INSTITUTE OF TERRESTRIAL ECOLOGY
(NATURAL ENVIRONMENT RESEARCH COUNCIL)

NCC/NERC CONTRACT F3/03/80
ITE PROJECT 466

Fourth Interim Report to Nature Conservancy Council

BIOLOGICAL SURVEY OF BRITISH RAIL PROPERTY

CAROLINE SARGENT & J O MOUNTFORD

Monks Wood Experimental Station
Abbots Ripton
Huntingdon
Cambs

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SUMMARY

The background of the work is briefly reviewed and the current year introduced (Section 1).

The survey has been stratified. In the absence of suitable alternatives, a polythetic classification of BR land was based on geographic attributes. The resulting classes provided strata which were used to sample London Midland Region and on which analysis for all Regions will be based. Some preliminary comparisons using information from Southern and Western Regions, shows that correlations exist between track and vegetation classes.

During the field season, 192 sites in the London Midland Region were visited. Files were opened for 44 of these which were considered to be of particular biological interest. Bryophyte and soil invertebrate investigations were begun during 1979, and these investigations are discussed together with the records for vascular plants and other animals. Classification and analysis of London Midland Region vegetation data will be done during 1981, in conjunction with information from all other Regions.

The work is briefly assessed, and areas where further attention is required are considered.

C O N T E N T S

1 INTRODUCTION

April 1979 to March 1980 has been the fourth year of a five and a half year contract between the NCC and ITE, aimed at describing the structure and distribution of ecosystems occurring on British Rail land. The work was initiated because recent radical changes in railway verge management and track usage have almost certainly involved profound alterations in vegetation structure and composition, and, consequently, in the kinds of habitat provided. It is recognised that semi-natural, ungrazed and now only sporadically managed railway verges provide a useful refuge and migration corridor for both plant and animal species; but there is little documentation for the kinds, numbers and distribution of species involved, and even less information about the effects of change.

1.1 The scope of the survey

A detailed discussion of why and how the railway survey was begun is given in the First Interim Report (Way & Sheail 1977), where a general description of changing permanent way management practices will also be found.

After an exploratory field season (1976), the survey was designed to allow a single year to examine each of the five British Rail Regions, with the exception that Southern and Western Regions, with lower track mileages, be combined. During 1977, Eastern Region was surveyed (Way, Sheail & Mountford 1978), whilst 1978 was spent looking at Southern and Western Regions (Sargent & Mountford 1979), and the field work described in this report was carried out on the London Midland Region in 1979. It is planned to survey Scottish Region during 1980, and to combine and analyse information from all Regions prior to preparing the final report during 1981.

1.2 The current year

Much of the desk work during the current year was concerned with the design, introduction and testing of a stratification system. The results are discussed in Section 2.

Section 3 describes the survey of London Midland Region, whilst some general conclusions are drawn and areas for future attention outlined in Section 4.

2 BRITISH RAIL STRATIFICATION

2.1 Introduction

In order to increase the precision of estimates derived from samples, it was decided to stratify the random sampling of British Rail land. Introduction of a stratified sampling system had initially been discarded because suitable and practicable divisions were not readily available. Ideally, a stratification of British Rail land should reflect local disturbance, drainage, and pH patterns. These are the factors most closely linked with vegetation structure and distribution (Sargent & Mountford 1979), but information at the required scale to make this practicable does not exist. Amongst the alternatives considered was the division of the system into component engineering structures, ie cuttings, embankments and flats. This possible stratification proved unsatisfactory because of the relative size (smallness) and heterogeneity of many of the features. Aspect of the verges might also have been used, although most cuttings and embankments have paired opposing slopes within their structure, and show an orientation of $\simeq 180^{o}$ between formations, making the system too complex to provide practicable strata.

Other ideas discussed were discarded for comparable reasons of accuracy, scale, relevance and practicability. Adjacent land use is sometimes, but not always, influential, whilst varying track usage may elicit varying kinds of management; trees are likely to be cleared more rigorously where overhead electrification occurs. Because of the engineered origin of the verges, mapped soil, drift and geological characteristics are often too locally inconsistent to be of use, whilst climate and topography provide valuable strata only at a broad regional level. Although individually unsuitable, it was considered that a combination of such characters might define relevant and homogeneous strata.

Following Bunce, Morrel and Stel (1975), it was decided to make a polythetic classification of selected climatic, edaphic and influential characteristics. Derived classed would be used as strata and would enable a stratified distribution of future random samples. Already completed sampling would be ascribed to the stratification post-hoc.

2.2 Methods

The original method (Bunce, Morrel & Stel 1975) was designed to produce a national land classification based on a grid of 10 km sqaures. It was necessary to modify this procedure to accommodate the linear environment and other particular characteristics of British Rail. An outline of the derived method was given in the previous interim report (Sargent & Mountford 1979) and will be mentioned only briefly here (2.2.2). The classification attributes used, however, were not as originally proposed, and are therefore described in more detail.

2.2.1 Attributes

The selection of attributes involved considerable discussion and only those characters thought likely to have a recognisable effect on vegetation (and hence habitat) were chosen:

a. Track Type

The type of track influences vegetation as management and other forms of disturbance vary with railway usage. The following attributes were drawn from regional maps made available by British Rail.

1. Single
2. Multiple
3. Narrow gauge
4. Electrified

b. Topography

Height above sea level was considered a useful character. The information was drawn from The Atlas of Britain and Northern Ireland (Oxford University Press 1963), and was weighted towards lower altitudes where the majority of railway lines occur.

6. <25' above sea level
7. <100' above sea level
8. <200' above sea level
9. <400' above sea level
10. =>400' above sea level

c. Adjacent land use

The environment through which the railway passes is likely to have some considerable influence and the following attributes, drawn from the 1:25 000 Ordnance Survey map, were recorded where they abutted on to railway land.

5. Water (river, lake, etc)
11. Coniferous woodland
12. Deciduous woodland
13. Scrub, brushwood
14. Rough pasture, heath
15. Marsh
16. Salt marsh
17. Dune
18. Orchard
19. Ornamental/parkland

d. Climatic variables

Dr. R.G.H. Bunce (ITE Merlewood) kindly provided mapped information about the climatic variables found most sensitive in the Land Classification scheme. The attributes fall into the following three groups.

Mean daily temperature ^{o}C January 1941-1970:

20. <5.5
21. <6.0

22. <6.5
23. <7.0
24. <7.5
25. <8.0
26. <9.0
27. >=9.0

Mean number of days snow lying 1941-1970:

28. <10
29. <20
30. <30
31. <40
32. >=40

Average daily duration bright sunshine hours July 1941-1970:

33. <4.0
34. <4.5
35. <5.0
36. <5.3
37. <6.0
38. >=6.0

e. Soil types

Dr. Avery of the Soil Survey of England and Wales, Rothamsted, provided valuable assistance by helping produce a simplified list of soil types. An outline of active British Rail lines was traced on to the soil map of England and Wales, and unit soil attributes read directly. It proved more difficult to assess railway lines in Scotland as information available for that country is not of comparable quality and it was necessary to make certain generalisations. The soil types recognized were:

40.	Raw sands (dune sands)	(1)
41.	Alluvial, humic-alluvial and associated alluvial brown soils (with high or controlled water table)	(2-8)
42.	Earthy (lowland) peat soils	(9)
43.	Well drained calcareous soils (rendzinas & brown calcareous earths)	(10-11, 14-17, 38-39, 40)
44.	Calcareous soils, mainly clays, with impeded drainage (calcareous pelosols)	(45-46)
45.	Non-calcareous (at surface), non-peaty gley soils with impeded drainage (stagnogley soils)	(51-59, 68-69)
46.	Non-alluvial gley soils (sandy or loamy) with high or controlled water table (sandy, argillic and cambic gley soils)	(47-50)
47.	Non-calcareous (at surface) brown soils, mainly sandy or coarse loamy (brown sands and some brown earths)	(12, 13, 20, 25, 26)
48.	Non-calcareous (at surface) brown soils, mainly loamy or clayey (brown earths, argillic and paleo-argillic brown earths) brown podzolic soils	(18-19, 21-24, 27-37, 60-64)
49.	Podzols (lowland, variable water regime)	(41-43, 65)
50.	(Upland) peaty gley soils (stagnohumic gley soils)	(70)
51.	(Upland) stagnopodzols, rankers, etc	(66, 67)
52.	Raw (upland) peat soils	(71)

f. Drift

Drift was read directly from the 1:625 000 Geological Drift maps of Great Britain. The following attributes were recorded.

74. Alluvium
75. Lowland peat
76. Blown sand
77. Brick earth
78. River and marine gravel
79. Head
80. Glacial gravel
81. Boulder clay
82. Plateau gravel
83. Clay and flints
84. Hill peat
85. Drift free

g. Solid geology

Information was drawn from the 1:625 000 solid geological map of Great Britain. The geological strata mapped were variously combined to produce the following shortened list:

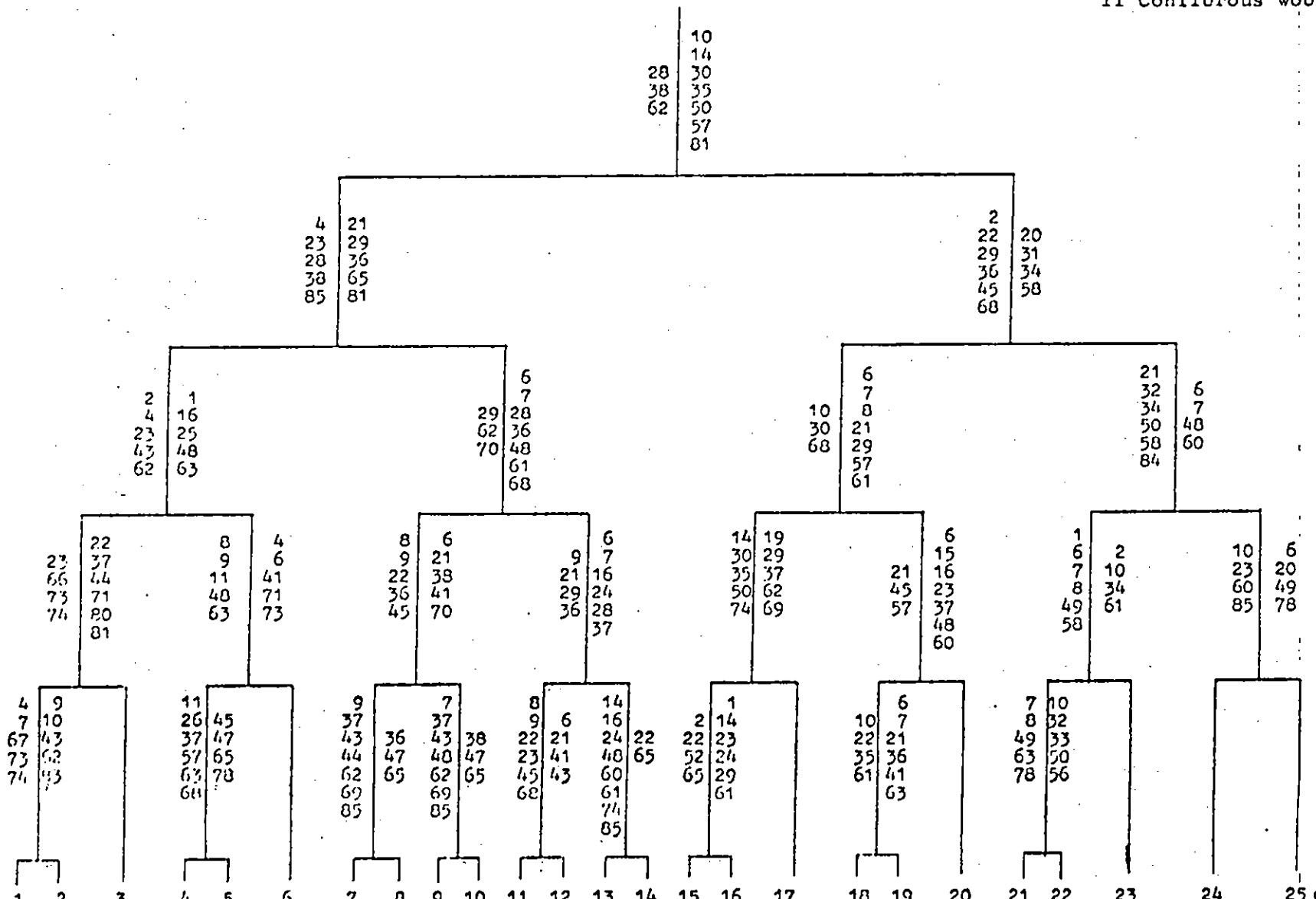
55.	Pre-Cambrian	X
56.	Igneous extrusive	T, R, A, S, B
57.	Igneous intrusive	G, F, H, D, E, Vu
58.	Metamorphic	G, B
59.	Slates (Cambrian)	a
	Limestones etc	
60.	Ordovician and Silurian	b1-b7
61.	Carboniferous and Magnesian	d2, e2, e4
62.	Oolites, chalk and cornbrash	g5-g9, h5
	Sandstones	
63.	Old Red (Devonian)	c1-c3
64.	New Red (Permian)	e3, e5
65.	Bunter, etc (Triassic)	f1-f6
66.	Greensand	h3-h4, h2
67.	Other beds (Eocene)	i1-i2, i4-i7
68.	Coal measures	d4-d6
	Clays etc	
69.	Lias	g1-g4
70.	Oxford, Kimmeridge	g10&g14
71.	London	i3
72.	Norwich	l
73.	Other (Oligocene&Pliocene)	i8-i12, k, k1, h1

2.2.2 Classification

The procedure was to divide the entire British Rail network into measured, and subsequently numbered, ten mile units. Attributes or characters were recorded for each rural unit, and the unit classified, with respect to its score, by Indicator Species Analysis (Hill, Bunce & Shaw 1975). The ISA was taken to five levels of division producing 32 classes. Classes having fewer than 15 members were subsequently amalgamated with their closest relation (provided this could be done within the fifth division) to produce groups of more comparable size for statistical and analytical purposes.

