Sea	52
Coastal feature	95
Cliff or quarry	5
Inland water body	5
Primary road	62
Minor road (<4m)	33
Path	47
Antiquity	-
Mean density:(km^{-2})	
Buildings	25
New domestic buildings	0.5
Complete hedgebank	13
Hedgebank with gaps	23
Derelict hedgebank	63
Dry stone wall	19
Derelict dry stone wall	9
Wood post and wire fence	22
Land use	
Mean percentage area:	
Seminatural broadleaf woodland	3.5
Coniferous plantation	3.8
Grassland	49.7
Arable crop	7.0
Fen	0.4
Bracken	0.5
Gorse heath	0.3
Mat grass hill pasture/ heath	-
Ericaceous heath	-
Bog and poor fen	0.6
Urban	10.3



This map has been removed to preserve the confidentiality of the sample square locations.

LAND CLASS 2

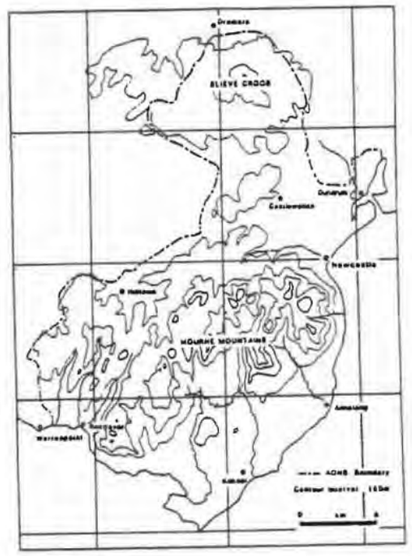
[redacted]

Topography	
Mean maximum altitude (m)	88
Mean minimum altitude (m)	41
Mean percentage area:	
Land between 0- 50m	35
" " 51-150m	64
" " 151-250m	-
" " 251-500m	-
Land >500m	-
Slope (0)	6
Soils and Geology	
Frequency:	
Peaty podzol	-
Acid brown earth (granite)	3
Acid brown earth (shale)	97
Gley	3
Silurian shale	97
Granite	3
Landscape	
Frequency:	
Sea	-
Coastal feature	27
Cliff or quarry	-
Inland water body	20
Primary road	40
Minor road (<4m)	57
Path	47
Antiquity	17
Mean density:(km^{-2})	
Buildings	19
New domestic buildings	0.5
Complete hedgebank	13
Hedgebank with gaps	26
Derelict hedgebank	26
Dry stone wall	70
Derelict dry stone wall	34
Wood post and wire fence	26
Land use	
Mean percentage area:	
Seminatural broadleaf woodland	1.2
Coniferous plantation	0.3
Grassland	64.8
Arable crop	11.9
Fen	0.1
Bracken	<0.1
Gorse heath	1.3
Mat grass hill pasture/ heath	-
Ericaceous heath	-
Bog and poor fen	0.2
Urban	1.7

This map has been removed to preserve the confidentiality of the sample square locations.

LAND CLASS 3

[redacted]



Topography

Mean maximum altitude (m)	202
Mean minimum altitude (m)	87
Mean percentage area:	
Land between 0- 50m	8
" " 51-150m	68
" " 151-250m	21
" " 251-500m	2
Land >500m	-
Slope (0)	9

Soils and Geology

Frequency:	
Peaty podzol	4
Acid brown earth (granite)	52
Acid brown earth (shale)	72
Gley	7
Silurian shale	86
Granite	28

Landscape

Frequency:	
Sea	-
Coastal feature	3
Cliff or quarry	14
Inland water body	-
Primary road	10
Minor road (<4m)	55
Path	59
Antiquity	14
Mean density:(km^{-2})	
Buildings	20
New domestic buildings	0.1
Complete hedgebank	6
Hedgebank with gaps	14
Derelict hedgebank	102
Dry stone wall	44
Derelict dry stone wall	35
Wood post and wire fence	24

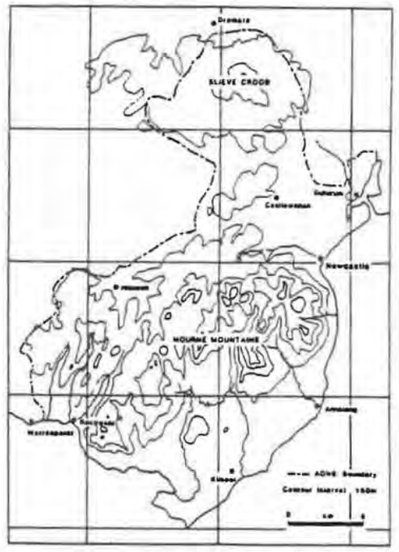
Land use

Mean percentage area:	
Seminatural broadleaf woodland	2.1
Coniferous plantation	8.5
Grassland	60.3
Arable crop	3.5
Fen	0.1
Bracken	2.2
Gorse heath	4.1
Mat grass hill pasture/ heath	-
Ericaceous heath	-
Bog and poor fen	0.1
Urban	-

This map has been removed to preserve the confidentiality of the sample square locations.

LAND CLASS 4

[redacted]



Topography

Mean maximum altitude (m)	250
Mean minimum altitude (m)	152
Mean percentage area:	
Land between 0- 50m	-
" " 51-150m	12
" " 151-250m	77
" " 251-500m	9
Land >500m	-
Slope (0)	8

Soils and Geology

Frequency:	
Peaty podzol	21
Acid brown earth (granite)	53
Acid brown earth (shale)	42
Gley	26
Silurian shale	79
Granite	5

Landscape

Frequency:	
Sea	-
Coastal feature	-
Cliff or quarry	11
Inland water body	13
Primary road	5
Minor road (<4m)	71
Path	53
Antiquity	21
Mean density:(km^{-2})	
Buildings	17
New domestic buildings	0.1
Complete hedgebank	6
Hedgebank with gaps	4
Derelict hedgebank	70
Dry stone wall	34
Derelict dry stone wall	88
Wood post and wire fence	22

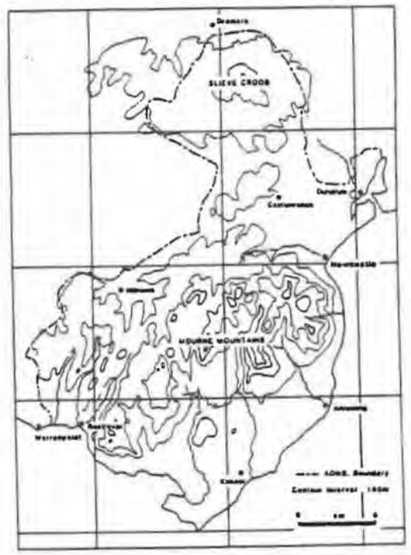
Land use

Mean percentage area:	
Seminatural broadleaf woodland	3.8
Coniferous plantation	9.1
Grassland	44.0
Arable crop	1.2
Fen	0.1
Bracken	5.1
Gorse heath	11.1
Mat grass hill pasture/ heath	0.1
Ericaceous heath	2.0
Bog and poor fen	1.0
Urban	-

This map has been removed to preserve the confidentiality of the sample square locations.

LAND CLASS 5

[redacted]



Topography

Mean maximum altitude (m)	377
Mean minimum altitude (m)	155
Mean percentage area:	
Land between 0- 50m	-
" " 51-150m	10
" " 151-250m	50
" " 251-500m	38
Land >500m	-
Slope (0)	15

Soils and Geology

Frequency:	
Peaty podzol	70
Acid brown earth (granite)	74
Acid brown earth (shale)	17
Gley	4
Silurian shale	52
Granite	61

Landscape

Frequency:	
Sea	-
Coastal feature	4
Cliff or quarry	13
Inland water body	22
Primary road	-
Minor road (<4m)	35
Path	61
Antiquity	4
Mean density:(km^{-2})	
Buildings	6
New domestic buildings	0.1
Complete hedgebank	2
Hedgebank with gaps	1
Derelict hedgebank	38
Dry stone wall	14
Derelict dry stone wall	38
Wood post and wire fence	12

Land use

Mean percentage area:	
Seminatural broadleaf woodland	0.8
Coniferous plantation	16.6
Grassland	21.6
Arable crop	0.3
Fen	0.1
Bracken	1.6
Gorse heath	0.5
Mat grass hill pasture/ heath	4.8
Ericaceous heath	16.4
Bog and poor fen	4.0
Urban	-

This map has been removed to preserve the confidentiality of the sample square locations.

LAND CLASS 6

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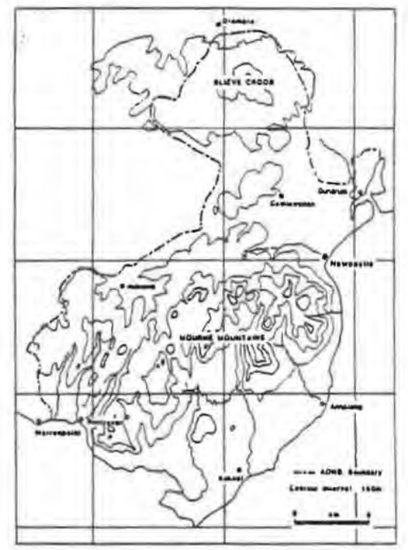

Topography

Mean maximum altitude (m)	529
Mean minimum altitude (m)	299
Mean percentage area:	
Land between 0- 50m	-
" " 51-150m	-
" " 151-250m	11
" " 251-500m	66
Land >500m	23
Slope (0)	14

Soils and Geology

Frequency:	
Peaty podzol	85
Acid brown earth (granite)	31
Acid brown earth (shale)	3
Gley	-
Silurian shale	46
Granite	85

Landscape

Frequency:	
Sea	-
Coastal feature	-
Cliff or quarry	38
Inland water body	15
Primary road	-
Minor road (<4m)	10
Path	74
Antiquity	3
Mean density:(km^{-2})	
Buildings	1
New domestic buildings	-
Complete hedgebank	-
Hedgebank with gaps	-
Derelict hedgebank	-
Dry stone wall	-
Derelict dry stone wall	1
Wood post and wire fence	3

Land use

Mean percentage area:	
Seminatural broadleaf woodland	-
Coniferous plantation	9.1
Grassland	-
Arable crop	-
Fen	-
Bracken	-
Gorse heath	-
Mat grass hill pasture/ heath	27.9
Ericaceous heath	39.8
Bog and poor fen	5.2
Urban	-

9. Management Prescription

9.1 Seminatural vegetation and field boundaries

9.1.1 Seminatural broadleaf woodland/scrub

The deciduous woodland cover of the Mournes has been seriously depleted in recent historical times. Its restoration should be considered as a priority in terms of improving plant community, wildlife and landscape diversity. The following points should be considered in any management plans designed to increase the cover and quality of woodland field plots.