TABLE 2.1 BRITISH RAIL LAND CLASSIFICATION

Indicator species (attributes), levels of division, and class definition



1 Single track
2 Multiple track
4 Electrified
6 <25' asl
7 <100' asl
8 <200' asl
9 <400' asl
10 > = 400' asl
11 Coniferous woodland

1
2
3
4
5

14 Rough pasture, heat
15 Marsh
16 Salt marsh
20 < 5.5°C Jan.
21 <6.0°C Jan.
22 <6.5°C Jan.
23 <7.0°C Jan.
24 <7.5°C Jan.
26 <9.0°C Jan.
28 <10 days snow lie
29 <20 days snow lie
30 <30 days snow lie
31 <40 days snow lie
32 > = 40 days snow li
33 <4 hrs sun July
34 <4.5 hrs sun July
35 <5.0 hrs sun July
36 <5.5 hrs sun July
37 <6.0 hrs sun July
38 > = 6.0 hrs sun July
41 Alluvial soils
42 Lowland peat soils
43 Well drained calc.
44 Poorly drained calc.
45 Stagnogleys
48 Non-calc. brown
49 Lowland podzols
50 Upland peaty gleys
57 Igneous intrusive
58 Metamorphic
60 Ord. and Sil.
61 Carb. and Mag.
62 Chalk and oolites
63 Old red sandstone
65 Bunter
67 Other sandstones
68 Coal measures
71 London clay
73 Other clays
74 Alluvium
78 River gravel
80 Glacial gravel
81 Boulder clay
84 Hill peat
85 Drift free

The derived classes provided strata. Previous years samples were ascribed, by location, to particular strata, and the selection of sites in London Midland Region (Chapter 3) was based, proportionally, on the derived divisions.

2.3 Results

2.3.1 Track mileage

Of the 1127 ten-mile rail units recognised, 899 were considered rural (giving an approximate length of 9000 miles) and were scored for the purposes of this investigation. From previous estimates of British Rail acreage (Messenger 1968; Way & Sheail 1977), it can be calculated that land associated with rural lines (but not including the track) occupies some 146 000 acres (± 34 000), whilst urban holdings account for 37 500 acres (± 14 000).*

2.3.2 Classification

The classification derived from ISA has been mapped (Map 1, cover pocket), and the dichotomies through which it was obtained are given. Amalgamation to produce statistically compatible terminal groups led to a total of 25 stratification classes (Table 2.1, Map 1). Preferential attributes have been defined for the classes and are tabulated (Table 2.2) with respect to the first axis of Reciprocal Averaging Ordination (Hill 1973). They suggest the importance of particular climatic and geological characters in the classification and indicate relationships between geographically disparate classes.

The initial division of the ISA separated southern, midland and coastal railway lines, from those occurring in the wetter, colder upland areas of the north and west. On the negative (southern) side of the dichotomy, mesozoic and more recent rocks including chalk and oolites, together with the absence of glacial drift, were important; palaeozoic, igneous and intrusive rocks were preferential on the positive side. Soil, altitude and climatic attributes separated in an expected manner, about the basic north:south dichotomy; railway type and adjacent land use characters were not particularly relevant at this level of division.

At the next stage, the selected attributes separated lines in the Midlands and East Anglia from those covering the greater part of southern England; differentiation was also made between the high igneous and metamorphic areas of Scotland, England and Wales, and the milder more lowland parts of the north. Subsequent division continued and defined these trends, with local rather than regional, attributes playing an increasingly important role.

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* When field work is completed and measured widths available for sites in all regions, it will become possible to give a more precise estimate of acreage.

Table 2.2. Preferential Attributes.

	Attributes														
Class	62	38	43	28	37	23	81	68	14	61	10	30	57	50	35
1	*	*	*	*		*									
2	*	*	*	*		*					*				
3	*	*	*	*	*	*	*		*						
6		*		*		*									
10	*	*			*	*	*								
5	*	*	*	*					*						
7	*		*		*		*				*				
9	*		*		*		*					*			
14				*	*	*	*	*							
13				*	*	*	*		*	*					
8	*						*	*	*						
12			*		*		*	*		*			*		
4		*		*	*	*	*	*			*		*		
11				*	*		*	*	*					*	
20				*	*	*	*	*		*	*	*	*	*	*
17					*		*	*	*	*	*	*	*		
18						*	*	*	*	*	*	*			*
19							*	*	*	*		*	*		
15							*	*	*	*	*	*	*		
16						*	*		*	*	*	*		*	*
24				*	*	*	*		*		*	*	*		*
25		*		*			*		*			*	*		*
21							*		*			*	*	*	*
23							*	*	*	*	*	*	*	*	*
22							*		*		*	*	*	*	

Key to Attributes:

10	> = 400' asl	43	Well drained calc. soils
14	Heath, rough pasture	50	Upland peaty gleys
23	<7.0°C January	57	Igneous intrusive
28	<10 days snow lie	61	Carb. and Mag.
30	<30 days snow lie	62	Chalk and oolites
35	<5.0 hrs sun July	68	Coal measures
37	<6.0 hrs sun July	81	Boulder clay
38	> = 6.0 hrs sun July		

The classes are listed with respect to the first axis of Reciprocal Average ordination. The attributes are ordinated by means of an index derived from their relative representativeness at the first division of indicator species analysis.

2.3.3 Track classes

Class 1 South-Eastern Lowlands

Estimated acreage: 11 500 ± 800
Preferential attributes: Chalk, oolites and cornbrash
>= 6 hours bright sunshine, July
Well drained calcareous soils
<10 days snow lie
<7°C January

This is a compact, exclusively south-eastern class, clustered by a combination of climatic and edaphic attributes.

The majority of lines are administered by Southern Region and are electrified. They occur on recent sand and clay deposits of the Oligocene, Eocene and Cretaceous, on which neutral to mildly acid soils have developed. The climate is sunny with cool winters and minimal snowfall. Some intermediates with Class 2 occur on lower outcrops of chalk.

Class 2 Southern Chalk Uplands

Estimated acreage: 6500 ± 600
Preferential attributes: Chalk, oolites and cornbrash
>=6.0 hours bright sunshine, July
Well drained calcareous soils
<10 days snow lie
<7°C January
>=400' asl

This is mainly a central southern group, including Salisbury Plain and the high chalklands of the surrounding area.

The lines are Southern and Western Region and the majority are multiple tracked but not electrified. They occur on clay with flints or on drift free areas where well drained calcareous soils have developed. The climate is similar to Class 1.

Class 3 London Basin and South Midland Hills

Estimated acreage: 5200 ± 920
Preferential attributes: Chalk, oolites and cornbrash
>=6.0 hours bright sunshine, July
Well drained calcareous soils
<10 days snow lie
<6.0 hours bright sunshine, July
<7°C January
Boulder clay
Heath and rough pasture

For statistical reasons this class combines the original end groups 3 and 4 (Table 2.1). It is not entirely homogeneous, having some units clustered in the London clay basin and others distributed through valleys of the chalk and limestone Chilterns (Cretaceous), Cotswolds (Jurassic) and Mendips (Carboniferous). However, the units are linked by climatic attributes and all occur on calcareous soils. An extensive group of intermediates is found in the Chiltern valleys.

All four southern British Rail Regions are represented in this group, and the lines are electrified in some areas.

Class 4 South-Western

Estimated acreage: 6500 ± 600
Preferential attributes: >=6.0 hours bright sunshine July
<10 days now lie
<6.0 hours bright sunshine
<7.0°C January
Boulder clay
Coal measures
>400' asl
Igneous intrusive

This is another compact class including the majority of units in Cornwall, Devon and Dyfed.

The lines are exclusively Western Region and are not electrified. Climatic attributes are important clustering vectors, and define a reasonably sunny area with mild winters and little snow. The lines are characteristically associated with old red sandstone (which accounts for the slightly anomalous inclusion of two units lying to the north of Hereford), and, to a lesser extent, with Carboniferous coal measures and millstone grit. Igneous intrusive rocks are also indicative of this class. The majority of sites are drift free and the soil is almost always a non-calcareous brown earth of some description. Topographic variations are large and are indicative of the secondarily dissected nature of the south-western peneplain.

Class 5 Central Southern

Estimated acreage: 4500 ± 510
Preferential attributes: Chalk, oolites and cornbrash
>=6.0 hours bright sunshine July
Well drained calcareous soils
<10 days snow lie
Heath and rough pasture

This area is essentially continuous with the previous but lies further to the east and is characterised by a slightly sunnier climate with colder winters.

The lines are mainly off the old red sandstone and coal measures, and are associated instead with younger Triassic and Jurassic deposits (including Keuper marl and lower Lias). They are more consistently found on drift covered areas and are especially characteristic of river and marine gravels.

Most lines in this class are multiple and are managed by Southern, Western and Eastern Regions.

Class 6 South Coastal

Estimated acreage: 1000 ± 200
Preferential attributes: >=6.0 hours bright sunshine July
<10 days snow lie
<7.0°C January

This is another combined class in which 2 small end groups (one on Romney Marsh, monotypic) have been put together for statistical purposes.

The combination seems sensible, since all units are coastal, occur below 25' asl, and are characterised by blown sand, dunes, salt marsh and mild climates. Soils, where developed are alluvial, or, more rarely stagnogley.

Units occur in Southern, Western and Eastern Regions on a variety of track types.

Class 7 South Midlands

Estimated acreage: 11 400 ± 780
Preferential attributes: Chalk, oolites and cornbrash
Well drained calcareous siols
<6.0 hours bright sunshine July
Boulder Clay
>400' asl

This is a large class occupying a considerable area in central and eastern England, with lines administered by Eastern, Western and London Midland Regions.

Although still predominantly southern, the climate is less mild than previous groups. The topography is slightly elevated (200'-300' asl), and there is a strong geological association with chalk and Jurassic limestones. The lower Lias and Oxford and Kimmeridge clays are also well represented. The soils developed are generally calcareous but have varied structural and drainage patterns. Boulder clay is the most widespread drift, although gravels are locally important.

Class 8 Midlands

Estimated acreage: 11 400 ± 810
Preferential attributes: Chalk, oolites and cornbrash
Boulder clay
Coal measures
Heath and rough pasture

This is another large group gradually replacing Class 7 northwards, but with a rather more scattered distribution. Focal areas occur in upland East Anglia and on the Cheshire Plain, and there is an outlier to the west of Carlisle.

The climate is generally less sunny than in the previous class, and there is a distinct trend towards non-calcareous Triassic rocks (including especially Bunter sandstone and Keuper marl). However, some intermediate units with chalk are retained in East Anglia, where comparably, calcareous soils also occur. Elsewhere stagnogleys and non-calcareous blown soils are more typical.

The lines are mainly multiple and are administered by Eastern, Western and the London Midland Regions.

There is considerable reason to suspect that this class would be improved by subdivision.

Class 9 Central Eastern Lowlands

Estimated acreage: 4500 ± 510
Preferential attributes: Chalk, oolites and cornbrash
Well drained calcareous soils
Boulder clay
<6.0 hours sunshine July
<30 days snow lie

This is a compact Eastern Region class, typically occurring on the low lying chalk of Lincolnshire and Yorkshire, where drift and soils are extremely variable, and are best characterised, in the local context, by absence of peat.

Some Oxford and Kimmeridge clay occurs, and soils include rendzinas, gleys and non-calcareous brown and alluvial types. The climate is continental, sunny with cold winters, and the tracks are predominantly multiple.

Class 10 Fenland and Broadland

Estimated acreage: 5400 ± 540
Preferential attributes: Chalk, oolites and cornbrash
>=6.0 hours sunshine July
<6.0 hours sunshine July
<7.0°C January
Boulder clay

This is a very local Eastern Region class, covering the low lying fens and broadlands of East Anglia.

The solid geology is variable, including Oxford and Kimmeridge clays and corallian beds. Chalk is significant around the margins of the areas and Norwich Crag is the main rock in the eastern part. Most of the rocks are overlain with peat or, locally, with alluvium, and the characteristic soil type is earthy lowland peat, although stagnogley, non-calcareous brown and alluvial soils also occur.

The climate is continental and the land almost exclusively below 25' asl. The lines are administered by Eastern Region and are generally multiple.

Class 11 Northern Coal Measures

Estimated acreage: 8300 ± 690
Preferential attributes: <10 days snow
<6.0 hours sunshine July
Boulder clay
Coal measures
Heath and rough pasture

This is a widespread group occurring in industrial Lancashire and Yorkshire, with outliers as distantly placed as Edinburgh and Hereford.

The class is rather variable climatically, but tends towards a moderate temperature and average sunshine hours. Most of the lines are multiple, and there are representatives in all British Rail Regions except Southern.

This is largely a coal measures group, although some Bunter and Keuper deposits occur, and a few intermediates with the following class (12) are found on Carboniferous limestone. Drift characters are varied and include boulder clay, alluvium and gravels. The soils, however, are more uniform, and are generally stagnogley or non-calcareous brown soils of a loamy or clayee type.

Class 12 Northern Limestone and Sandstone

Estimated acreage: 6800 ± 620
Preferential attributes: Well drained calcareous soils
<6.0 hours bright sunshine July
Boulder clay
Coal measures
Carboniferous and Magnesian

This class has a comparable distribution with 11, but is generally off the coal measures, rather more low lying, and with a tendency toward a more extreme climate.

The class is most abundant between York and Grantham and extends northwards along the east coast of Scotland. It is more local to the west of the Pennines. The lines are largely multiple and are under the administration of the Scottish, Eastern and London Midland Regions.

This group is most commonly associated with Bunter sandstone, but also occurs frequently on Magnesian and Carboniferous limestone as well as Permian (new red) sandstone. A variety of drift is found with no clear pattern except that alluvium is most common. Soils, comparably, are often alluvial, but calcareous and non-calcareous types of varying structure have developed on the underlying strata.

Class 13 Western Coastal

Estimates acreage: 4700 ± 520
Preferential attributes: <10 days snow lie
<6.0 hours bright sunshine July
<7.0°C January
Boulder clay
Heath and rough pasture
Carboniferous and Magnesian

This is a west coast class, with the majority of units occurring close to the sea in Wales and Cumbria. Outliers, however, are found on the Stour and Exe estuaries, likely removed from their more natural affinity (Class 6, Southern Coastal) by climatic considerations. The climate of this class is oceanic, mild with warm temperatures, but not particularly sunny.

Three geological groups are fairly equally represented: Ordovician and Silurian rocks are characteristic of the Welsh group, whilst Carboniferous limestones occur along the Cumbrian coast. The majority of other rocks are Triassic. The drift pattern shows a strong association with alluvium, but boulder clay and drift free areas are also contributory. Non-calcareous brown soils are typical, but areas of alluvial and stagnogley soils also occur.

The lines are almost consistently below 25' asl, are single or multiple, and come under the administration of London Midland, Western and Eastern Regions.

Class 14 Lancashire Plain

Estimated acreage: 2400 ± 360
Preferential attributes: <10 days snow lie
<6.0 hours bright sunshine July
<7.0°C January
Boulder clay
Coal measures

A rather small group concentrated on the coastal plain from the Wirral to Fylde, but with scattered outliers.

The major geological strata are from the Triassic and include Bunter sandstone and Keuper marl. The drift is various, and about two thirds of these lowland units are characterisied by peat or blown sand. Soils include stagnogley, alluvial and non-calcareous brown types with a lowland podzol being typical of Lancashire Moss members. The climate is cool (6.0°C January) and not particularly sunny.

This class is entirely administered by London Midland Region, and is largely composed of multiple track units.

Class 15 Pennines

Estimated acreage: 8300 ± 690
Preferential attributes: Boulder clay
Coal measures
Heath and rough pasture
Carboniferous and Magnesian
>400' asl
<30 days snow lie
Igneous intrusive

This is an upland group with the majority of members occurring in the area between Settle, Uttoxeter, Leeds and Wigan.

The lines are mainly on Carboniferous strata, including the millstone grit of the Pennines and the coal measures of their foothills, however Triassic rocks are not infrequent and the Magnesian is also represented. Drift is predominantly boulder clay, and soils are characteristically upland, including raw peats, peaty gleys and stagnogleys. Some non-calcareous brown soils also occur.

The climate is cool with a fairly long snow lie and the lines are frequently found above 400' and almost invariably above 200'. Administration is by Eastern and London Midland Regions, with Scottish Region holding responsibility for a single, anomalously included, unit on the line between Glasgow and Edinburgh.

Class 16 Oceanic Carboniferous

Estimated acreage: 5900 ± 570
Preferential attributes: <7.0°C January
Boulder clay
Heath and rough pasture
Carboniferous and Magnesian
>400' asl
<30 days snow lie
Upland peaty gleys
<5 hours bright sunshine July

This group is widely dispersed and includes almost all the South Wales mining valleys, areas in the Marches and Derbyshire and parts of the Southern Uplands of Scotland.

Its members are restricted to Carboniferous rocks, generally coal measures, and are further grouped by possession of poorly drained acidic soils. Boulder clay is the most abundant drift.

The climate is wet, but sunshine hours and snow lie vary widely with altitude. There are a considerable number of single track lines in this group, and members fall into all British Rail administrative Regions except Southern.

Class 17 Midland Hills

Estimated acreage: 5500 ± 540
Preferential attributes: <6.0 hours bright sunshine July
Boulder clay
Coal measures
Heath and rough pasture
Carboniferous and Magnesian
>400' asl
<30 days snow lie
Igneous and intrusive

This class is combined, for statistical reasons, from the original end groups 19 and 20.

Although the units are dispersed they hold in common moderate elevation, and cool winters with medium snow lie and sunshine figures. They occur characteristically on Triassic rocks, although the Carboniferous, Jurassic and Magnesian are also well represented. The drift is usually boulder clay on which stagnogley or, more rarely, non-calcareous brown soils, have developed, although where drift is absent rendzinas become characteristic of the limestones.

The units, which are single and multiple tracked, are administered by London Midland, Eastern and Western Regions.

Class 18 Hilly North Coastal Carboniferous

Estimated acreage: 4500 ± 510
Preferential attributes: <7.0°C January
Boulder clay
Coal measures
Heath and rough pasture
Carboniferous and Magnesian
>400' asl
<30 days snow lie
<5 hours bright sunshine July

This is a dispersed group occurring in southern Scotland and northern England on coastal and hilly Carboniferous deposits. Units occur on limestone, coal measures and millstone grit, and are particularly associated with intrusive and extrusive igneous rocks. Boulder clay is the prevalent drift, and in most areas stagnogleys, or acid mineral soils with poor drainage have developed. The climate is cool but not extreme.

Lines, which are generally multiple, are administered by Eastern, London Midland and Scottish Regions.

Class 19 Scottish lowlands

Estimated acreage: 9100 ± 980
Preferential attributes: Boulder clay
Coal measures
Heath and rough pasture
Carboniferous and Magnesian
<30 days snow lie
Igneous intrusive

This class holds much in common with the previous (18), but generally occurs on more low lying land, and hence occupies much of the central lowlands and coastal areas of Scotland.

The most important geological strata in this group belong to the Carboniferous, but old red sandstone and Magnesian limestones are also represented. The drift is predominantly boulder clay, although areas of allivium and gravel also occur, the soils developed on these deposits are stagnogleys, non-calcareous browns and alluvials.

The lines are administered by Scottish, London Midland and Eastern Regions, and are largely multiple with some electrified units.

Class 20 North-Western Coastal

Estimated acreage: 2600 ± 380
Preferential attributes: <10 days snow lie
<6 hours bright sunshine July
7.0^{o}C January
Boulder clay
Coal measures
Carboniferous and Magnesian
>400' asl
<30 days snow
Igneous intrusive
Upland peaty gleys
<5 hours bright sunshine July

This is a combined class (end groups 23 and 24) of coastal units in Scotland, Wales and the Lake District. The units have a mild gulf stream climate, with increasing snow lie and decreasing bright sunshine northwards.

The geology is variable and includes the Silurian and Ordovician of Wales, together with Carboniferous and Triassic strata and old red sandstones. Igneous intrusions are not uncommon. Drift, where present, is alluvial, gravel or boulder clay, and this has superficially developed into stagnogley and non-calcareous brown soils.

The lines occur in Western, London Midland and Scottish Regions and include large stretches of single track.

Class 21 Highland Coastal

Estimated acreage: 4200 ± 510
Preferential attributes: Boulder clay
Heath and rough pasture
<30 days snow lie
Igneous intrusive
Upland peaty gleys
<5 hours bright sunshine July

This class is confined to the north of Scotland where it occurs in coastal and lower lying areas.

Old red sandstones, metamorphic, and igneous intrusive rocks are the important geological strata, and these are typically overlain by boulder clay, over gravels or allivium. Much of the soil is podsolised, although gleys and organic (peaty) soils are also characteristic.

The climate is generally cold with moderately long snow lie, although the figure for sunshine hours varies considerably between east and west coasts. The lines are all administered by Scottish Region, and a large proportion are single track.

Class 22 Low Highlands

Estimated acreage: 2700 ± 460
Preferential attributes: Boulder clay
Heath and rough pasture
>400' asl
<30 days snow lie
Igneous intrusive
Upland peaty gleys

This class is restricted to the Highland area where it includes most units of moderate elevation.

Metamorphic and igneous rocks are ubiquitous, and the strata are generally overlain by boulder clay or hill peat. The soil is characteristically upland peaty gley, with rankers and stagnopodzols occurring more rarely.

The climate is cool and wet, and the snow lies for 50 days in some units. The lines are single track and are administered by Scottish Region.

Class 23 Highland and Montane

Estimated acreage: 6200 ± 700
Preferential attributes: Boulder clay
Coal measures
Heath and rough pasture
Carboniferous and Magnesian
>400' asl
<30 days snow lie
Igneous intrusive
Upland peaty gleys
<5 hours bright sunshine July

This class is combined, for statistical reasons, from end groups 27 and 28, which include the highest railway lines in the North Pennines, Southern Uplands and Scottish Highlands.

Carboniferous rocks occur in the more southerly cluster, where limestone, millstone grit and coal measures are represented. Igneous rocks are typical of the Southern Upland group, where Silurian and Ordovicion strata also occur. The Highland area rocks are almost exclusively igneous and metamorphic. Boulder clay and hill peat are the predominant drifts, with the latter being more characteristic of Highland lines.

Acid brown and organic soils, gleys, podzols and raw peat are all characteristic of these cold, wet upland areas.

There are single, multiple and electrified tracks in this class which has areas administered by all three northern Regions of British Rail.

Class 24 Welsh and South-Western Uplands

Estimated acreage: 2900 ± 440
Preferential attributes: <10 days snow lie
<6 hours bright sunshine July
>7.0°C January
Boulder clay
Heath and rough pasture
>400' asl
<30 days snow
Igneous intrusive
<5 hours bright sunshine July

This class combines the Welsh and Cornish hill units (end groups 29 and 30) into a logical south-western upland group. The climate is mild, although the Welsh hill sites have a long winter snow lie figure.

In Cornwall, the lines occur on old red sandstone and igneous intrusive rocks, whilst, in Wales the predominant geological strata are Ordovician and Silurian. Drift, where present is mainly boulder clay, although alluvium and glacial gravel also occur, and the soils are non-calcareous browns, stagnopodzols, peats and rankers.

The lines are single and multiple and are administered by London Midland and Western Regions.

Class 25 Acidic Coastal

Estimated acreage: 2600 ± 410
Preferential attributes: >=6.0 hours bright sunshine July
<10 days snow lie
Boulder clay
Heath and rough pasture
<30 days snow lie
Igneous intrusive
<5 hours bright sunshine July

This class is an uneasy marriage of acid sites beside north-eastern forths and south-western coasts (end groups 31 and 32), having markedly differing climatic attributes. The soils, drift and topography, however are comparable.