(a) Sites need to be identified by full survey. The work involved can be reduced by concentrating on land classes which have been identified as having most suitable sites.

(b) Those sites which are suitable for the establishment of small deciduous woods and copses include:

(1) European gorse, blackthorn and hawthorn scrub, often with regenerating sycamore and ash. These sites are found mainly in land classes 1, 3 & 4.

(2) Small parcels of land which are difficult to farm and consist of species-poor grassland communities. This refers primarily to land classes 1 & 2.

(3) Bracken infested farmland, mainly in land class 4.

(4) Shelter belts currently supporting conifers.

(5) Existing conifer plantations nearing maturity.

(6) Habitats particularly in land class 3, close to streams, rivers and mixed hedges with ditches.

(7) Areas at higher elevations in land class 6 which once supported scrub as indicated by Ordnance Survey maps.

(c) The effective management of existing deciduous woodland to encourage tree regeneration and to maintain species diversity and the appearance of the landscape, involves restricting access to farm stock by fencing and the cessation of burning as a management technique.

(d) Tree planting at certain sites should be avoided. These include habitats such as coastal vegetation, species-rich dry and wet grassland, fen, lowland wet heath and dwarf gorse heath. They have an ecological value which may be reduced by amenity or landscape tree planting programmes.

(e) In land class 4, there is considerable potential for the widespread plantation of woodland on the steep rocky soils of farmland which is no longer productive and which often carries European gorse, bracken and regenerating scrub. This may have implications for landscape change, particularly if it is linked to programmes of afforestation designed to increase farm revenue and which exploit other seminatural communities such as heath and rough grassland. In these areas, the maintenance of a balance between small deciduous woods and farms should be given priority.

9.1.2 Riverside woodland

Management should be concentrated in land class 3 and have the primary objectives of:

(a) Fencing so as to prevent access by farm animals, preferably in such a way as to increase woodland area by incorporating a strip of currently farmed land.

(b) Opening the canopy by coppice management at certain sites.

(c) Clearing invasive species such as bracken and non-native species as Rhododendron.

(d) Planting native species such as oak and hazel.

In development of the sites for amenity, consideration should be given to their value as wildlife habitats. Riverside woodland associated with inaccessible river banks has a high wildlife conservation value since it is likely to have had a continuous history of woodland cover. Establishing continuity between riverside woodland, field plots of seminatural deciduous woodland, species-rich hedges and ditches should be given some priority.

9.1.3 Fen carr

Threats are mainly from drainage, rubbish dumping, agricultural landfill operations, rural house building and pollution. Full cover field survey should be undertaken in land classes 1 & 2 to establish the distribution and species composition of fen carr.

9.1.4 Conifer plantation

Management plans should be geared to increasing the species diversity and decreasing the visual prominance of existing plantations. With this objective the following points are relevant:

(a) Blanket cover of the landscape with conifer plantations contrasts with the scale of landscape variation which is usual in the AONB. Those parts of the AONB with a potential for timber production, for example land class 4, should be identified with a view to anticipating such land use change.

(b) Existing conifer plantations should be managed to increase their content of deciduous trees at the expense of conifers, particularly at the margins.

(c) Since many conifer plantations are nearing maturity, there is scope for replanting programmes which are more in keeping with the small scale of landscape variation in the Mourne AONB. In the coastal, low elevation plantations of land classes 1 and 2, there was often an understorey of regenerating ash, oak and holly some of which may be related to former native woodland. This, together with Scots pine, if allowed to stand, could form the basis of replanting mixed woods.

(d) Where conifer plantations are likely to remain as a landscape feature, attempts should be made to link isolated blocks with further plantation and to soften straight or angular edges. Replanting programmes should aim to establish a greater diversity of conifers.

9.1.5 Broadleaf plantation and demesne woodland

This woodland is vulnerable to felling operations or loss due to the death and subsequent removal of mature trees. The high agricultural value of the land on which it occurs and the lack of regeneration or planting of some of the more characteristic species suggest that encouragement should be given to appropriate management and further planting in land classes 1 & 2.

9.1.6 Other woodland

Trees associated with farm buildings, isolated or groups of scattered trees and lines of trees should be the focus of active management if their contribution to the landscape is to be maintained. In view of current limited regeneration and replanting, priority should be given to planting programmes involving preferred species such as Scots pine and oak with beech and sycamore at exposed sites.

The extension of existing sites would allow establishment alongside mature trees thereby helping to maintain continuity of cover and increasing the possibility of management for timber.

At sites with derelict buildings, natural regeneration could be enhanced by excluding grazing animals. The screening effect of trees might also be improved with tree planting.

9.1.7 Maritime vegetation

Management prescription is strongly influenced by recreation pressure, urban development and rubbish disposal problems.

(a) Attention should be given to the removal of seaborne rubbish and the prevention of dumping household and commercial waste.

(b) Landfill tipping to prevent erosion, stabilise tracks or reclaim ground next to domestic buildings on the coast should not be carried out without proper control.

(c) Efforts should be made to ensure that recreation damage does not extend to remaining areas of seminatural vegetation.

9.1.8 Species-rich grassland

The species richness of wet and dry grassland types was not high when compared with nature reserves in the province. It is related to:

(a) The intensity and type of past and current agricultural use.

(b) The time since ploughing, drainage, reseeding or fertilization.

There is a need for ecological survey particularly in land class 3 to establish both the quality and distribution of species-rich seminatural grassland. The main threats to its existence are from:

(1) Agricultural improvement, due mainly to the intensive cultivation of available land. Related problems are landfill tipping in wet hollows and drainage schemes. The detrimental effects of rubbish dumping into seminatural habitats should be controlled and adequate facilities should be provided locally for its disposal.

(2) Succession to scrub or bracken invasion in grassland and other habitats which are generally poorly managed for agriculture. These processes are likely to occur mainly in land classes 3 & 4.

(3) Building projects, often small scale, on isolated plots which support seminatural vegetation.

(4) Recreation disturbance, which is largely confined to the coast and mountains (land classes 1 & 6) where there is the greatest cover of seminatural vegetation. The inaccessibility of farmed land for walking contributes to the problem.

The fragmented nature of species-rich grassland in the landscape makes management to maintain or improve species diversity difficult. Management should be based primarily on advice after a farm visit.

Species-rich seminatural grassland should not generally be planted with trees unless invasion by gorse or bracken is advanced. There is a danger that such sites associated with, for example, river banks might lose species if incorporated into woodland planting programmes.

9.1.9 Fen and wet grassland

Wetland sites as field parcels or associated with ditches could be managed by fencing to prevent access by farm stock. Priority should be given to preventing their reclamation by landfill and use as rubbish dumps. Many ditches were not functional mainly due to trampling damage and neglect. Shading by overgrown hedges had frequently reduced their species diversity. Hedge management is therefore required. Efforts should be made to clean up polluted ditches and other wetland sites.

Full cover field survey for fen should be carried out in land class 1 as part of a restoration and conservation management programme.

There were few ponds on farms. They were usually man-made and had a poor flora. There is potential for their improvement by planting trees, shrubs and aquatic plants.

9.1.10 Bracken

With a reduction in grazing intensity or grassland management there is likely to be further spread of bracken into hill pasture and heath in land classes 3-5. This has implications for the maintenance of species diversity in seminatural dry grasslands, particularly in land class 3.

Grassland with dense stands of bracken have a poor productivity. Control is possible with selective herbicides but in land class 4, the topography and small field sizes do not make this an easy option. A more viable alternative is to use such land for commercial timber production or wildlife conservation, for example by establishing groups of native trees and allowing successional changes to take place.

Such management must be balanced against the loss of characteristic field boundaries and ancient land use artefacts which would occur if woodland was allowed to develop.

Habitats dominated by bracken but with an underflora of bluebell were recorded in land class 4. These sites probably represent former woodland and they should be managed by tree planting.

9.1.11 Hill pasture

With appropriate management involving the control of grazing and burning, the proportion of ericaceous shrubs in certain mat-grass hill pastures could be increased, thereby improving species diversity and the aesthetic value of the landscape.

The high stocking density of sheep recorded on mat-grass hill pasture however, was not compatible with the recovery of ericaceous shrubs. Appropriate management may be difficult in view of the shared grazing rights and multiple use over large parts of land class 6. Field and experimental studies are necessary to establish the conditions under which the spread of ericaceous shrubs will be favoured. The restoration of mat-grass heath to ericaceous heath by heather planting could also be examined.

9.1.12 Gorse heath

When flowering, gorse gives the AONB (largely, land classes 1, 3 & 4) one of its most characteristic aspects. The plant community dynamics of dwarf gorse heath and mosaics with other communities however, have not been studied. European gorse is generally considered to be invasive on dry heath at low elevation, particularly where bare soil is created by physical disturbance. It can be controlled by burning and high grazing intensities in such cases. Both of these management techniques were recorded in the AONB.

Dwarf gorse heaths should be studied further to examine their species composition and ecological succession in relation to burning, grazing and climatic factors. The considerable ecological and landscape value of this vegetation could be threatened by bracken invasion, succession to scrub/woodland or any extensive tree planting programme in land class 4.

Control of farm reclamation projects should be considered, particularly where they involve hill tops. Dwarf gorse heath and hill pasture grassland mosaics on steeper sites are in less danger from reclamation, although invasion by bracken and shrubs may occur if management is poor.

9.1.13 Ericaceous heath, wet heath and bog/peaty flush

Heath, wet heath and bog/peaty flush vegetation in land class 6 has been heavily overgrazed in the past. As a result, purple moor-grass dominated large areas and mat-grass was frequent at better drained sites. The ericaceous component of this vegetation was often poor and peat erosion was extensive. The relative scarcity of ericaceous shrubs reflects the generally poor standard of grazing and burning management which has taken place in the past and which has led to the predominance of grasses. The concentration of sheep on mat-grass hill pasture, recorded during field survey is likely to decrease during the Winter months as sheep move to ericaceous heath. The effective stocking density on mat-grass and ericaceous heaths is probably, therefore, higher than that calculated for land class 6 as a whole. Ecological survey and experimental work should be undertaken to investigate vegetation and management differences across boundary fences and walls.