The southern sites are on Pre-Cambrian, Ordovician and Silurian and Carboniferous rocks, whilst the northern group are clustered on old red sandstones. These acid ancient rocks are overlain by alluvium or boulder clay, on which podzols and non-calcareous brown soils have developed.

The lines are administered by Scottish and London Midland Regions and are typically single track.

Table 2.3. Sampling proportions of the post-hoc British Rail stratification.

Class	Members	Sample	% in sample
1	71	30	42
2	40	19	48
3	32	12	38
4	40	18	45
5	28	14	50
6	6	2	33
7	70	36	51
8	70	39	56
9	28	23	82
10	33	14	42
11	51	15	
12	42	16	
13	29	16	55
14	15	10	67
15	51	26	
16	36	13	
17	35	17	49
18	28	4	
19	56	10	
20	16	9	
21	26		
22	24		
23	38	9	
24	18	8	44
25	16	2	

The right hand column shows the proportion of sites sampled in each of the classification strata. Incomplete rows have class members in Scottish Region which is yet to be sampled.

2.3.4 Sampling proportions

Eastern, Southern and Western Region random samples, which were all ascribed post-hoc to stratification classes have been tabulated with the stratified London Midland Region survey to show the percentage of units sampled within each class (Table 2.3).

A minimum of 33% is found in the anomalous (<15 members after amalgamation) South Coast Class, 6. Elsewhere the figure varies between 38% and 82%, with a mean for all classes (excluding those with representatives in Scottish Region) of 50%.

These figures apply only to the random survey and do not include sites visited in either the cutting/embankment or Biological Interest surveys. When all information is combined, the mean sampling percentage will be in excess of 70%.

2.4 Comparison of vegetation and track classifications

Quadrat information from the 60 random sites visited in Southern and Western Regions during 1978 was classified using ISA. The results, with and without weighting for percentage cover, are given in the Third Interim report (Sargent & Mountford 1979). The vegetation classification derived without cover information was compared with the geographic classification of BR land (track classification) introduced to provide sampling strata. Vegetation and track classifications were arrayed according to their scores on respective first axes of RA ordination (Table 2.4). A total of 573 quadrats clasified into 14 vegetation types were distributed throughout the 14 track classes having members in Southern and Western Regions. An initial inspection of the table (2.4) suggests that there is no clear association between track and vegetation classes.

Certain kinds of vegetation occur throughout BR land irrespective of locally prevalent geographical and climatic conditions. Such vegetation is disturbed and deflected by the dominant influences and effects of BR management and usage; including periodic clearing and spraying and the dumping of ballast, cinder and nitrogenous waste. From Southern and Western Regions, for example, such vegetation falls into the following classes:

1. Disturbed, well drained *Arrhenatherum* with bramble.
5. Damp, nitrophilous *Arrhenatherum* with nettle and bramble.
7. Rank cinder and ballast vegetation.
9. Ash scrub.
10. Base poor scrub.
12. Rank open hawthorn scrub.

In Table 2.5 these classes have been removed from the array and clustering of the remaining classes emphasised by dotted lines.

Similarities exist in the distribution of track and more stable or undisturbed vegetation classes. In particular, following the method of Bunce & Smith (1978) a linear relationship may be shown to exist between the classifications. Kendalls coefficient of rank correlation gives τ = .53*, whilst a regression analysis of mean vegetation score (y) against track classes (x) (considered as constant) produces the equation y = .65 + 43.57, p = .72*. A linear equation may not be the most appropriate way of expressing the relationship between these classifications since the rank order of track and vegetation classes is by mean RA score and may not reflect a direct linearity in the environment.

Table 2.4 Southern and Western Regions track and vegetation classes arranged with respect fo first axis RA ordination scores.

TRACK

VEGETATION Class	Score	1	2	3	5	7	14	13	8	4	11	20	17	24	16	
		12	13	16	22	22	24	29	30	32	33	38	39	49	50	
2	79		2			1		2	1					1	1	8
4	77	6								3	2	1	1	1		14
1	73	43	15	3	6	10		3	6	3			3	2	2	96
3	70	7						9		25	1	3		6	5	56
8	67	9	7						2	5			1			24
7	65	9		5	2	3		5		4			2	1	5	36
6	58	9	3					1		3					1	17
5	56	8	12	1	7	5		9			1	1		7	12	63
11	46	2					1	1							1	5
10	38	17	3		5	3		2		17		10			1	58
13	37	9	7		1	1										18
14	35	1	8													9
12	31	20	14	4	4	3		13		9				4	1	72
9	27	11	16	2	25	26	5	3	1					3	5	97
		151	87	15	50	52	6	48	10	69	4	15	7	25	34	573

Table 2.5. The assemblages of vegetation found along sections of the track of the Southern and Western Regions now severely influenced by railway management (Vegetation types 1,5,7,9,10 and 12, vide Table 2.4, reflect the dominant influences of management practices; they occur equally throughout Britain).

			TRACK													
	Class		1	2	3	5	7	14	13	8	4	11	20	17	24	16	
		Score	12	13	16	22	22	24	29	30	32	33	38	39	49	50	
VEGETATION	2	79		2			1		2	1					1	1	8
	4	77	6								3	2	1	1	1		14
																	-
	3	70	7						9		25	1	3		6	5	56
	8	67	9	7						2	5			1			24
																	-
	6	58	9	3					1		3					1	17
																	-
	11	46	2					1	1							1	5
																	-
	13	37	9	7		1	1										18
	14	35	1	8													9
																	-
																	-
			43	27	-	1	2	1	13	3	36	3	4	2	8	8	151

The greater diversity of vegetation classes occurring in track classes 1 and 2 suggests that not all track classes are equally homogeneous, however analyses of variance between all track classes and all track and vegetation classes are significant.

When vegetation information from the entire BR network becomes available it seems possible that the use of track classification will be shown to provide a reasonable method of prediction for at least some vegetation types.

3 THE LONDON MIDLAND REGION

This chapter describes field work in the LMR during 1979. Certain modifications to information collection are discussed and short sections written about the groups of plants and animals investigated. LMR vegetation will be classified and analysed following the methods tested on Southern and Western Region data (Sargent & Mountford 1979) when information from all regions becomes available and can be pooled.

Maps showing the location of sites and the relation of LMR lines to geological and topographical features are given.

3.1 Information collection

Data collection in the LMR was greatly helped by cooperation of Permanent Way staff who entered into useful discussions and supplied excellent maps.

Field work began in April in the Chilterns and progressed northward during the season to culminate in Cumbria at the end of August. During this period, 120 random sites and 72 biological interest (BI) survey sites* were visited. Within the random survey, 44 sites proved to be cuttings, 31 embankments, and the remainder flats or mixed formations. Following discussion (Sargent & Mountford 1979), the cutting/embankment survey had been discontinued to free resources to increase the density of random sampling. The high proportion of cuttings and embankments visited randomly supports the decision to curtail this area of work.

3.1.1 Random site selection

Unlike previous years, the random sites in LMR were stratified. Of the 25 strata into which BR land has been divided (Chapter 2), 16 have representatives in LMR. The distribution of samples was strictly proportional to the number of track (ten mile) units in each stratum (Table 3.1) with the exception that it was decided to visit a minimum of 2 random sites stratum^{-1}.

Location of the sites followed a 2 stage random number technique in which first the 10 mile unit to be sampled, and then the site(s) (100 m) within that unit, were selected. In some cases, where the units were randomly chosen more than once, this method gave rise to more than one site being visited in a unit.

3.1.2 The vegetation key

In an attempt to relate sites visited within the BI survey to random sites, a vegetation key was introduced.

The key (Fig. 1) was derived from the ISA of combined random data from Southern, Western and Eastern Regions. The ISA was run to 5 levels and the resulting 32 classes used without modification.

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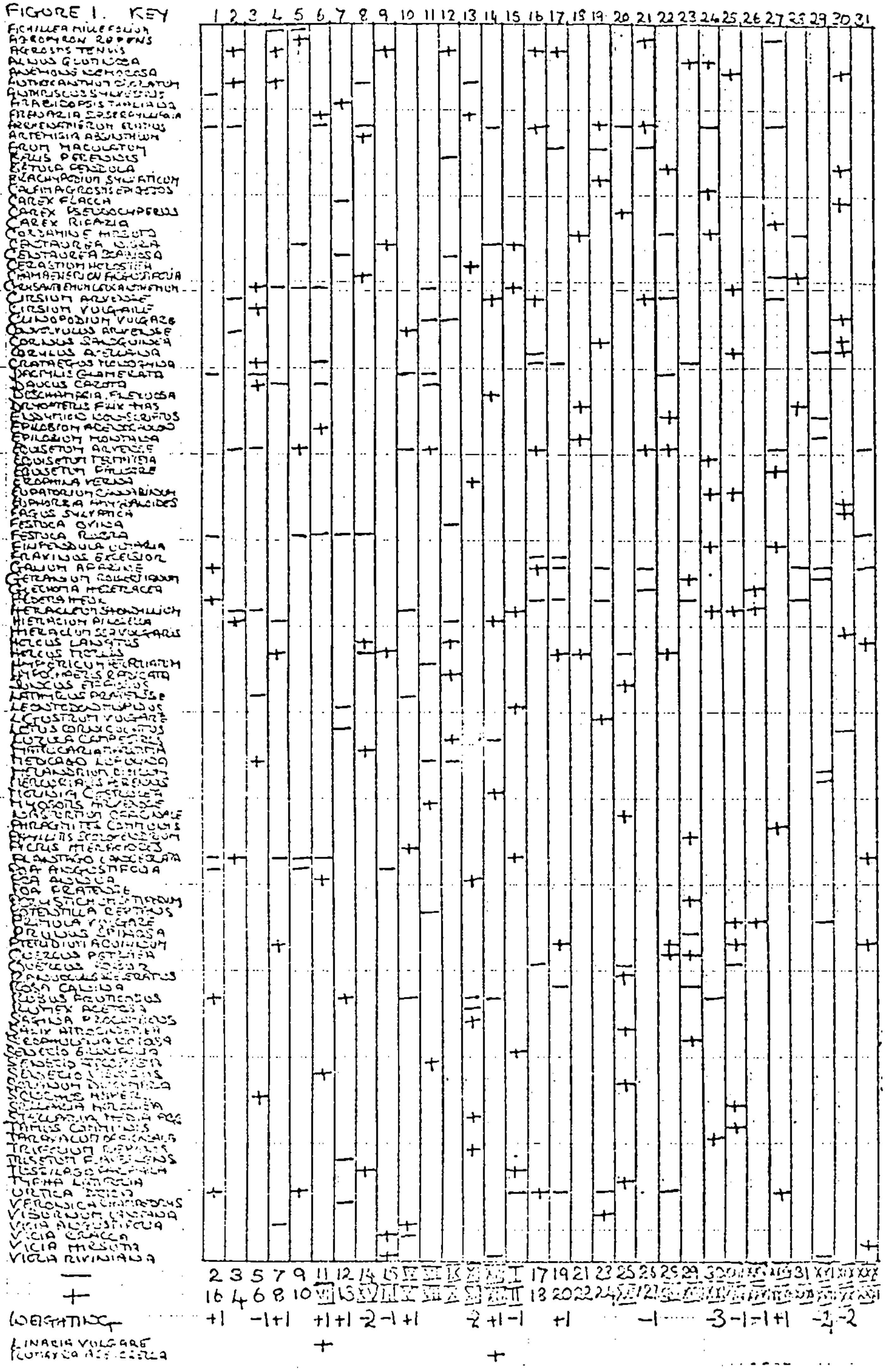
* Non-random sites which are expected to be of biological interest and which are visited because of prior information of some kind.

Table 3.1. Division of sampling effort amongst strata occurring in the London Midland Region.

Stratum Revised No.	Stratum Old No.	Track units Members	Sites Sampled
3	(3	1	2
	(4	5	3
7	9	27	14
8	10	34	17
11	13	28	12
12	4	8	4
13	15	14	7
14	16	11	6
15	17	34	16
16	18	5	3
17	(19	25	12
	(20	2	2
18	21	1	2
19	22	6	4
20	(23	5	3
	(24	3	2
23	27	10	5
24	29	7	4
25	32	2	2
16	19	229	120

FIGURE 1. KEY


ACHILLEA MILLEFOLIUM
AGROPYRON REPENS
AGROSTIS TENUIS
ALNUS GLUTINOSA
ANEMONE NEMOROSA
ANTHOXANTHUM ODORATUM
ANTHRISCUS SYLVESTRIS
ARABIDOPSIS THALIANA
ARENARIA SERPYLLIFOLIA
ARRHENATHERUM ELATIUS
ARTEMISIA ABSINTHIUM
ARUM MACULATUM
BELLIS PERENNIS
BETULA PENDULA
BRACHYPODIUM SYLVATICUM
CALAMAGROSTIS EPIGEJOS
CAREX FLACCA
CAREX PSEUDOCYPERUS
CAREX RIPARIA
CARDAMINE HIRSUTA
CENTAUREA NIGRA
CENTAUREA SCABIOSA
CERASTIUM HOLOSTEOIDES
CHAMAENERION ANGUSTIFOLIUM
CHRYSANTHEMUM LEUCANTHEMUM
CIRSIUM ARVENSE
CIRSIUM VULGARE
CLINOPODIUM VULGARE
CONVOLVULUS ARVENSIS
CORNUS SANGUINEA
CORYLUS AVELLANA
CRATAEGUS MONOGYNA
DACTYLIS GLOMERATA
DAUCUS CAROTA
DESCHAMPSIA FLEXUOSA
DRYOPTERIS FILIX-MAS
EPILOBIUM ADENOCAULON
EPILOBIUM MONTANUM
EQUISETUM ARVENSE
EQUISETUM TELMATEIA
EQUISETUM PALUSTRE
EROPHILA VERNA
EUPATORIUM CANNABINUM
EUPHORBIA AMYGDALOIDES
FAGUS SYLVATICA
FESTUCA OVINA
FESTUCA RUBRA
FILIPENDULA ULMARIA
FRAXINUS EXCELSIOR
GALIUM APARINE
GERANIUM ROBERTIANUM
GLECHOMA HEDERACEA
HEDERA HELIX
HERACLEUM SPHONDYLIUM
HIERACIUM PILOSELLA
HOLCUS LANATUS
HOLCUS MOLLIS
HYPERICUM PERFORATUM
HYPOCHAERIS RADICATA
JUNCUS EFFUSUS
LATHYRUS PRATENSIS
LEONTODON HISPIDUS
LIGUSTRUM VULGARE
LOTUS CORNICULATUS
LUZULA CAMPESTRIS
MEDICAGO LUPULINA
MELANDRIUM ALBUM
MERCURIALIS PERENNIS
MOLINIA CAERULEA
MYOSOTIS ARVENSIS
NASTURTIUM OFFICINALE
PHRAGMITES COMMUNIS
PHYLLITIS SCOLOPENDRIUM
PICRIS HIERACIOIDES
PLANTAGO LANCEOLATA
POA ANGUSTIFOLIA
POA ANNUA
POA PRATENSIS
POTENTILLA REPTANS
PRIMULA VULGARIS
PRUNUS SPINOSA
PTERIDIUM AQUILINUM
QUERCUS PETRAEA
QUERCUS ROBUR
RANUNCULUS SCELERATUS
ROSA CANINA
RUBUS FRUTICOSUS
RUMEX ACETOSA
SAGINA PROCUMBENS
SALIX ATROCINEREA
SCROPHULARIA NODOSA
SENECIO SQUALIDUS
SENECIO VULGARIS
SOLANUM DULCAMARA
SONCHUS ARVENSIS
STELLARIA HOLOSTEA
STELLARIA MEDIA AGG
TAMUS COMMUNIS
TARAXACUM OFFICINALE
TRIFOLIUM REPENS
TRISETUM FLAVESCENS
TUSSILAGO FARFARA
TYPHA LATIFOLIA
URTICA DIOICA
VERONICA CHAMAEDRYS
VIBURNUM LANTANA
VICIA ANGUSTIFOLIA
VICIA CRACCA
VICIA HIRSUTA
VIOLA RIVINIANA
WEIGHTING
LINARIA VULGARE

the key was tested at a number of BI sites in the LMR where time permitted. A transect was laid out at the approximate centre of each site, and quadrats were distributed along the transect as in the random survey (Sargent & Mountford 1979). Incidence data from each quadrat was fed through the key, and the vegetation class or classes present scored for each site.

In the majority of cases, a sensible classification was obtained. However, the exercise was essentially an attempt to classify LMR vegetation in terms of plant associations occurring in S, E and W Regions. The degree to which it was successful indicates:

a. The continuity of certain vegetation types throughout the English and Welsh areas of BR.

b. That it should be perfectly possible to produce a useful general key to BR vegetation when information from all Regions becomes available. Until such time, further use of keys, beyond testing the principle, will not be made.

3.1.3 Sites of Biological Interest

Of all the sites recorded, it was decided that 44 merited consideration for their biological interest. Ten outstanding sites within the random survey are included and the remainder are from the Biological Interest Survey. Of these, 25 were visited at the suggestion of NCC officers, 2 were found from information in Floras, and a further 7 were discovered or visited speculatively following examination of local maps.

Files have been opened for the majority of these sites (Appendix 4), and indicate where particular forms of management or protection would be appropriate. Files have also been completed for sites of particular interest in Southern and Western Regions visited during 1979 (Appendix 3).

3.2 Vascular plants

During 1979, 736 species of vascular plant were recorded, compared with 770 in Southern and Western Regions. The slightly lower species total reflects the generally impoverished flora further north. Eighty species were noted for the first time in the survey, and these were mainly characteristic of coastal and upland areas, especially on Carboniferous limestone. A significant number of aliens were included for the first time, and the balance of the new plants were those associated with habitats rather sparsely developed on BR, especially wetland and woodland.

There is a discernable increase in the abundance of calcifuge species in 1979 as compared to 1978, and a more marked change compared to the largely calcareous Eastern Region. Among the commoner flowering plants, differences between the years are not clear, but it is interesting to note the much greater abundance of *Cynosurus cristatus* in central Wales.

Carboniferous limestone supplied the richest sites of 1979 in terms of general flora and specific rarities. Graig Fawr (B180), Wye Dale (R203 and B165) and Gauber (R229 and B173) were outstanding with *Draba incana*, *Helianthemum c. canum*,

Hornungia petraea, *Pyrola r. rotundifolia* and *Silene nutans* although all the sites with exposures of this rock were above average. Typical species such as *Asplenium viride*, *Carex lepidocarpa*, *Coeloglossum viride*, *Cochlearia officinalis* ssp *alpina*, *Epipactis atrorubens*, *Galium sterneri*, *Geranium sanguineum*, *Gymnocarpium robertianum*, *Hypericum montanum*, *Minuartia verna*, *Primula farinosa*, *Rubia peregrina*, *Selaginella selaginoides*, *Sesleria caerulea*, *Sorbus rupicola* and *Thalictrum m. minus* were found more generally and the endemic whitebeam, *Sorbus lancastriensis* has a small population at Meathop (B172) in Cumbria.

Other upland areas supported local species, *Meconopsis cambrica* was found at two places high in the Welsh hills, and *Pyrola minor* and *Festuca vivipara* in Cumbria.

The lines of North Wales and Cumbria tend to follow the coast and several sites had fragments of salt-marsh, or more rarely sand-dune and cliff. Nearly one fifth of the new species found in 1979 were maritime plants, but most were the common and widespread taxa. *Catapodium marinum* was found at two points on the Merioneth coast, *Limonium humile* occurred by the line over the R. Esk estuary in Cumbria, *Equisetum variegatum* where the line crosses the Anglesey dunes, and *Lathyrus sylvestris* was regular on grassy banks all along the west coast.

Interesting aliens included *Erinus alpinus* and *Rumex scutatus* on limestone cuttings north of Clitheroe and a good population of *Tetragonolobus maritimus* at Rushbeds Wood (B111) in Buckinghamshire. *Arenaria balearica* grew on a wall in Southport, a further record of *Bromus inermis* was made at Pentre Aaron (R178), *Tellima grandiflora* was found at Singret (B138) near Wrexham and Melling (R227) in north Lancashire, and *Festuca longifolia* was recorded in several places in the southern part of the Region.

Amongst other interesting plants seen was *Allium scorodoprasum* at 2 sites in the Ellen valley east of Maryport, and a particular feature of the 1979 data was the presence of 3 maritime species in localities well removed from the sea. *Cochlearia danica* grew at Snowford Junction (B125) in Warwickshire and at King's Langley (R123) in Hertfordshire. *Cerastium diffusum* was widespread in the west Midlands growing on cinder by the cess, a habitat where *Carex arenaria* was common in North Wales, and occasional in Lancashire and Cumbria. The dumping of sea-sand at Emscote Power Station (B121) added other maritime species in an inland locality, but, even without this interference, BR provides artificial shingle-banks and sand-flats through ballast and cinder throughout the Region.

Notable records were made for some fairly common species outside their normal range: *Vicia tetrasperma* near Portmadoc, *Cerastium arvense* just south of Crewe and *Calamagrostis canescens* on the Wirral, and some new data were gathered on the typically railway species previously discussed (Sargent & Mountford 1979). *Equisetum arvense* was apparently ubiquitous, and *Senecio squalidus* was widespread. *Chaenorhinum minus* also occurred throughout the Region, with an interesting record at nearly 1000' asl (Lodge Hall (B173)). *Linaria repens* was common in west and central Wales and occurred at isolated localities in Lancashire (Silverdale (B171)) and Cumbria (Low Borrowbridge (R231)). *Vulpia myuros* was abundant on cinder in North Wales where the Atlas of the British Flora shows it to be local or rare, and it occurred occasionally elsewhere in the Region.

Table 3.2. Vascular plant species found on London Midland Region during 1979.

Table 3.2. Vascular plant species found on London Midland Region during 1979 (continued).

Acer platanoides L.
Acinos arvensis (Lam.) Dandy
Agropyron junceiforme A & D. Love
Agropyron pungens (Pers.) Roem. & Schult.
Agrostis gigantea Roth
Allium scorodoprasum L.
Ammophila arenaria (L.) Link
Antirrhinum majus L.
Aphanes arvensis ss. L.
Aphanes microcarpa (Boiss. & Reut.) Rothm.
Aquilegia vulgaris L.
Arabidopsis thaliana (L.) Heynh.
Arabis caucasica Willd.
Arabis hirsuta (L.) Scop.
Arenaria balearica L.
Arenaria s. leptoclados (Reichenb.) Guss.
Arenaria s. serpyllifolia L.
Armeria m. maritima (Mill.) Willd.
Asparagus o. officinalis L.
Asplenium viride Huds.
Aster novi-belgii L.
Aster tripolium L.
Athyrium filix-femina (L.) Roth.
Atriplex hostata L.
Avena sativa L.
Barbarea verna (Mill.) Aschers.
Betula pendula Roth. x *B. pubescens* Ehrh.
Bidens tripartita L.
Brassica napus L.
Brassica oleracea L.
Brassica rapa L.
Bromus inermis Leyss.
Buddleja davidii Franch.
Calamagrostis canescens (Weber) Roth
Calystegia sepium s.s. (L.) R.Br.
Calystegia silvatica (Kit.) Grisob.
Campanula alliariifolia Willd.
Campanula latifolia L.
Campanula trachelium L.
Carex acutiformis Ehrh.
Carex arenaria L.
Carex lepidocarpa Tausch.
Carex ovalis Good.
Carex pallescens L.
Carex pendula Huds.
Carex pseudocyperus L.
Carex pulicaris L.
Carex rostrata Stokes
Carpinus betulus L.
Catapodium marinum (L.) C.E. Hubbard.
Centranthus ruber (L.) D.C.
Cerastium tomentosum L.
Chamaecyparis lawsoniana (A. Murr.) Parl.
Chrysanthemum maximum Ramond
Cochlearia danica L.

Table 3.2. (continued)

Cochlearia o. alpina (Bab.) Hook
Cochlearia o. officinalis L.
Coeloglossum viride (L.) Hartm.
Convallaria majalis L.
Corydalis claviculata (L.) DC.
Corydalis lutea (L.) DC.
Cotoneaster microphyllus Wall.
Crepis paludosa (L.) Moench
Crocosmia x *crocosmiiflora* (Lemoine) N.E.Br.
Dianthus barbatus L.
Doronicum pardalianches L.
Draba incana L.
Dryopteris carthusiana (Viller) H.P. Fuchs
Eleocharis uniglumis (Link) Schult.
Endymion hispanicus (Mill.) Chouard.
Epilobium brunnescens (Cockayne) Raven & Engelham
Epipactis atrorubens (Hoffm.) Schult.
Equisetum variegatum Schleich. ex Web. & Mohr
Erinus alpinus L.
Erophila verna (L.) Chevall.
Euphorbia cyparissias L.
Euphorbia esula s.l. L.
Euphrasia borealis Wettst.
Euphrasia brevipila Burnat & Gremli
Euphrasia nemorosa (Pers.) Wallr.
Euphrasia rostkoviana Hayne
Festuca longifolia Thuill.
Festuca ovina L. ssp *tenuifolia* (Sibth.) Peterm.
Festuca vivipara (L.) Sm.
Fragaria x *ananassa* Duchesne
Fumaria boraei Jord
Galanthus nivalis L.
Galeopsis t. bifida (Boenn.) Lej. & Court.
Galeopsis t. tetrahit L.
Galium pumilum Murr. ssp *sterneri* (Ehren.)
Geranium rotundifolium L.
Geranium sanguineum L.
Glaux maritima L.
Gymnocarpium robertianum (Hoffm.) Newm.
Halimione portulacoides (L.) Aell.
Helianthemum c. canum (L.) Baumg.
Hemerocallis fulva (L.) L.
Heracleum mantegazzianum Somm. & Lev.
Hieracium ssp L.
Hieracium umbellatum L.
Honkenya peploides (L.) Ehrh.
Hordeum vulgare L.
Hornungia petraea (L.) Rchb.
Hydrocotyle vulgaris L.
Hypericum calycinum L.
Hypericum montanum L.
Iris germanica L.
Juncus gerardii Lois.
Juncus maritimus Lam.
Knifofia sp Moench
Labiatae anagyroides Medic.
Lamium hybridum Vill.