The lowland wet heaths in land classes 2 & 3 to the South of the Mournes are currently being lost through agricultural improvement. Ecological survey should be carried out to establish their distribution, quality and rate at which they are being reclaimed. Current management practice includes burning and many sites are overgrazed. This has often led to the dominance of purple moor-grass and the establishment of European gorse.

9.1.14 Field boundaries

Field boundary removal has occurred on a comparatively large scale (4.2% of the total) and has led to the loss of approximately 5,580 field boundaries (377km) since 1977 (the mean date of Ordnance Survey cartographic field survey). In order to maintain the present landscape, the rate of boundary removal needs to be controlled.

Wire fences have largely taken over the functional role of stockproof barrier. Landscape quality is strongly dependent on the extent to which traditional boundaries can be restored and maintained against current trends. The construction of simple dry stone walls is preferred to wire fencing in

areas where they are a tradition. Vernacular styles and structure need to be taken into account before management advice is given. This is particularly relevant where there are ecologically interesting communities such as species-rich earth banks and ditches.

Complex dry stone walls can become colonised by shrubs and trees which gives them a wildlife and landscape value but which can also lead to their destruction as individual trees mature. Certain neglected walls have potential for wildlife management, particularly if their repair is impractical and they have become colonised by plants. In this case, their management as hedges is appropriate.

Stockproofing dry stone walls with wire fences by driving posts into the wall should be avoided since this destroys their structure. Wire fences erected next to stone walls can also lead to their neglect by acting as an obstruction to maintenance. Farmers are less inclined to repair walls where wire fencing maintains stockproof boundaries.

Hedge restoration needs to take place on a large scale to maintain landscape quality. Hedge types with the most shrub and tree species might be given priority for wildlife conservation. Hedges with hazel and oak were associated with the most diverse hedge floras. Ditched hedges with alder and willow were also ecologically interesting as were those associated with wide verges and species-rich banks. The region should be surveyed for such hedges.

When walls and hedges were established they were probably surrounded mainly by seminatural vegetation from which they accumulated many of their species. At the present time, they exist in an agricultural landscape, the more species-rich examples acting as refuges for wildlife. A largely derelict hedge, however, is incompatible with its role as a wildlife habitat.

The following points are relevant to field boundary management:

(a) Management of species-rich boundary types could be undertaken initially on a trial basis, on working farms representing each land class.

(b) Priority should be given to the establishment of walls or hedges as replacements for wire fences.

(c) Wall types, banks and hedge planting techniques corresponding to vernacular styles should be used.

(d) Native shrubs and trees in addition to hawthorn could be planted.

Hedgebank management depends on bank structure as well as hedge species composition. The size of the bank and presence of any ditches governs the extent to which they are stockproof. Ditch management is necessary to maintain certain hedges as stockproof barriers. Where there is standing water it should be carried out on a rotational basis, in association with fencing and bank repair to reduce trampling by farm stock and increase species diversity. Hedge shrub and tree management is secondary in this respect.

Hedgebanks with gaps can be repaired by interplanting and hedge laying. Filling gaps with other materials is successful only in the short term. Lines of shrubs are less easily restored.

The wooded appearance of land class 3 was strongly dependent on the presence of hedges with trees. Large scale hedge maintenance however, is likely to involve tree-felling and subsequently effect landscape quality. The removal of overgrown hedges may also ultimately occur if wire fences obstruct hedge management.

Trees had often caused damage to the physical structure of walled banks, thereby complicating hedgebank restoration.

Field boundaries at the urban-rural fringe were heterogeneous and abrupt. Efforts should be made, therefore, to encourage vernacular styles and the planting of native deciduous shrubs and trees.

Appropriate hedge, wall and ditch management are seen as integral to the maintenance of ecological diversity and landscape character. Practical

guidelines should be issued and carried out within a framework of environmental education and awareness.

Whilst management prescription has been based on field observation, there is also a need for research on the subject. This should investigate the effects of hedge management techniques, and hedge structure and composition in relation to stockproofing and wildlife. Emphasis should also be given to estimating the cost-effectiveness of different field boundary types particularly in relation to their role as protection for agricultural pests such as rabbits.

9.2 Farming practice

Proposals for maintaining ecological resources and landscape quality should be based on striking a balance between the benefits of modern farming, its visual impact on the landscape and the retention of a diverse flora and fauna.

Any proposals to improve landscape and wildlife diversity involving the inefficient use of land, however, are not likely to gain the support of the farming community. For example, a return to traditional labour intensive methods, a single hay crop taken in mid or late Summer, or productive field parcels managed for their wildlife rather than for agriculture.

A primary objective should be to improve the flow of ecological management advice and information to the farming community.

9.3 Zonal management strategies for the Mourne AONB

In order to simplify planning and management issues, the Department of the Environment for Northern Ireland (1986a) has subjectively classified the AONB into 13 geograpically unified zones based on a combination of geological, topographical and land use features. These zones contain a range of different land classes (Table 27). Planning and management prescription may be difficult since action will vary depending on which part of any zone is being considered.

Stratification of the 13 zones according to their land class composition

can be used to help solve this problem. For example:

(1) South Mourne (D) consists mostly of the low elevation land classes 1 & 2 making up the coastal plain. The greatest threats to this zone are related to agricultural intensification and urbanisation. Coastal seminatural vegetation and small areas of wetland associated with farms are amongst the most vulnerable ecosystems. Policy designed to maintain these sites might therefore be given specific attention. There is much scope for tree planting on farms.

(2) South Mourne (B) has a large proportion of coastal (land class 1), lowland (land class 2) and upland/lowland transitional (land class 3) squares. Problems associated with coastal recreation and the management of seminatural vegetation are most likely. Specifically, the maintainance of riverside woodland and hedge trees in land class 3 would have to be given some priority in landscape management plans, along with the rehabilitation of derelict hedges.

(3) The valley systems of South Mourne (F) contain representative squares from each land class and therefore present a considerable diversity of management options covering a wide range of seminatural vegetation, land use and landscape features. Management prescription for the valleys should therefore consider this heterogeneity as an integral part of the landscape. In different parts of the valley, agricultural reclamation and intensification, rural housing, hedge and wall dereliction and the management of seminatural vegetation would receive priority.

(4) Slieve Croob (L) has the greatest proportion of squares belonging to land class 4. Management problems associated with the widespread occurrence of landscape dereliction and the spread of invasive seminatural vegetation into farmland predominate. The zone had a high proportion of ruined dry stone walls and hedgebanks which have lost their agricultural function of retaining stock. Landscape dereliction and a potential threat of land use change to conifer plantation might therefore be given a high priority for planning purposes.

Table 27 Percentage frequency in the 6 Mourne land classes, of kilometre squares belonging to subjectively defined landscape zones (Department of the Environment for Northern Ireland, 1986).

	Mourne Land Class					
Landscape Zone	1	2	3	4	5	6
South Mourne (A)	23	52	19	4	2	-
South Mourne (B)	25	25	50	-	-	-
South Mourne (C)	-	9	64	23	5	-
South Mourne (D)	75	25	-	-	-	-
South Mourne (E)	39	8	54	-	-	-
South Mourne (F)	5	10	33	23	10	19
South Mourne (G)	-	-	25	12	25	38
North Mourne (H)	-	3	25	47	3	22
North Mourne (I)	5	14	27	55	-	-
Newcastle/Castlewellan(J)	20	44	14	23	-	-
Leitrim Valley (K)	-	39	44	17	-	-
Slieve Croob (L)	-	7	11	58	4	20
Mourne Mountains	-	-	1	4	14	82

10. Validation of The Predicted Estimates of Resources

Independent comparisons were used to test the value of the predictions derived from the land class sampling programme. Comparisons have been made with the results of full cover surveys of conifer plantations, deciduous woodlands, agriculture and dereliction within the AONB.

10.1 Agriculture

The Department of Agriculture (Northern Ireland) collates June farm census returns and calculates hectarages of crops for agricultural districts. The main categories of land use recorded include cereal and arable crops, grass for mowing, grass not for mowing and rough grazing. East Down, Banbridge, Down Urban and Newry No. 1 agricultural districts fall partly within the AONB boundary. South Down falls entirely within the boundary of the AONB.

Comparisons with agricultural predictions from the present study are difficult to make, partly because the land classes and the agricultural districts do not correspond and partly because, with the exception of South Down, the districts include land which is outside the AONB. In addition, the grassland classification employed by the Department of Agriculture is based mainly on age and management whereas that of the present study is based primarily on species composition.

Despite these drawbacks, an attempt has been made to compare our predictions of the amounts of arable crops and agricultural grassland in the AONB, with the 1985 estimates prepared by the Department of Agriculture (Table 28) for agricultural districts (Department of Agriculture, Northern Ireland 1986a).

Only Department of Agriculture estimates for South Down were used since this was the only agricultural district which lay entirely within the AONB. It covers a section of the high Mournes and coastal plain from Warrenpoint to Newcastle. The assumption was made that this agricultural district was representative of the whole AONB as it occupied approximately 50% of the

land area and contained the full range of land classes at typical frequencies.

The areas of grassland and crops predicted from land class field survey and estimates derived by the Department of Agriculture from the South Mourne agricultural district data, compare favourably. The largest difference was between the predicted and estimated area of potatoes but it should be born in mind that the census figures relate to 1985 and that the AONB predictions relate to 1986. There are also errors associated with the agricultural census data but these are difficult to assess.

10.2 Conifer plantation

The total area of conifer plantation in the AONB marked on 1:50,000 Ordnance Survey maps of the region, was determined with a dot grid template of plastic tracing film. These data were collated by land class and are shown in Table 29.

Field survey by the sampling programme predicted a larger area of plantation (7.5%) when compared with the map data (5.1%). Predicted areas were noticeably higher in land class 6. It was in this land class, however, that new plantation was recorded which was not marked on Ordnance Survey maps.

10.3 Deciduous woodland

Tomlinson & Kerr (1986) examined the contribution of trees and woodlands to the landscape in the Mourne AONB using 1:10,000 O.S. maps and by field survey.

They estimated that woodland comprised 660ha excluding shelterbelts nature reserves and state forests. This represented 1.2% of the total AONB. In the present survey all woodland/scrub types which exceeded $100m^2$ were recorded. The results predicted a total of 6595ha of woodland representing 10.9% of the AONB. Excluding conifer plantations, woodland comprised 2063ha or 3.4% of the AONB. This included lines of trees and trees associated with farm buildings.

Our prediction of 1134ha of seminatural woodland/scrub or 1.9% of the AONB was much greater than the full cover figure of approximately 79ha for woodland in natural situations. The land classification study also predicted that there was twice as much woodland in field plots and fen carr (1.2%) than woodland associated with rivers (0.6%). This compares with the full cover field survey of about equal quantities. The differences can be explained by the fact that the land classifiction study took into account small and fragmented parcels of woodland/scrub that would not normally be represented on some maps and woodland which had regenerated since existing maps were surveyed in 1977 (mean survey date). It gives some idea of the potential of farmland for woodland rehabilitation.

The land classification predicted an area of 461ha for broadleaf plantations and demesne woodlands representing 0.7% of the AONB. This was comparable to the full cover field survey estimate of approximately 400ha for parkland, gardens and estate woodland.

10.4 Dereliction

The Department of the Environment for Northern Ireland (1986c) have mapped the number of derelict buildings, unapproved tipping sites and points of mineral extraction in the Mourne AONB.

The full cover survey estimated that there were approximately 1700 derelict buildings in the AONB. These were mainly located away from the high Mournes or urban settlements at a density greater than 4 km^{-2}. The figures are similar to those predicted in the present study; a total of 2324 derelict buildings at a density of 4 km^{-2} over the whole AONB. The predicted density for land classes 1, 2 and 5 was 4 km^{-2} with higher densities predicted for the lowland/upland transitional land classes 3 (5 km^{-2}) and 4 (7 km^{-2}). The larger total predicted number of derelict buildings results mainly from the greater number of derelict buildings in land class 4. Differences in recording methods between the two surveys help to explain the

divergent totals since derelict buildings not recorded on Ordnance Survey maps were largely omitted from the full cover survey.

The DoE (1986c) survey identified 120 unapproved tipping sites where refuse was discarded. The survey was restricted to major sites within view of a road. It recognised similar types of tipping to our study namely rubbish discarded by farmers on their own land and domestic waste dumped by the general public in the countryside. It is evident from our work, giving the predicted number of sites of disposed rubbish (1514), that there were many more smaller locations in the AONB where domestic, agricultural and other rubbish is dumped. The sites mainly occurred in landclasses 1-4 with a greater number of sites per square kilometre occurring in the coastal and intensively farmed land classes 1 and 2. Few major tipping sites were found at high elevation in the DoE study. Main locations were at the foot of the Mourne mountains between Hilltown and Kilcoo and on the coast from Bloody Bridge to Mill Bay. Secondary loci occurred in valleys notably on the South side of the Mourne mountains.

The present study also predicted a total of 1340 sites of abandoned vehicles in the AONB.

Table 28 The predicted area (ha) and percentage area of crops in the AONB from the present study and projected values from the 1985 South Mourne agricultural census data.

Crop	Land class survey (ha)	Agricultural census (ha)	Land class survey (%)	Agricultural census (%)
Barley	1382	1424	2.3	2.3
Other cereals	304	328	0.5	0.5
Potatoes	388	680	0.6	1.1
Other vegetables	128	114	0.2	0.2
Agricultural grassland	22862	19582	37.6	32.2
Total	25064	22128	41.2	36.4

Table 29 Comparison of predicted areas of coniferous plantation in the 6 land classes with areas derived from Ordnance Survey maps.

Land Class	% area of land class		area (km^2) in land class		% area of AONB coniferous plantation	
	present Study	map data	present study	map data	present study	map data
1	3.8	0.5	239	31	5	1
2	0.3	2.8	33	290	1	9
3	8.5	7.5	837	744	19	24
4	9.1	5.6	1275	782	28	25
5	16.6	17.2	682	705	15	22
6	9.1	3.7	1466	592	32	19
AONB	7.5	5.1	4532	3144	100	100

11. Discussion

The report has described the current major types of land use, landscape features and ecological resources present within different parts of the AONB and has indicated the manner in which they are changing. It is within this objective framework that informed decisions on management and planning can be made and that the effects of their implimentation can be monitored and assessed.

Debate on landscape change in the lowlands and uplands of England and Wales led to the publication of 'New Agricultural Landscapes' (Countryside Commission 1974) and 'The Changing Upland's', (Sinclair 1983, Allaby 1983) The conclusions presented in these two reports and in 'Nature Conservation in Great Britain' (Nature Conservancy Council 1984) have implications for resource management in the Mourne AONB.

It was argued in 'New Agricultural Landscapes' that the disappearance of field boundaries and seminatural vegetation in the more intensively farmed lowlands was due mainly to their loss of agricultural function. The rate of loss was governed by the extent to which they interfered with farm efficiency. There was evidence throughout the Mourne AONB that along with agricultural intensification, loss of agricultural function was a major factor influencing the neglect and subsequent change of field boundaries and seminatural vegetation. Dry stone walls were a major exception, particularly in the Mourne plain where they were valued highly by some local farmers despite higher maintenance costs.

In 'New Agricultural Landscapes', it was suggested that a practical answer to the problem of decline in landscape quality and the conflicting demands of agriculture with other land uses, was the establishment of a network of agriculturally unproductive land which would link interesting visual features and wildlife habitats. Policy for landscape improvement was

based largely on maintaining valuable landscape features, widening and planting unproductive areas, setting out management guidelines for unfenced areas and giving special attention to village edges and riparian zones.

Problems in implementing this policy were seen as the lack of recognition of landscape problems by the farming community, the unwillingness of many farmers to make concessions to landscape conservation, financial implications of maintaining unproductive areas, and the lack of practial advice and skilled labour available to those prepared to take positive action. These problems are common to any scheme which depends largely on voluntary involvement.

In order to test the policy in action, a number of New Agricultural Landscape projects were set up by the Countryside Commission in co-operation with local authorities, to tackle the problem of landscape decline. Project officers were employed by local authorities to work in relatively small areas developing landscape conservation through direct and sustained contact with farmers. The systematic approach of developing a continuous network of natural features was not successful but positive results on small scale works accrued mainly through efforts to create an awareness of conservation amongst farmers and the general public (Appleby 1983).

The key to achieving comprehensive countryside conservation in the long term was seen as education followed by action in which co-operation between local councils, Conservation Trusts, Farming and Wildlife Advisory Groups and Government Departments was essential and in which there was a role for grant-aid, regulation and planning. A similar policy has been adopted by the Nature Conservancy Council (1984). This combined approach is relevant to the proposed introduction of legislation on Environmentally Sensitive Areas (Department of the Environment for Northern Ireland 1986a), particularly in view of the voluntary nature of the scheme and the systematic response needed for its success.

Current agricultural policy discriminates in favour of the larger, full-time viable holdings, particularly on the better land. In the lowlands, much of the landscape change is a consequence of the intensification of farming on large holdings. In contrast, landscape change in the uplands has largely resulted from the decline of agriculture. Intensification, often involving reclamation at the upland/lowland interface, is usually only possible with outside financial support and is, for the most part, carried out by the larger farm enterprises.

'The Changing Uplands' indicated that whilst the likelihood of landscape changes was less on smaller upland farms, it was these which were more seriously jeopoardized by farm amalgamation. It was argued, therefore, that special assistance should be given to small and part-time farmers to maximise their contribution to landscape conservation.

Reclamation and farm almalgamation in the upland/lowland transition zone, leading to loss of wildlife habitat and the disruption of traditional field patterns was particularly noticeable in the Mourne AONB. The landscape types produced by such agricultural intensification were often highlighted on neighbouring holdings in which agricultural decline was evident.

Agricultural decline in the uplands, in common with agricultural intensification in the lowlands, results in the loss, by neglect, of landscape features such as field boundaries. This problem was widespread in the upland and lowland/upland transition zone in the AONB along with the neglect of land and its subsequent invasion by bracken and scrub. The poorer land has a crucial landscape and wildlife conservation value, which is in danger of being lost by either agricultural dereliction or by land use change, for example forestry.

It may not be wise to apply the arguments used by the Countryside Commission, to Northern Ireland in view of the different patterns of land ownership and letting. Some way of modifying the influence of progressive farmers and increasing the contribution of small land owners to positive landscape and wildlife conservation seems necessary, however, if landscape patterns and ecological diversity are to be maintained.

In the uplands, public authorities, as major landowners, have a greater opportunity for determining landscape change. In Scotland, the Countryside Commission for Scotland, the Nature Conservancy Council and the Scottish Agricultural Colleges Advisory Service have developed an approach to countryside conservation which depends on the implementation of farm conservation plans (Countryside Commission for Scotland 1986). This step was taken after research had indicated that the wildlife interest on farms had declined in the recent past and with the realisation that without positive action, further deterioration would take place.

Warnock (1986) examined the potential of farmland in the Mourne AONB for landscape and wildlife conservation. He used a case study approach to look at farms which were selected as being typical of the Mourne multivariate land classes (Cooper 1986b). The farms were all large, intensively managed units. The survey did not consider the smaller and part-time farm enterprises and therefore it lacked perspective.

Regardless of the land class in which the farms were situated, a considerable environmental impact of recent changes in farm practice was reported. The main changes involved more intensive grassland management and an increase in stock numbers over the last 10 years. The reclamation and improvement of rough grazing areas on marginal land had also accelerated, stimulated mainly by grant aid.

There were two main conclusions arising from the work. Firstly that there was a considerable amount of dereliction particularly in relation to field boundaries and that without active management, landscape change over the next few decades would continue. Secondly that the loss of wildlife habitats is also likely to continue, particularly on remaining marginal land of little agricultural value.

A survey of the actions and opinions of the intensive farmers revealed that few of them knew about traditional hedge management techniques and many regarded hedge trees as a nuisance. Few had noticed a decline in wildlife on their farms and seminatural habitats were usually seen as waste ground. There was a clear need for environmental education and practical advice which many farmers would welcome. Given that many farm enterprises in the AONB are of a part-time, less intensive nature and that land ownership is often complex, further farm-based surveys on the effects of land management on the landscape and on attitudes to change are needed.

The work described in the present report is of greatest value during the early phase of countryside conservation, when information on the distribution, type and status of landscape ecological resources is needed. The sampling programme allows cost-efficient survey of a wide range of resources to be made and stratification by land class provides a basis on which their distribution can be mapped.

Quantification of the distribution of resources provides a perspective in which management and planning decisions can be made. It provides a framework against which the consequences of different land use strategies can be compared.

The report has not presented or discussed all of the data collected during field survey. Only an essential summary of the main categories of information has been given. The data base can be searched for specific records if the need arises. In the same way, it is possible to mount a

field search for a resource which was not recorded during the main field survey.