Table 3.2 (continued)

Larix decidua Mill.
Lathyrus latifolius L.
Lathyrus odoratus L.
Lathyrus sylvestris L.
Lemna minor L.
Lepidium ruderale L.
Limonium-humile Mill.-
Limonium vulgare Mill.
Linaria purpurea (L.) Mill.
Lupinus arboreus Sims
Lupinus polyphyllus Lindl.
Lycium barbarum L.
Lysimachia vulgaris L.
Mahonia aquifolium (Pursh.) Nutt
Meconopsis cambrica (L.) Vig.
Melampyrum pratense L.
Mentha rotundifolia (L.) Huds.
Mentha spicata L.
Minuartia verna (L.) Hiern
Misopates orontium (L.) Raf.
Montia sibirica (L.) Howell
Myosotis secunda A. Murr.
Myosotis sylvatica Hoffm.
Myriophyllum spicatum L.
Narcissus x *biflorus* Curtis
Oenanthe lachenalii C.C. Gmel.
Oenothera erythrosepala Borbas
Ophioglossum v. vulgatum L.
Orchis morio L.
Parnassia palustris L.
Petroselinum segetum (L.) Koch
Phleum arenarium L.
Phleum pratense s.s. L.
Picea abies (L.) Karst.
Picea sitchensis (Bong.) Carr.
Pilosella aurantiaca (L.) C.H. & F.W. Schultz ssp *brunneocrocea* (Pugsl.) P.D. Sell & C. West
Pinguicula vulgaris L.
Pinus nigra Arnold
Plantago maritima L.
Platanthera chlorantha (Cust.) Rchb.
Polygonatum x *hybridum* Brug.
Polygonum aviculare s.s. L.
Polygonum polystachyum Wall ex Meisn.
Polygonum sachalinense F. Schmidt
Populus alba L.
Populus x *canadensis* Moench var. *serotina* (Hertig) Rehd.
Populus gileadensis Rouleau
Potentilla anglica Laicharding
Potentilla norvegica L.
Primula farinosa L.
Prunus laurocerasus L.
Puccinellia maritima (Huds.) Parl
Pyrola minor L.
Pyrola r. rotundifolia L.
Pyrus communis L.
Quercus ilex L.
Rhododendron ponticum L.

Table 3.2 (continued)

Rhus typhina L.
Rheum sp. L.
Ribes sanguineum Pursh.
Robinia pseudoacacia L.
Rorippa islandica (Oeder) Borbas
Rubia peregrina L.
Rubus idaeus L.
Rubus saxatilis L.
Rumex acetosella s.s. L.
Rumex scutatus L.
Sagina a. apetala Ard.
Sagina maritima Don
Salix cinerea L. ssp *oleifolia* Macreight
Salix x *laurina* Sm.
Salix pentandra L.
Salix phylicifolia L.
Salix repens ssp *argentea* (Sm.) G. & A. Camus.
Salix r. repens L.
Salvia verticillata L.
Saxifraga x *urbium* D.A. Webb
Schoenopectus tabernaemontani (C.C. Gmel.) Palla
Scirpus maritimus L.
Sedum forsterianum Sm.
Sedum reflexum L.
Sedum spurium M.Bieb.
Selaginella selaginoides (L.) Link
Senecio vulgaris L. forma *ligulatus* D.E. Allen
Serratula tinctoria L.
Sesleria caerulea (L.) Ard.
Silene x *intermedia* Schur.
Silene maritima With.
Silene nutans L. var *smithiana* Moss
Sisymbrium orientale L.
Solanum tuberosum L.
Solidago canadensis L.
Sorbus aria (L.) Crantz s.s.
Sorbus intermedia (Ehrh.) Pers. s.s.
Sorbus lancastriensis E.F. Warb.
Sorbus rupicola (Syme) Hedl.
Spartina anglica C.E. Hubbard
Spartina x *townsendii* H. & J. Groves
Spergularia marina (L.) Grizeb.
Spergularia media (L.) C. Presl
Stellaria neglecta Weihe
Suaeda maritima (L.) Dum.
Symphytum grandiflorum DC.
Teesdalia nudicaulis (L.) R.Br.
Tellima grandiflora (Pursh.) Dougl. ex Lindl.
Tetragonolobus maritimus (L.) Roth
Thalictrum m. minus L.
Tilia x *vulgaris* Hayne
Trifolium scabrum L.
Triglochin maritima L.
Triticum aestivum L.

Table 3.2 (continued)

Valerianella locusta (L.) Betcke
Vicia lathyroides L.
Vicia sativa L. ssp *nigra* (L.) Ehrh.
Vicia sylvatica L.
Viola c. canina L.
Viola odorata L. var *dumetorum* Jord.
Viola p. palustris L.
Viola tricolor L. ssp *curtisii* (E. Forst.) Syme.

3.3 Bryophytes

A survey of the bryophyte flora of BR land was begun in 1979 for its intrinsic interest and with the intention of reinforcing the vegetation classification. All bryophytes occurring in quadrats were recorded and an additional list made of those species seen within each site. Samples of plants of uncertain identity were taken for subsequent verification, and voucher specimens of all species recorded are kept at Monks Wood.

Of the 116 mosses (species and varieties) and 30 hepatics recorded (Table 3.3), 5 species were particularly frequent: *Brachythecium rutabulum*, *Rhynchostegium confertum (Eurynchium)*, and *Lophocolea bidentata* were characteristic of the rank grassland occurring on much of BR land, whilst *Funaria hygrometrica* and *Bryum argenteum* were often found on cinder, particularly along the herbicide sprayed cess. *F. hygrometrica* occurred in all except 3 of the random sites in the LMR, and part of its success may be due to phenology, since it is commonly fertile in the spring before most spraying takes place. On narrow disturbed sites, especially in the south east, the moss flora was more or less restricted to these 5 species. However, wider sites with a more maritime climate showed much greater diversity, and more than 30 species were recorded at several large cuttings near the west coast.

Rock cuttings provide a particularly interesting BR habitat, especially where there is sufficient water. On limestone cuttings, species recorded include: *Seligeria calcarea*, *Neckera complanata*, *Leiocolea turbinata* and *Gymnostomum aeruginosum*, whilst, on sandstone, associations members included: *Calypogeia fissa*, *Barbilophozia floerkei*, *Dicranella heteromalla* and *Odontoschisma denudatum* (one site only).

Sites adjacent or close to the sea shore supported very few bryophytes. *Schistidium maritimum* occurred at one site on the Cumbrian coast (where it is a new record for the particular 10 km square), but elsewhere *F. hygrometrica* and one or two small species of *Bryum* were the only mosses found. The railway tends to remain in lowland areas, but two sites were of sufficient altitude for *Racomitrium* to be recorded. *R. fasciculare* and *R. heterostichum*, occurred on siliceous boulders beside the line between Betwys-y-Coed and Blaenau Ffestiniog, whilst *R. canescens* was found in limestone grassland at Ribblehead, in association with characteristic species.

Inspection of the list (Table 3.3) shows that comparatively few of even the most common epiphytic mosses were recorded, reflecting the general absence of mature woodland from BR, although scrub and developing woodland are widespread. The majority of species found belong to grassland communities, and it is expected that they will show sufficient discrimination to be of value during classification.

Several of the plants found are almost certainly new records for their particular area, and an annotated list is being sent to Dr. A.J.E. Smith, UCNW, Bangor, for information and confirmation.

Table 3.3 . Bryophytes recorded from LMR during 1979.

(a) Mosses. Nomenclature follows Smith (1978)

Amblystegium serpens
A. riparium
A. varium
Atrichum undulatum
Aulacomnium androgynum
Barbula convoluta
B. fallax
B. recurvirostra
B. reflexa
B. unguiculata
Brachythecium albicans
B. glareosum
B. plumosum
B. rutabulum
B. velutinum
Breutelia chrysocoma
Bryum alpinum
B. argenteum
B. argenteum var argenteum
B. bicolor
B. caespiticium
B. pallens
B. rubens
Calliergon cuspidatum
Campylium chrysophyllum
C. stellatum
Campylopus paradoxus
Ceratodon purpureus
Cirriphyllum crassinervium
C. piliferum
Climacium dendroides
Cratoneuron commutatum
C. commutatum var commutatum
C. commutatum var falcatum
C. filicinum
Cryphaea heteromalla
Ctenidium molluscum
Dichodontium pellucidum
Dicranella heteromalla
D. varia
Dicranum bonjeani
D. majus
D. scoparium
Drepanocladus aduncus
D. revolvens
D. uncinatus
Eurhynchium praelongum
E. praelongum var praelongum
E. praelongum var stokesii
E. striatum
E. swartzii
Fissidens adianthoides
F. bryoides
F. taxifolius

Funaria hygrometrica
Grimmia pulvinata
Gymnostomum aeruginosum
Homalia trichomanoides
Holmalothecium sericeum
H. lutescens
Hookeria lucens
Hylocomium splendens
Hypnum cupressiforme
H. cupressiforme var cupressiforme
H. cupressiforme var lacunosum
H. cupressiforme var resupinatum
H. jutlandicum
H. mamillatum
H. lindbergii
Isopterygium elegans
Isothecium myosuroides
I. myurum
Leptodictyum pyriforme
Leucobryum glaucum
Mnium hornum
M. marginatum
M. stellare
Neckera complanata
Philonotis fontana
Plagiomnium affine
P. cuspidatum
P. rostratum
P. undulatum
Plagiothecium denticulatum
P. latebricola
P. undulatum
Pleurozium schreberi
Pohlia carnea
P. wahlenbergii
P. nutans
Polytrichum commune
P. formosum
P. juniperinum
Pottia bryoides
P. lanceolata
Pseudoscleropodium purum
Racomitrium canescens
R. fasciculare
R. heterostichum
Rhodobryum roseum
Rhynchostegium confertum
Rhytidiadelphus loreus
R. squarrosus
R. triquetrus
Schistidium apocarpum
S. maritimum
Seligeria calcarea
Sphagnum fimbriatum
S. palustre
S. subnitens
Taxiphyllum wissgrillii
Thuidium philibertii
T. tamariscinum
Tortula muralis
T. ruralis
Trichostomum brachydontium

(b) Hepatics

Barbilophozia floerkei (Web. & Mohr) Loeske
Calypogeia fissa (L.) Raddi
Cephalozia bicuspidata (L.) Dum.
Cephaloziella byssacea (Roth.) Warnst.
C. hampeana (Nees) Schiffn
Conocephalum conicum (L.) Dum.
Diplophyllum albicans (L.) Dum.
Fossombronia pusilla (L.) Dum.
Frullania tamarisci (L.) Dum.
Gymnocolea inflata (Huds.) Dum.
Lophocolea bidentata (L.) Dum.
L. cuspidata (Nees) Limpr.
L. heterophylla (Scurad.) Dum.
Lophozia ventricosa (Dicks.) Dum.
Lunularia cruciata (L.) Dum.
Marchantia polymorpha L.
Marsupella emarginata (Ehrh.) Dum.
Metzgeria furcata (L.) Dum.
Nardia scalaris (Scurad.) Groy
Odontoschisma denudatum (Nees) Dum.
Pellia epiphylla (L.) Corda
Plagiochila asplenioides (L.) Dum.
P. spinulosa (Dicks.) Dum.
Ptilidium ciliare (L.) Nees.
Riccardia pinguis (L.) Gray
Saccogyna viticulosa (Mich.) Dum.
Scapania nemorosa (L.) Dum.
S. undulata (L.) Dum.
Solenostoma crenulatum (Sm.) Mitt.

3.4 Animal data

This section relies on data collected by Brendon Carleton, a third year sandwich course student from Bath University, who was attached to this project during the summer months.