Having discussed the distribution and status of landscape resources, and their potential for change, there remains the task of monitoring trends and rates of change. This complements the practical process of landscape conservation and is necessary in order to assess the effectiveness of countryside conservation. The standardised nature of the sampling programme and survey methods employed for the present work means that they can be applied to monitoring purposes by independent field surveyors, either in part or as a whole.

12. References

Allaby, M. (1983). The Changing Uplands. Countyside Commission. Cheltenham.

Appleby, M.J. (1983). Suffolk New Agricultural Landscapes Project. Suffolk County Council.

Bunce, R.G.H., Barr, C.J. and Whittaker, H. (1983). A stratification system for ecological sampling. In. Ecological Mapping from Ground, Air and Space (ed. R.M. Fuller). Institute of Terrestrial Ecology. p. 39-46.

Bunce, R.G.H. and Smith, R.S. (1978). An Ecological Survey of Cumbria. Cumbria County Council and Lake District Special Planning Board. Kendal.

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

Cooper, A. (1986b). A System of Land Classification for the Mourne AONB. (Report to the Countryside and Wildlife Branch, DOENI). Department of Environmental Studies. University of Ulster.

Cooper, A. and Murray, R. (1986a). A Landscape Ecological Study of the Mourne AONB. (Interim Report to the Countryside and Wildlife Branch, DOENI). Department of Environmental Studies. University of Ulster.

Cooper, A. and Murray, R. (1986b). An Approach to the Assessment of Landscape Resources. Northern Ireland Conference on Environmental Impact Assessment. Department of Environmental Studies. University of Ulster.

Countryside Commission. (1974). New Agricultural Landscapes. Countryside Commission. Cheltenham.

Countryside Commission for Scotland. (1986). Countryside Conservation : a guide for farmers. CCS.

Department of Agriculture. (1986a). Agricultural Area (Distribution of crops, grass, rough grazing and other land by districts June 1985). DOANI.

Department of Agriculture for Northern Ireland (1986b). Implications of ESA designation to Agriculture in Mourne AONB. Countryside and Wildlife Branch. DOENI.

Department of the Environment for Northern Ireland (1986a). Mourne Environmentally Sensitive Area. Countryside and Wildlife Branch. DOENI.

Department of the Environment for Northern Ireland (1986b). Mourne AONB as an Environmentally Sensitive Agricultural Area. Conservation Branch. DOENI.

Department of the Environment for Northern Ireland. (1986c). Dereliction in Mourne AONB. Countryside and Wildlife Branch. DOENI.

Gardiner, M.J. and Radford, T. (1980). Soil Associations of Ireland and Their Land Use Potential. National Soil Survey of Ireland. Dublin.

Gauch, H. (1982). Multivariate Analysis in Community Ecology. Cambridge University Press.

Hill, M.O. (1979). TWINSPAN. Cornell Univeristy. New York.

Nature Conservancy Council (1984). Nature Conservation in Great Britain. Nature Conservancy Council.

Sinclair, G. (1983). The Upland Landscapes Study. Environment Information Services. Dyfed. Wales.

Singer, S.B. (1980). DATAEDIT. Cornell University. New York.

Tomlinson, R. and Kerr, S. (1986). Mourne-Slieve Croob AONB Tree Survey. (Report to the Countryside and Wildlife Branch. DOENI). QUB.

Warnock, S. (1986). An Analysis of the Potential for Landscape and Wildlife Conservation on Farmland in the Mourne AONB. M.Sc. Thesis. Wye College. University of London.

Webb, D.A. (1977). An Irish Flora. Dundalgan Press. Dundalk.

White, J. (1982). Studies on Irish Vegetation. Royal Dublin Society. Dublin.

Grid references on page 63, have been removed to preserve the confidentiality of the sample square locations.

Appendix 1

Grid references of the 1km squares sampled in the field survey.

Mourne Land class	Sample Number	[redacted]
1	1	
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Appendix 2

University of Ulster

March 1986

MÓURNE LANDSCAPE ECOLOGY PROJECT

FIELD DATA SHEET

O.S. GRID REF _____

MOURNE LAND CLASS NUMBER _____

SQUARE NO. _____

DATE _____

SURVEYOR _____

ALAN COOPER

DEPARTMENT OF ENVIRONMENTAL STUDIES

This map has been removed to preserve the confidentiality of the sample square locations.

[redacted]

WOODLAND AND SCRUB

O.S.Grid ref.

Square number

Surveyor	Date

TYPE

1 Broadleaved
2 Coniferous
3 Mixed
4 Plantation
5 Seminatural
6 Amenity
7 Gillside
8 Shelterbelt
9 Isolated tree
10 Parkland
11 Linear trees
12 Scrub
13 Farmyard trees
14 Garden trees
15 Scattered-trees
16 Demesne wood

STRUCTURE

17 Closed canopy
18 Open canopy
19 Shrub layer
20 Dense undergrowth
21 Mature
22 Pole-stage
23 Even-age
24 Height:0-1m
25 " :1-3m
26 " :3-10m
27 " : >10m

HABITATS

28 Dead trees
29 Fallen trees (brk.
30 " " (uprt.
31 Rotten log
32 Rec.cut hard.stmp.
33 Old hardwood stump
34 Rec.cut conf. stmp.
35 Old conifer stump
36 Coppice stool
37 Bryoph.covd. rock
38 Wet drain
39 Dry drain
40 Glade
41 Ride
42 Bryoph. on branch.
43 Lichen on branches
44 Ivy on groumd
45 Bramble thicket
46 Blackthorn thicket
47 Hawthorn thicket
48 Rhododendron thckt.
49 Spec-rich grd.flora
50 Spec-poor grd.flora
51 Grass-dom.grd.flora

MANAGEMENT

52 Unmanaged
53 Thinning
54 Brashing
55 Rec. cut coppice
56 Neglected coppice
57 Felling
58 Planting
59 Underplanting
60 Tuley tubes
61 Staked trees
62 Grazed
63 Not enclosed

REGENERATION

64 Alder
65 Ash
66 Aspen
67 Beech
68 Birch
69 Elm
70 Hawthorn
71 Hazel
72 Holly
73 Oak
74 Rowan
75 Rhododendron
76 Sycamore
77 Scots pine
78 Yew
79 Other

SPECIES COMPOSITION

80 Alder
81 Ash
82 Aspen
83 Beech
84 Birch
85 Elm
86 Hazel
87 Hawthorn
88 Larch
89 Lodgepole pine
90 Norway spruce
91 Oak
92 Rowan
93 Sitka spruce
94 Scots pine
95 Sycamore
96 Willow
97 Gorse
98 Other hardwood
99 Other conifer
100 Yew

ABUNDANCE

101 < 25% of canopy
102 26-50%
103 51-75%
104 >75%

WOODLAND SOILS

105 Waterlogged peat
106 Drained peat
107 Wet min.soil
108 Well-drain.min.sl.
109 Acidic soil
110 Base-rich soil

This map has been removed to preserve the confidentiality of the sample square locations.

[redacted]

SEMINAT.VEG./WILDLIFE

O.S.Grid ref.

Square number

Surveyor	Date

INLAND GRASSLAND

111 Hill pasture
112 Poor hill pasture
113 Bracken
114 Permanent pasture
115 Wet past.1.Juncus
116 " 2.Filip
117 " 3.Cal/Sen.
118 Calcareous pasture
119 Relict potatoe rigs
120 Neglected
121 Unimproved

HEATH AND BOG

122 Base-enriched peat
123 Sphagnum carpets
124 Wet hth 1.Mixd.sp.
125 " 2.J.squar.
126 " 3.Tr./Cal.
127 " 4.Cal./Er.
128 " 5.Cal./Va.
129 " 6.Molinia
130 " 7.Er. vag.
131 " 8.Myrica
132 Raised bog 1.Sphag.
133 " " 2.Call.
134 Cut bog with Myrica
135 Dry heath 1.Erica
136 " " 2.Calluna
137 " " 3.Ulex
138 Wet hth/grslnd mos.
139 Dry hth/grslnd mos.
140 Mountain peat
141 Wind-shorn mt. hth.
142 Peaty flush
143 Peat wking 1.dom.
144 " " 2.ind.
145 Eroding peat
146 Peat hag

FRESHWATER AND MARSH

147 Free-floating veg.
148 Rootd-float.leav.
149 Submgd-no fl.lvs.
150 Reedbeds
151 Marsh/fen
152 Sdge-mrsh 1.ac.peat
153 " " 2.bs-rich
154 Calc./basic flush
155 Innundation comms.

COASTAL HABITATS

156 Mar.ldge/crev.veg.
157 Bird cliff veg.
158 Sea cliff grassland
159 Sea cliff heath
160 Coastal strand
161 Open saltmarsh
162 Closed saltmarsh
163 Spartina marsh
164 Zostera beds
165 Green alge beds
166 Brown algae beds
167 Young dunes
168 Old dunes 1.min.
169 " " 2.org.
170 Dune slack 1.herb.
171 " " 2.Salix
172 Hippophae scrub