3.4.1 Introduction

Some improvements to information collection techniques were made. In particular, the animal recording proformas were modified to accommodate the introduction of BTO habitat types (Figure 2). The groups recorded were comparable to previous years (birds, other vertebrates and invertebrates) and estimates of habitat quality were made.

Invertebrate records had previously been restricted to large invertebrates which were recognisable in the field. During 1979, however, a limited investigation of soil invertebrates was begun. Data collected were designed to be statistically acceptable, enabling the student to gain experience with analytical techniques as well as contributing usefully to the general survey.

A method of extracting significant information from the bulk of animal data (where resources prevent statistically satisfactory sampling) has yet to be determined. Although viewed solely in the context of qualitative support for vegetation and BR land classification, the information collected will undoubtedly prove of value.

3.4.2 Birds

Seventy-three species of bird (excluding domestic geese and fowl) were recorded on BR land during the field season. A list of the species is given (Table 3.4) and is annotated to show frequency of sightings. Of the 9 species not previously recorded, only curlews and grey wagtails were seen at more than one site, the curlews along the higher Pennine lines and with the grey wagtails in wet central Wales.

The records were not entirely comparable with those of Southern, Eastern and Western Regions. In particular, there was a reduction in the numbers of garden birds, especially whitethroats, yellow hammer, wrens and garden warblers observed, whilst records of estuarine and sea birds increased. This latter is almost certainly due to the closeness with which railway lines hug the shore in north Wales, Cumbria and parts of Lancashire.

Counts for birds associated with fresh water were also higher and particularly interesting were the records for sandmartins (nesting), spotted flycatchers, grey wagtails and a kingfisher between Newtown and Dovey Junction, where the line runs beside the rivers Dovey and Twymyn and has many tributary streams within its boundaries.

Swifts and swallows were exceedingly common feeding above railway lines, and all disused platelayers huts examined supported at least two nests of these species. Other railway nests, especially of scrub and developing woodland, characteristically belong to chaffinches, blackbirds, blue and great tits, willow warblers and robins, for which BR land also provides suitable feeding habitat.

ANIMAL RECORD	REGN.	DIVN.	AREA	SITE

SITE NAME	RECORDER	WEATHER	LANDFORM
		Hot dry sunny, but much NW wind of rain	1 2 3 4 (5) 6 7 Fairly large with hillocks [illegible] on the floor
M.P. 11	TIPPING 21 · 31		
COUNTY Salop	N.L.U. 805	DATE 27/6/79 · TIME 1000 → 1315	

HABITAT APPRAISAL

A	B	%	MGT.	DESCRIPTION
0	5	20	700	Mainly rough grassland with a variety of herbs. Bramble and nettles in clumps at intervals, also willow herb in patches. Some small scrub in places but not a lot, — young oak, dog roses, hawthorn etc.
1	6	80	700	

ANIMAL	FH	FC	R
Birds (small)	4	3	3
Birds (large)	3	2	1
Mamm. (small)	4	3	4
Mamm. (large)	3	2	3
Other verts.	3	2	3
Lepidoptera	4	4	4
Other insects	4	4	4
Other inverts.	4	4	4

SPECIES LIST OF ANIMALS RECORDED

	BIRDS	CODE	ORD.	OTHER VERTS.	ORD.	INVERTS.	ORD.
ON BR	[illegible]		1	Rabbit	4	[illegible]	
	Skylark		1	Vole	3	[illegible]	
	[illegible]		1			[illegible]	
	[illegible]		2			Large White	
	Song thrush		1			Common [illegible]	
	Garden warbler		1			Grasshopper	
	Chiff Chaff		1			[illegible]	
	Wood Pigeon		1			Red ant	
	Starling		1			[illegible]	
						[illegible]	
						[illegible]	
TOTALS	contd. over			contd. over		contd. over	
ASSOC WITH BR			1				
TOTALS	contd. over			contd. over		contd. over	

Table 3.4. Bird species seen on BR land during 1979 survey.

		Frequency			
		<=1%	>1%	>10%	New Record
Ardea cinerea	grey heron	*			
Anas platyrhynchos	mallard	*	*		
Tadorna tadorna	shelduck	*			*
Accipiter nisus	sparrowhawk	*	*		
Falco tinnunculus	kestrel	*	*		
Lagopus lagopus scoticus	red grouse	*	*		*
Perdix perdix	partridge	*	*		
Phasianus colchicus	pheasant	*	*		
Gallinula chloropus	moorhen	*	*		
Haematopus ostralegus	oystercatcher	*			*
Vanellus vanellus	lapwing	*	*		
Numenius arquata	curlew	*	*		*
Larus fuscus	lesser black-backed gull	*	*		
Larus argentatus	hering gull	*	*		
Columba livia	domestic pigeon	*	*		
Columba oenas	stock dove	*	*		
Columba palumbus	wood pigeon	*	*	*	
Streptopelia turtur	turtle dove	*	*		
Streptopelia decaocto	collared turtle dove	*	*		
Cuculus canorus	cuckoo	*	*		
Strix aluco	tawny owl	*			
Apus apus	swift	*	*		
Alcedo atthis	kingfisher	*			*
Picus viridis	green woodpecker	*	*		
Dendrocopos major	great spotted woodpecker	*			
Alauda arvensis	skylark	*	*	*	
Riparia riparia	sand martin	*			
Hirundo rustica	swallow	*	*	*	
Delichon urbica	house martin	*	*	*	
Anthus pratensis	meadow pipit	*	*		
Anthus trivialis	tree pipit	*			
Motacilla cinerea	grey wagtail	*	*		*
Motacilla alba yarrellii	pied wagtail	*	*		
Sturnus vulgaris	starling	*	*	*	
Garrulus glandarius	jay	*	*		
Pica pica	magpie	*	*	*	
Corvus monedula	jackdaw	*	*		
Corvus frugilegus	rook	*	*		
Corvus corone corone	carrion crow	*	*	*	
Prunella modularis	dunnock	*	*		
Troglodytes troglodytes	wren	*	*		
Locustella naevia	grasshopper warbler	*			*
Acrocephalus schoenobaenus	sedge warbler	*	*		
Sylvia borin	garden warbler	*			
Sylvia atricapilla	blackcap	*	*		
Sylvia communis	whitethroat	*	*		
Phylloscopus trochilus	willow warbler	*	*	*	
Phylloscopus collybita	chiffchaff	*	*		
Phylloscopus sibilatrix	wood warbler	*			*
Muscicapa striata	spotted flycatcher	*			
Oenanthe oenanthe	wheatear	*			*
Saxicola rubetra	whinchat	*			

		Frequency			
		<=1%	>1%	>10%	New Record
Erithacus rubecula	robin	*	*	*	
Turdus merula	blackbird	*	*	*	
Turdus philomelos	songthrush	*	*		
Turdus viscivorus	mistlethrush	*	*		
Parus palustris	marsh tit	*	*		
Parus montanus	willow tit	*	*		
Parus caeruleus	blue tit	*	*	*	
Parus ater	coal tit	*	*		
Parus major	great tit	*	*	*	
Aegithalos caudatus	longtailed tit	*	*		
Sitta europaea	nuthatch	*			
Passer domesticus	house sparrow	*	*	*	
Passer montanus	tree sparrow	*	*	*	
Fringilla coelebs	chaffinch	*	*	*	
Pyrrhula pyrrhula	bullfinch	*	*		
Carduelis chloris	greenfinch	*	*		
Carduelis carduelis	goldfinch	*	*		
Acanthis cannabina	linnet	*	*		
Emberiza calandra	corn bunting	*	*		
Emberiza schoeniclus	reed bunting	*	*		
Emberiza citrinella	yellow hammer	*	*		

Table 3.5. Other vertebrate species.

Oryctolagus cuniculus	rabbit	*	*	*	
Clethrionomys glareolus	bank vole	*	*	*	
Rana temporaria	common frog				
Apodemus sylvaticus	wood mouse	*	*		
Bufo bufo	common toad	*	*		
Lacerta vivipara	common lizard	*	*		
Vulpes vulpes	fox	*	*		
Sciurus carolinensis	grey squirrel	*	*		
Sorex amaeus	common shrew	*	*		
Vipera berus	adder	*	*		
Agricola terrestris	water vole	*			
Muntiacus reevesii	muntjac	*			
Pisces sp		*			

3.4.3 Other vertebrates

Species and frequency information are given (Table 3.5).

As in previous years rabbits were very commonly seen, using railway verges as refuges whilst foraging on adjacent agricultural land. Bank voles, wood mice and shrews were occasionally sighted, but, without recourse to trapping, their numbers are likely to be underestimated. Other expected small mammals, including badger, hare, hedgehog, mole and rat, were not recorded on LMR.

Reptile and amphibian sightings were comparable with previous years records, and included several good-sized adders.

3.4.4 Field observed invertebrates

With the exception of butterflies, where species names are given (Table 3.6) it was not practicable to identify consistently other individuals beyond group level in the field.

Fifteen species of butterfly were sighted, of which the large and small whites and small tortoiseshell were the most common, whilst the small skipper and speckled wood were seen only once. The red admiral had not previously been recorded during the survey, but was present at 4 sites during the summer.

All other field-identified invertebrates are shown in Table 3.7, and the most consistently recorded include the snails, *Cepea nemoralis* and *C. hortensis;* slugs, *Arion ater* and *A. hortensis;* moths, *Zygaena filipendula* and *Callimorpha jacobaea;* froghopper, *Cercopis vulnerata* and gnat, *Culex pipiens*.

3.4.5 Soil invertebrates

Measured soil samples were removed from the cess, verge and adjacent land at 20 random sites. The samples were placed in a Tollgren apparatus (Murphy 1962) and the extracted invertebrates recorded. Identification was not normally beyond class level, but it was thought that numerical distribution was sufficiently interesting to warrant inclusion in this report.

All groups recorded are shown in Table 3.8 . It will be seen that, with the exception of the pauropod, all groups occurring in the railway cess were also found in the verges and in adjacent land. However, a large proportion of the groups occurring elsewhere were not recorded from the cess. The numbers of groups and individuals site^{-1} were:

Cess : 4-9 groups site^{-1}; 16.9 individuals site^{-1}
Verge : 7-9 groups site^{-1}; 81.3 individuals site^{-1}
Adjacent land : 8-9 groups site^{-1}; 61.8 individuals site^{-1}

The cess is composed of porous cinder to a depth of several inches, enabling drainage of rain water and fluid waste (often nitrogenous) expelled from trains. It is kept weed-free by regular spraying with herbicides and is often contaminated with oil, and to a lesser extent, litter.

Table 3.6 . Species list of insects recorded in the field during 1979 survey.

Order	Common Name	Scientific Name
LEPIDOPTERA		
(Rhopalocera	Large White	*Pieris brassicae*
	Small white	*Pieris rapae*
	Green veined white	*Pieris napi*
	Orange tip	*Anthocharis cardamines*
	Peacock	*Inachis io*
	Small tortoiseshell	*Aglais urticae*
	Pearl bordered fritillary	*Boloria euphrozyne*
	Meadow brown	*Maniola jurtina*
	Gatekeeper	*Pyronia tithonus*
	Small heath	*Coenonympha pamphilus*
	Speckled wood	*Pararge aegeria*
	Small copper	*Lycaena phlaeas*
	Common blue	*Polyommatus icarus*
	Small skipper	*Thymelicus sylvestris*
	Red Admiral	*Vanessa atalanta*
(Heterocera)	Cinnabar	*Callimorpha jacobaeae*
	Six spot burnet	*Zygaena filipendulae*
	Grass moth	Pyralidae
COLEOPTERA	Staphylinid beetle	Staphylinidae
	Click beetle	Elateridae
	Dung beetle	Scarabaeoidea
	Bark beetle	*Scolytis* sp
	Soldier beetle	Cantharidae
	Whirligig beetle	Gyrinidae
	7 spot ladybird	*Coccinellia 7 punctata*
	2, 6 spot ladybird	Coccinellidae
	24 spot ladybird	
	Weevil	Curculionidae
HYMENOPTERA	Ant sp	Formicidae : *Lasius* sp
	Ant, meadow	*Lasius flavus*
	Ant, wood	*Formica* sp
	Bee sp	Apidae
	Bee, honey	*Apis mellifera*
	Bee, bufftailed	*Bombus* sp/*Psithyrus* sp
	Bee, redtailed	*Bombus* sp
	Sawfly gall	*Pontania* sp
	Wasp sp	Vespidae
	Wasp, parasitic	*Chrysis* sp
	Wasp, oak apple gall	*Biorhiza pallida*
	Wasp, oak artichoke gall	*Andricus fecundator*
	Wasp, oak marble gall	*Andricus* sp
	Wasp, robin pin cushion gall	*Diplolepis rosae*
	Wasp, spangle gall	*Neuroterus* sp
ORTHOPTERA	Grasshopper spp	Acrididae
	Bush cricket sp	Tettigoniidae

DIPTERA inc.	Sepsis fly	Sepsidae
	Biting "gnat" midge	Ceratopogonidae
	Blow fly	Calliphoridae
	Crane fly	*Tipula* sp Tipulidae
	Horse fly	Tabanidae
	Hover fly	Syrphidae
	Mosquito	Culicidae
	House fly	*Musca domestica*
HEMIPTERA	Frog hopper spp	Cercopidae
	Frog hopper	*Cerocopis vulnerata*
	Plant hopper sp	Jassidae
	Pond skater sp	Gerridae
	Water boatman	Corixidae
	Aphid sp	Aphidoidea
	Capsid bug	Geocorisae
ODONATA	Dragonfly spp	Anisoptera
	Damsel fly	Zygoptera inc. *Agrion* sp
THYSANOPTERA	Thrip	Thripidae
	Thunderfly	Thripidae
EPHEMEROPTERA	Mayfly	Ephemera
NEUROPTERA	Lacewing (green)	Chrysopidae
TRICHOPTERA	Caddis fly	
PLECOPTERA	Stone fly	
COLLEMBOLA	Springtail	

Table 3.7. Species list of other invertebrates recorded on BR property, during 1979 survey.