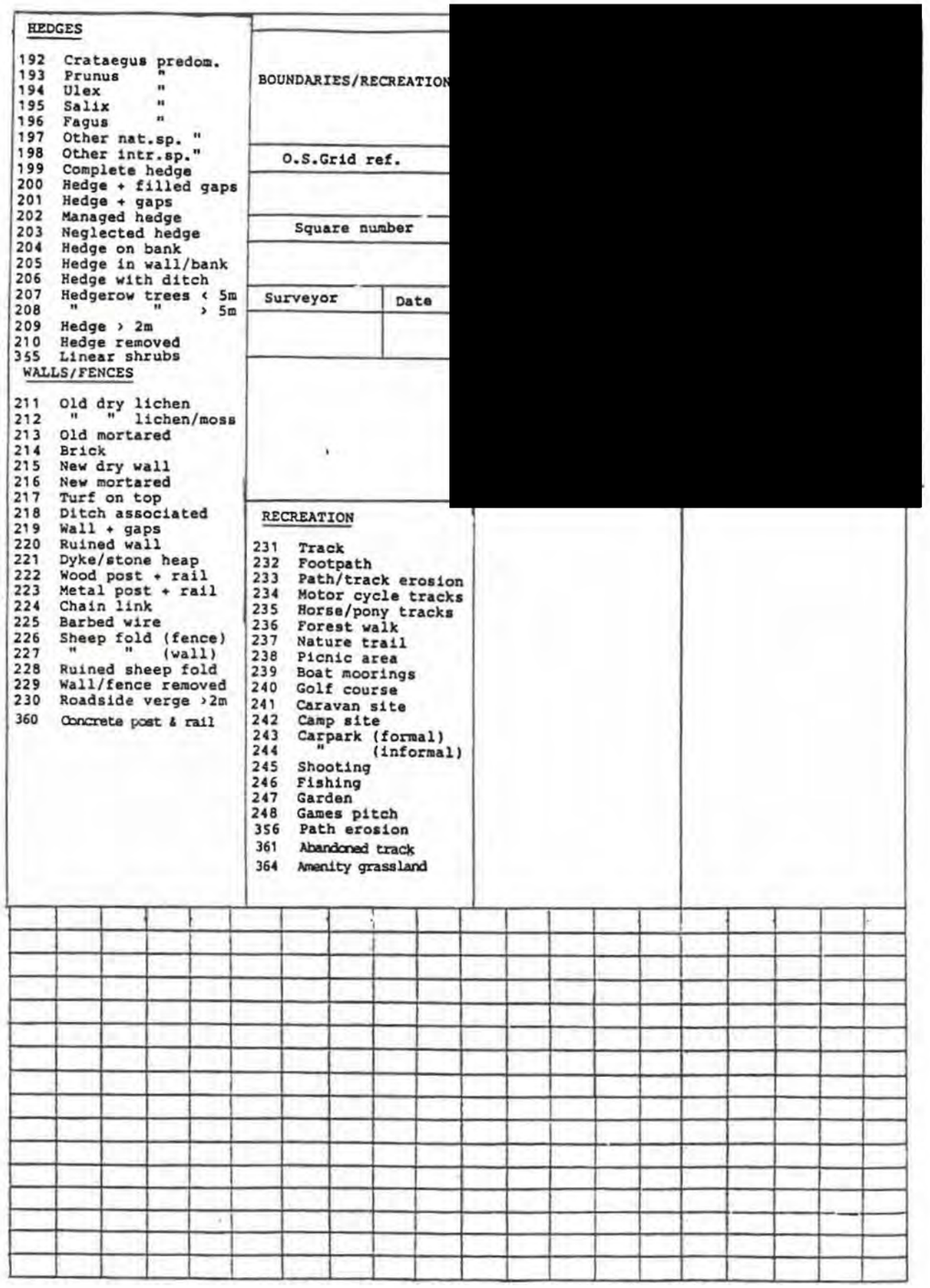
INLAND OPEN HABITATS

173 Limestone pavement
174 Embankment/cutting
175 Burnt vegetation
176 Ruderal/epham.veg.
177 Scree vegetation
178 Ldge/crev.cliff veg.

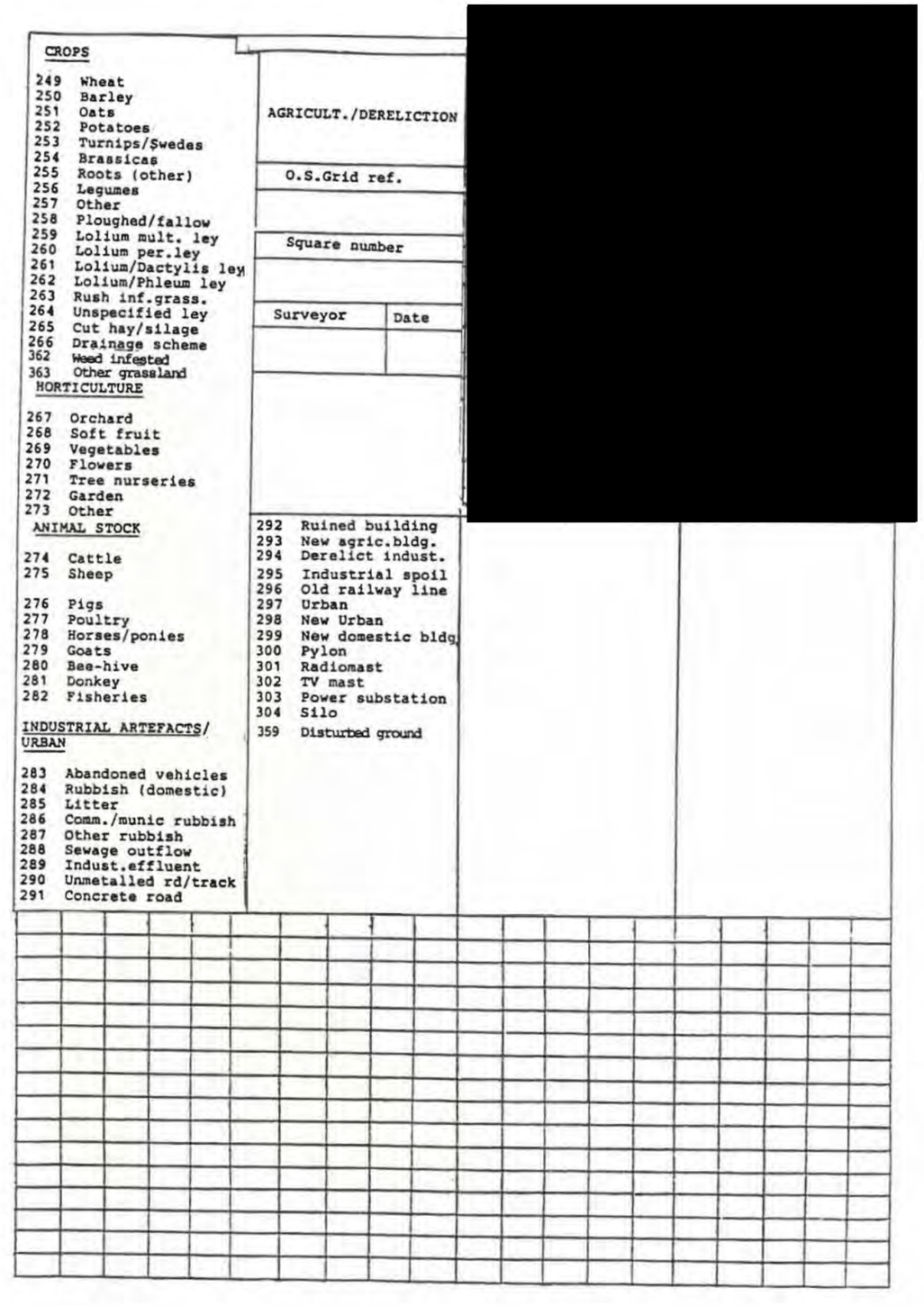
WILDLIFE

179 Badger
180 Fox
181 Anthill
182 Red deer
183 Other deer
184 Rabbit
185 Hare
186 Game bird
187 Rookery
188 Herbivorous bird
189 Omnivorous bird
190 Small mammal
191 Carcase/bones

This map has been removed to preserve the confidentiality of the sample square locations.



This map has been removed to preserve the confidentiality of the sample square locations.



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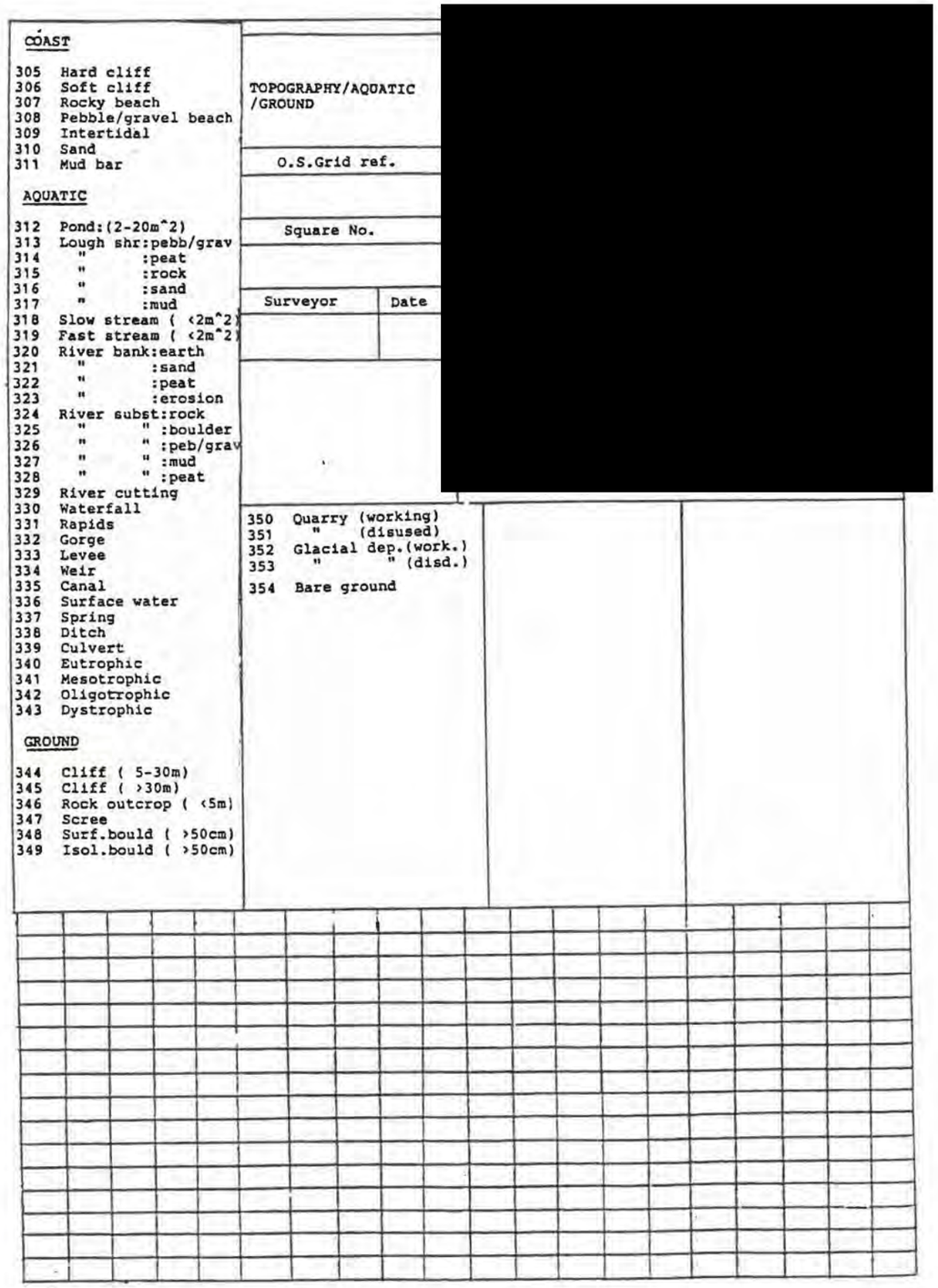

Appendix 3

LANDSCAPE ECOLOGY PROJECT FIELD HANDBOOK

INTRODUCTION

This handbook is a guide to recording information on the distribution of plant communities, wildlife habitats and landscape elements in the Mourne AONB. It explains the terms used in the field data recording sheets so as to standardise the field assessment of habitat information. Hard and fast rules, however, cannot be made for all eventualities. Record significant divergences from the basic methodology so that future field guides can be modified.

LOCATING THE 0.25Km SQUARE

Precise location of the boundaries to the square is important. Data from neighbouring squares should not be recorded. Conversely, it is important that the square is covered adequately and that the whole square is fully recorded. Locating a boundary is generally more difficult in upland regions, so more time should be left for this purpose.

TRAVELLING WITHIN THE SQUARE

Do not assume that a part of the square which cannot be seen will be much the same as parts already visited. You should not hope that "it'll be much the same on the other side of the hill". Using roads and footpaths as vantage points however is an integral part of the technique. Dangerous sites such as cliffs should be avoided. On the 1:10,000 maps, 1mm = 12 paces approximately. Make adjustments if you are very large, very small, tired or going up a steep hill.

PERMISSION OF ACCESS

Permission to enter private land should be obtained if possible. This usually means contacting the nearest working farm. Always carry identification which links you to the University. Please follow up all requests for information when landowners ask and mention at an early stage that growing crops and fences will not be damaged.

RECORDING

The principle of DOMINANCE should be followed when recording; that is minor elements may be disregarded to obtain an overall view. Recording should be CLEAR, LEGIBLE, DECISIVE and COMPREHENSIBLE so that the analysis of the data can be carried out by someone other than the original recorder. If you are uncertain about what to record, report this on the field sheet. All decisions about what to record should be made in the field and not left until 'later'. This imparts a false sense of objectivity.

Always use an H.B. propelling pencil with a 0.5mm lead. This does not smudge in wet weather. Draw a line through errors. A rubbed-out line is often difficult to distinguish from a faintly recorded one. Observe the following details when recording in the field:

1. If a feature on the checklist is present in the square, draw a circle round the relevant code number.

2. Show the location of each code by writing it on the map.

3. Some features require several codes, in which case neatness and clarity are essential. Use the boxes at the bottom of each page to record areas which need more than one code e.g. woodland and hedges. Define and mark these areas on the map with a letter. Further divisions can be made with a slash in the same box e.g. 91/101 indicates <25% oak. The letter and appropriate codes should be marked sequentially. Remember that the codes are simply a shorthand method of recording and that everything you write should make sense.

Record any feature which cannot be measured from the map, in the comments section. Additional information must be simply recorded but should not replace or duplicate information on the map. Create code numbers for attributes not on the checklist and keep a note of additions.

NOTES ON THE HABITAT CHECKLIST

Species dominance is usually taken to refer to areas greater than 10m x 10m. Areas less than this should not be recorded except as mosaics. The percentage cover of communities in a mosaic should be assessed when recording.

WOODLAND

Type

1. Broadleaved: <10% conifers.

2. Conifers: <10% broadleaved.

3. Mixed: 10-90% broadleaved or conifer.

4. Plantation: monoculture with uniform age-structure and species; usually conifers but also deciduous.

5. Seminatural: various native trees predominant (90%) usually reflecting natural variation in site and soil; with mixed age-classes; not originating from planting (includes ancient and recent stands).

6. Amenity: public access; non-native trees often predominant; with mixed age-classes or single dominant stands;often multiple use.

7. Gillside: narrow strip of woodland on either or both sides of a stream or river.

8. Shelterbelt: obviously planted; with angular/straight lines.

10. Parkland: scattered individual trees mainly >10m apart; with grazing or recreation under.

11. Linear trees: record only when not associated with hedges; trees in hedges are recorded as part of the hedge structure.

13. Farmyard trees: groups of mature trees associated with farm buildings.

15. Scattered trees: regenerating immature trees in abandoned land; crowns not contributing >25% of ground surface.

Structure

17. Closed canopy: woodland where there are no gaps between the branches of different trees.

18. Open canopy: branches of trees do not overlap, but not parkland.

19. Shrub layer: small trees (<3m) or shrubs beneath a tree canopy; more than just the odd bush; a distinct layer.

20. Dense undergrowth: free passage impeded.

21. Mature: canopy trees usually >10m and >50cm. d.b.h.

22. Pole-stage: most trees <10cm d.b.h.

24-27. Height: record average height of tree canopy.

Habitats

28. Dead trees: not saplings, but trees >5cm d.b.h.

31. Rotten log: >5cm diameter.

36. Coppice: multistemmed trees.

38. Wet drain: drainage ditch with standing water.

40. Glade: open area within wood (>5m).

41. Ride: unmetalled road or extraction route through a plantation.

Management

53. Thinning: single trees removed at intervals.

54. Brashing: lower branches removed.

57. Felling: within the last year; note the extent.

62. Grazed: cropped ground flora with hoofprints evident.

63. Not enclosed: free access to grazing animals.

Regeneration

Individuals <1m high, not seedlings.

Species composition

Record the dominants in any one area of the wood.

Abundance

Record for dominants only.

Environment and soils

Use the indicator potential of plant species. No need to carry out soil physicochemical analysis.

SEMINATURAL VEGETATION AND WILDLIFE

Some idea of the number of animals should be given but not at the expense of other work. Some vegetation mosaics will not be listed on the data sheet. Communities can be recorded as linear features e.g. when they occur in ditches.

Inland grassland

111. Hill pasture: well-drained Festuca/Agrostis grassland

112. Poor hill pasture: ditto but usually also with Nardus, Danthonia and Galium saxatile

113. Bracken: Pteridium-dominated permanent grassland; including land being invaded.

114. Permanent pasture: relatively species-rich well-moderately drained permanent grassland with Cynosurus cristatus conspicuous.

115. Wet permanent pasture (Juncus): poorly drained permanent grassland on peaty or gleyed soils with Juncus spp. abundant; do not include rush infested reseeded pasture.

116. Wet permanent pasture (Filipendula): ditto with Filipendula abundant.

117. Wet permanent pasture (Calt./Sen aquat.): ditto with Caltha or Senecio aquat. abundant.

118. Calcareous pasture: well-drained species-rich permanent pasture over limestone or chalk rock/drift with calcicole species conspicuous.

119. Relict potatoe ridges: ridge and furrow undulations at a scale of about 2m.

120. Neglected grassland: ungrazed, rank vegetation in unmanaged fields.

121. Unimproved: not treated with fertilizers or herbicides, not drained or reseeded; use this to distinguish permanent but reseeded pasture i.e. with rye-grass.

Heath and bog

122 Base-enriched peat: waterlogged peat, flushed with base-rich drainage water, >1m deep.

123. Sphagnum carpets: <5% vascular plants.

124. Wet heath (mixed): acidic peat; no single species dominant.

125. Wet heath (Juncus): ditto with Juncus squar. predominant.

126. Wet heath (Trich/Call): ditto with Trichophorum caes. and Calluna predominant.

127. Wet heath (Call/Erioph): ditto with Calluna and Eriophorum angust. predominant.

128. Wet heath (Call/Vaccin): ditto with Calluna vulg. and Vaccinium myrt. predominant.

129. Wet heath (Molinia): ditto with Molinia predominant.

130. Wet heath (Erioph. vag.): ditto with Eriophorum vaginatum predominant.

132. Raised bog (Sphagnum): waterlogged acidic peat generally <200m elevation with Sphagnum spp. abundant.

133. Raised bog (Calluna): better drained acidic peat generally <200m elevation with Calluna predominant.

134. Cut-over bog (Myrica): raised bog, cut-over; with Myrica.

135. Dry heath (Erica): well-drained mineral or shallow peat soil with Erica cinerea predominant.

136. Dry heath (Calluna): well-drained mineral soil, shallow peat or peaty podzols with Calluna vulgaris predominant.

137. Dry heath (Ulex): ditto with Ulex.

140. Mountain peat: high elevation blanket bog usually with Vaccinium/Empetrum.

141. Wind-shorn mt. heath: dwarf, dry heath usually with Rhacomitrium and Arctostaphylos.

142. Peaty flush: usually some base enrichment and Juncus spp.

144. Peat working (industrial): include sub-turf, horizontal peat coring.

Freshwater and marsh

150 Reedbeds: vegetation of waterlogged soils, generally >50cm. tall with various species almost monodominant.

151. Marsh/fen: species-rich vegetation of waterlogged, nutrient-rich soils (often peaty); generally <50cm tall and with species other than sedges predominant.

151. Acidic sedge marsh: marsh on acidic peat; generally <50cm tall and with sedges predominant.

153. Sedge marsh: marsh on nutrient-rich peat; generally <50cm tall and with sedges predominant.

154. Calcareous/basic flush: vegetation associated with springs.

155. Inundation communities: open unstable communities subject to periodic inundation around river banks, lakes, islands and reservoirs.

Coastal habitats

158 Sea cliff grassland: with halophyte species such as Armeria and Plantago maritima.

160. Coastal strand: ruderal vegetation of the upper shore.

161. Open saltmarsh: stabilised mud/silt with Salicornia predominant.

162. Closed saltmarsh: species-rich turf often with single species dominance on silt or mud.

163. Spartina marsh: saltmarsh in which Spartina has become established.

167. Young dunes: mounds or ridges of sand above high tide, dominated by Ammophila.

168. Old dunes: species-rich dunes on humus-poor soils with Tortula.

169. Old organic dunes: species-rich old dunes with organic soils.

170. Dune slack (herbaceous): wet hollows behind dunes, with herbaceous marsh and dune species.

171. Dune slack (Salix): dune slack with Salix.

Wildlife

Look for signs mainly; do not search for particular species.

AGRICULTURE/DERELICTION

Crops

Ley: short term grassland reseeded <5yr. previously; evidence of ploughing, bare soil; scarcity of broad leaved plants; usually dominated by a single species.

259. Lolium multiflorum ley: Lolium multiflorum predominant.

260. Lolium perenne ley: Lolium perenne predominant.

261. Lolium/Dactylis ley: Lolium and Dactylis predominant.

262. Lolium/Phleum ley: Lolium and Phleum predominant.

263. Rush infested reseeded grassland: Lolium and sown species predominant.

272. Garden: Large public gardens, not those associated with urban/rural housing.

Animal Stock

274. Cattle: include if cow pats present.

275. Sheep: include if wool present. Count approx. numbers of animals.

Industrial/recreation artifacts

284. Rubbish (domestic): piles of litter.

287. Other rubbish: e.g.tyre, prams, concrete, farm refuse (stipulate).

BOUNDARIES/RECREATION

Make no attempt to describe the complex boundaries associated with urban development or farm buildings except where a relatively few uniform boundaries exist, linking adjoining farmland.

Hedges

Use compound categories of boundary where necessary and mark these as letters on the map. Lengths can be measured at a later date.

201. Hedge with gaps: up to 10%, otherwise lines of shrubs.

203. Neglected hedge: no signs of management in about 15 yrs; shrubs usually leggy and tall.

204. Hedge on bank: even if discontinuous it still counts; includes stony bank; this code can be used for a bank with no shrubs if, for example the hedge has been damaged, note this as a comment.

207. Hedgerow trees <5m: mainly emergent saplings.

208. Hedgerow trees >5m: usually mature trees.

355. Linear shrubs: e.g.hedge with >10% gaps.

211. Old dry lichen: >10yrs with some lichen.

212. Old dry lichen/moss: >5% cover.

215. New dry wall: even if cement has been used to supplement bad work.

219. Wall with gaps: >5% and at least 2 gaps.

221. Dyke/stone heap: in a line or in a heap, mainly from agricultural clearance.

222. Wood post plus rail: either barbed or ordinary wire.

223. Metal post plus rail: ditto.

225. Barbed wire: only bits and pieces used to block up gaps.

Code certain boundaries e.g. wall + fence as compound attributes i.e. 211/222 and e.g. stone wall + gorse would be recorded as 211/194. Describe the position of the fence in relation to the boundary.

Recreation

231. Track: hardcore footpath.

232. Footpath: not metalled.

236. Forest walk: usually signposted.

245. Shooting: e.g. indicated by empty cartridges.

246. Fishing: e.g. notices and artifacts.

297-999. Make no attempt to describe details other than their location.

TOPOGRAPHY

Aquatic

331. Rapids: exposed turbulence.

332. Gorge: precipitous, rocky streamside.

333. Levee: man made bank against flooding.

335. Canal: include canalised river.

343. Dystrophic: stained dark with organic matter.

Ground

348. Surface boulders: more or less continuous cover.

CONCLUSIONS

When you have finished a square, check that everything has been recorded. Photograph a typical view with a 35m slide film and record the direction of the field of view on a base map. Sort out minor problems such as species identification in the evening. Preparation for the following day's work should also be made the previous evening. Before leaving for the day's work, make sure that someone knows the squares you will be visiting.

Appendix 4

Plant species names given in the text

Alder	Alnus glutinosa
Ash	Fraxinus excelsior
Aspen	Populus tremula
Beech	Fagus sylvatica
Bell-heather	Erica cinerea
Bent/Brown bent	Agrostis capillaris
Bilberry	Vaccinium myrtillus
Birch	Betula pubescens
Blackthorn	Prunus spinosa
Bluebell	Hyacinthoides non-scriptus
Bog-moss	Sphagnum spp.
Bog myrtle	Myrica gale
Bog-rush	Schoenus nigricans
Bracken	Pteridium aquilinum
Broom	Cytisus scoparius
Bur-reed	Sparganium erectum
Corsican pine	Pinus nigra
Cotton-grass	Eriophorum angustifolium/E. vaginatum
Crab apple	Malus sylvestris
Creeping bent	Agrostis stolonifera
Crested dogstail	Cynosurus cristatus
Cypress	Chamaecyparis spp.
Deer-grass	Scirpus caespitosus
Elder	Sambucus nigra
Elm	Ulmus spp.
Eucalypt	Eucalyptus sp.
Fescue	Festuca spp.
Fuchsia	Fuchsia magellanica
Gean	Prunus avium
Gorse/European gorse	Ulex europaeus
Gorse/Dwarf gorse	Ulex gallii
Hawthorn	Crataegus monogyna
Hazel	Corylus avellana
Holly	Ilex aquifolium
Horse chestnut	Aesculus hippocastanum
Italian rye-grass	Lolium multiflorum
Larch	Larix decidua
Lime	Tilia spp.
Ling-heather	Calluna vulgaris
Lodgepole pine	Pinus contorta
Mat-grass	Nardus stricta
Monkey puzzle tree	Araucaria araucana
Norway spruce	Picea abies
Oak	Quercus spp.
Oyster-plant	Mertensia maritima
Perennial rye-grass	Lolium perenne
Privet	Ligustrum vulgare
Purple moor-grass	Molinia caerulea
Reed-grass	Glyceria spp.
Rhododendron	Rhododendron ponticum
Rough-stalked meadow-grass	Poa trivialis
Rowan	Sorbus aucuparia
Scots pine	Pinus sylvestris
Sea radish	Raphanus raphanistrum
Sedges	Carex spp.
Sita spruce	Picea sitchensis

Sharp-flowered rush/jointed rush	Juncus acutiflorus/articulatus
Soft-flowered rush	Juncus effusus
Sweet chestnut	Castanea sativa
Sweet vernal-grass	Anthoxanthum odoratum
Sycamore	Acer pseudoplatanus
Timothy	Phleum pratense
White clover	Trifolium repens
Willow	Salix spp.
Wood vetch	Vicia sylvatica
Yellow flag	Iris pseudacorus
Yew	Taxus baccata
Yorkshire fog	Holcus lanatus

Appendix 5.
Descriptions of land use categories and field boundary types

WOODLAND

1. Seminatural broadleaf woodland/scrub (field parcels): Woodland not associated with rivers (and excluding fen carr), which has not been planted and where native species predominate (90%). Conifers may comprise <10% of trees.

2. Seminatural broafleaf woodland/scrub (riverside): Woodland associated with rivers or bodies of water (excluding fen carr). Native species predominate (90%). Conifers may comprise <10% of trees.

3. Fen carr: Either alder, willow or both species present and associated with fen vegetation.

4. Coniferous plantation: Planted stands with uniform age-structure of primarily conifer species. Sites include those recently clear-felled, new plantings and mature plantations.

5. Broadleaf plantation and demesne woodland: Planted stands with <10% conifers associated with the grounds of large buildings, amenity areas and demesnes.

6. Trees associated with farm buildings: Groups of mature or semi-mature trees not in hedges or walls; associated with either farmhouses or farmyards. The area of trees is calculated so as to include buildings and land to which the resource relates.

7. Isolated and groups of scattered trees: Trees occurring singly scattered trees not associated with woodland.

8. Lines of trees: Lines not associated with hedges. Shelterbelts are included in the category.

SEMINATURAL VEGETATION

1. Maritime vegetation: Occurring solely in land class 1 and comprising saltmarsh, sand-dune, shingle ridge, strandline and maritime cliff vegetation.

2. Species-rich dry grassland: Unimproved grassland, moderately drained and where ryegrass species are absent. Crested dogstail and forbs are usually conspicious.

3. Species-rich wet grassland: Unimproved grassland, poorly drained usually containing rushes.

4. Fen: Species-rich vegetation of waterlogged nutrient-rich soils excluding fen carr. Indicator species include the reed-grasses, yellow flag and bur-reed.

5. Bent/fescue hill pasture: Well-drained grassland where bent and fescue are dominant, sometimes with Yorkshire fog and sweet vernal-grass frequent.

6. Mat-grass hill pasture: Grassland where mat-grass is dominant.

7. Bracken: Areas where bracken is dominant or invading grassland.

8. Gorse heath: Forming single species stands or co-dominant with grassland. Dwarf gorse, European gorse or both may be present. Gorse also occurs in a mosaic with bracken.

9. Ericaceous heath: Either ling, bell-heather and bilberry or a combination dominant. Sites are generally well-drained.

10. Wet heath: Less well-drained sites of mainly ericaceous species but some gorse. The heath occurs in combination with purple moor-grass, bog myrtle, deer-grass, bog-mosses and cotton-grass.

11. Bog/peaty flush: Waterlogged acid peat. Indicator species include sharp-flowered rush, cotton-grass, sedges and bog-mosses.

2. AGRICULTURAL LAND:

1. Grassland - Italian/perennial ryegrass: Relatively recently sown grassland sometimes with timothy and white clover.

2. Grassland - perennial ryegrass: Grassland in which perennial ryegrass is dominant. Timothy and white clover occur in the more productive swards and crested dogstail and bent in the least productive.

3. Grassland - mixed species: Grassland containing various forbs and grass species including perennial ryegrass but usually with a high frequency of crested dogstail.

4. Arable land: Mainly barley and potatoes with some wheat, oats, brassicas and turnips.

5. Fallow land: Land with no grass or crop at the time of field survey. It includes bare ground being reclaimed.

FIELD BOUNDARIES:

1. Boundary removed: Boundaries shown as present on 1:10,000 O.S. maps but absent at the time of survey.

2. Hedge: A linear boundary comprising shrubs.

3. Hedgebank: A hedge associated with either an earth or a walled bank.

4. Hedgerow: A hedge not associated with a bank.

5. Complete hedge: A hedge with no gaps and generally stockproof.

6. Hedge with gaps: A hedge with gaps forming <10% of its length.

7. Scattered shrubs: A hedge with gaps forming >10%. This category includes deteriorated hedgebanks and hedgerows with few shrubs. It is generally not stockproof.

8. Managed hedge: a hedge with signs of recent cutting or trimming.

9. Dry stone wall: A stone wall constructed without mortar.

10. Mortar wall: A stone or brick wall constructed using mortar.

11. Maintained dry stone wall: A wall with less than 2 gaps or gaps forming <5% of its length.

12. Neglected dry stone wall: A wall with more than 2 gaps or gaps forming >5% of its length. This category includes mainly derelict walls with no agricultural function.

13. Post and rail; Wood, metal or concrete posts with barbed or ordinary wire. Post and rail occurs on its own or in association with other boundary types.

14. Hedge Species: Only dominant species recorded.

15. Hedge trees: Only emergent species recorded; <5m or >5m.

Appendix 6

Field data sheets and map archives are held at the Department of Environmental Studies, University of Ulster and the Countryside and Wildlife Branch at the Department of the Environment for Northern Ireland.