Class	Common Name	Scientific Name
ARACHNIDA	Spider spp	Araneida
	Wolf spider spp	Lycosidae
	Harvest spider spp	Phalangiidae
	Sycamore gall mite	Acari
CHILOPODA	Centipede sp	Lithobiidae
DIPLOPODA	Millipede sp	
	Millipede, pill	*Glomeris marginata*
CRUSTACEA	Freshwater shrimp	*Gammarus* sp
	Woodlice	Isopods
OLIGOCHAETA	Earth worm	
GASTROPODA	Slug	*Arion ater*
	Slug	*Arion hortensis*
	Snail, hairy	*Higromia hysptdra*
	Snail, glass	*Vitrina pellucida*
	Snail, Garden	*Helix aspersa*
	Snail	*Cepea nemoralis*
	Snail	*C. hortensis*
	Snail and slug spp	Stylommatophora

The verges and adjacent land are essentially continuous, but are affected by differing management practices. Verges are sporadically cut, burnt or cleared, and may be spread with ballast, whilst adjacent land generally supports some kind of agricultural usage.

Significant differences in soil fauna were expected.

Both diversity and species number are lower in the toxic cess than elsewhere ($p<0.005$), reflecting an unfavourable environment. It is likely that components of the population are ephemeral, and that recolonisation from adjacent verges occurs following a spraying event.

The density of individuals is greater in the verges than in adjacent land ($p<0.01$), and may be related to the comparatively undisturbed conditions prevailing in most verge soils.

The results suggest that considerably more detailed work would be profitable. In particular, the cess or cinder beds provide a distinctive habitat on which little work has been done, and where interesting species are likely to be found.

Table 3.8 . Soil invertebrates.

Class, Order	Cess (English name)	Verge, Adjacent (English name)
Gastropoda		Stylommatophora
Gugochaeta	Enchytraeid worm	Enchtyraeid worm
		Earthworm
Pauropoda	Pauropod	
Diplopoda		Millipede
Chilopoda	Centipede	Centipede
Symphyla		Symphylan
Insecta, Collembola	Sminthurid springtail	Sminthurid springtail
	Poduromorph springtail	Poduromorph springtail
	Entomobryomorph springtail	Entomobryomorph springtail
Diplura		Dipluran
Protura	Proturan	Proturan
Thysanoptera	Thrip	Thrip
Homoptera		Cercopid larva
Coleoptera	Larva	Larva
		Adult
Lepidoptera		Larva
Diptera		Larva
Aymenoptera	Ant	Ant
		Hymenopteran
Crustacea, Amphipoda		Amphipod
Isopoda	Wood louse	Wood louse
Arachnida, Araneae		Spider
Acari	Tyroglypolid mite	Tyroglypolid mite
	Mesostigmatid mite	Mesostigmatid mite
	Cheyletid mite	Cheyletid mite
	(Beetle mite	Beetle mite
	(Armadillo mite	Armadillo mite

4 DISCUSSION AND FUTURE WORK

4.1 Field work

During the year, certain changes were made (Section 3). In particular, the decision not to continue the cutting/embankment survey will have a considerable effect on the outcome of the project. Although, and in part a direct result, rather fewer exceptional sites were visited during the objective part of the survey, it was possible to make a much more intensive random investigation, providing a greater amount of compatible information, than in previous years. Additionally resources were freed to enable more sites of possible Biological Interest to be visited. The cutting/embankment survey will not be reinstated. During its first year, the Bryophyte survey proved interesting. Particularly well shown was the environmental sensitivity of many of these plants, and it proved generally possible to estimate the quality of a site by the diversity of its bryophyte species list. A number of new locations for species were recorded, and it is expected that the information will contribute usefully to vegetation classification.

The soil invertebrate survey was slightly less rewarding, largely because of the extreme difficulty encountered by the student in identifying the animals collected to species or genus level. Nevertheless it is intended to pursue this area of work and it is hoped that during 1980, the student will be some rather less ambitious work, identifying components of the poorly known fauna of the cinder cess.

Vascular plant recording and field observations of animals, habitat and environment will continue in Scottish Region during 1980, as in previous years.

4.2 Stratification and classification

Whilst the BR land classification is likely to provide a useful method of improving precision and interpretation, it also introduces certain difficulties. In particular, as similarly derived classifications are being compared any conclusions must be relative, either and both classifications being equally dependant on the methods used to derive them. That correlations occur (Section 2) suggests that the method is strong, but the implication remains that at least one set of data should be independently tested.

No yardstick for measuring the value of track classes exists, but as there is an extensive literature concerned with vegetation classification, independent examination of the ISA vegetation classes would seem to provide the most profitable approach. Comparison with an established vegetation classification would have the further obvious advantage of removing BR vegetation from the artificial isolation created by independent survey and analysis. It would clearly establish those associations peculiar to the railway environment.

It is most reasonable to attempt to compare railway information with the Braun-Blanquet system, and it is possible, by inspection, to ascribe ISA derived clusters to particular Braun-Blanquet taxa. However, the method is imprecise. Divisions within the systems, despite the potential to manipulate ISA by weighting and other devices, are only fortuitously compatible and, particularly where information is continuously variable, class limits seldom correspond.

To try, on the other hand, to sort the railway information manually following the European (Braun-Blanquet) method, is impracticable. The eventual railway data set (approximately 1 250 species and 5 000 quadrats) will occupy a matrix of ≈ 6.25 x 10^6 components.

It has therefore been decided to develop a "mid-channel" approach.

ISA, which provides an extremely efficient sorting method, will be used to reduce the data set to a number of clusters of manageable size. Because only comparatively few quadrats will occur in each cluster and because the species set for each cluster will be smaller than the total, the sum of sizes of component matrices will be considerably less (≈ x .025) than the size of the overall data matrix. The information will thus become practicable for Braun-Blanquet analysis. ISA clusters will be independently worked, approximating the European technique, and misfits pooled for redistribution.

The method will have the particular advantage over standard Braun-Blanquet technique of enabling an exceedingly large set of data to be analysed, and over ISA (or similar mathematical methods) of enabling the information to be clustered with respect to already existing classifications.

Within this particular piece of work it will also enable independent examination of the BR track stratification.

4.3 1981

Although much of 1981 will be concerned with the analysis of collected data and the mapping of defined vegetation types and species (in conjunction with the Experimental Cartography Unit), some time will remain available for field work. It is intended to use this time to visit identified lengths of line of conservation interest, to map and describe such areas in detail and to record, where survey information exists, any changes that may have taken place. It is estimated that there will be about thirty such sites throughout the country, ranging in length from a few hundred metres to several miles. It is hoped that these sites will become the subject of some particular form of protection by BR and the NCC.

At the same time, it is apparent that the colonisation of extensive areas of BR land by scrub and woodland has become a matter of concern and interest. With the cooperation of the LMR it is intended to establish some experimental plots on the Corby-Kettering line to investigate rates and patterns of scrub development under railway influence.

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APPENDIX 1. Random sites 1979.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
BR WATFORD DIVISION								
R122	30 April	TL 036338	Worthy End	Bedford-Luton	E	Emb	21.5-35	Herb and species-rich *Arrhenatherum* grassland. Disturbed near cess with ephemerals on cinder. Becoming increasingly species-poor and eventually bramble below.
					W	Emb	27-29	*Poa/Festuca/Arrhenatherum* grassland with campion. Bramble developing on lower slopes. *Festuca longifolia* recorded.
R123	1 May	TL 076033	Pinge Langley	Euston-Hemel Hemsted	W	Emb	11.4-12.6	Bramble, alder and sycamore scrub on unstable, heavily ballasted slope. Nettles on damp, flatter ground below *Salvia verticillata* common near access.
					E	Flat/ Emb	3.6-3.8	Low, heavily ballasted formation with rough, herb and species poor, *Arrhenatherum* grassland. *Cochlearia danica* recorded on ballast, protected from spray by discarded sleepor.
R124	1 May	TL 126174	East Hyde	St Albans-Luton	E	Emb	10-13.5	Steep formation with coarse herb and species-poor *Arrhenatherum* grassland. Some scrub, nettle and bramble stands.
					W	Emb	12.3-15.9	Steep formation with unstable surface of cinder and ballast. Hawthorn thickets, bramble and rank *Arrhenatherum* grassland on more gently sloping areas below.
R125	2 May	TL 158013	Houndswood	Kings Cross-St Albans	E	Cut	9.6-16.4	Coarse chalk grassland below, with areas of base-rich and base-poor woodland above, including *Quercus cerris/Betula pendula* and *Betula callis* with invasive gorse, and beech/ash/ *Prunus avium* over *Arrhenatherum elatius*. Good species list.
					W	Cut	5.5-13.5	*Poa/Festuca/Arrhenatherum* grassland with campion and *Filipendula* at Transect 3, becoming ash/elm scrub with *Clematis* over mercury, ivy and *Arum maculatum* at T4.
R126	2 May	TQ 178980	Kendal's Hall	St Pancras-Leicester	W	Cut/ Flat	6.2-12	Coarse herb-poor *Arrhenatherum* grassland, with areas of bramble and isolated small oak trees. Nettle occasional but poor in species. *Euphorbia cyp[illegible]* s.l.
					E	Cut/ Flat	7.8-12	Coarse herb and species-poor *Arrhenatherum* grassland with patches of bramble on flat and on dumped ballast near line. Some areas more mixed with *Poa*, cocksfoot and *Centaurea nigra* common, plus yarrow.
R127	3 May	SP 874047	Wendover Dean	Marylebone-Aylesbury	W	Flat(& Cut)	13	Coarse tussocky herb and species-poor *Arrhenatherum* grassland. Some areas have *Poa*, *Dactylis* and *Helictotrichon pubescens* sub-dominant. Bramble, nettle and *Lineanthemum* occasional. Small ditch crosses flat.
					E	Cut/ Flat	4.8-5	Very similar to W side but generally more mixed and with *Festuca rubra* locally common. Many anthills. *Sedum telephium* and *Festuca longifolia* occur.
R128	3 May	SU 926910	Beaconsfield	Paddington-Birmingham (via Bicester)	S	Cut(& Emb & Flat)	7.5-21.2	The cutting is *Bolous callis* grassland with hazel and bramble on ballast by line and birch/beech woodland on broad flat above. The embankment is disturbed and has coarse grass, bramble, nettle, oak and elder.
					N	Cut(& Emb & Flat)	13.8-23	The cutting is similar to S, but has fescue, low broom and sorrel also, with oak/birch woodland on flat above. Flat by line to W has species-rich calcicolous grassland and slope of embankment has blackthorn scrub.
R129	4 May	SP 780027	Pitch Green	Chinnor branch	S	Flat	0.5	Very narrow, very poor verge - only 10 species on the 100 m. Rough herb and species-poor *Arrhenatherum* and couch grassland with nettle in patches. Bramble and brier very sparse spreading from fence.
					N	Flat	0.5	As S side but with 13 species and *Dactylis* significant.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R130	4 May	SP 813053	Askett	Aylesbury-Princes Risborough	SE	Flat(& Ditch/ Cut)	4.8-5.5	Flowing ditch with *Fumaria* etc on damp cinder. Cleared bank with regenerating *Symphoricarpos*, and hazel etc over ivy with *Viola odorata*, *Epilobium hirsutum*, nettle under shrubs.
					NW	Flat(& Cut)	8.2	Coarse herb and species-poor *Arrhenatherum* grassland plus *Dactylis*, *Heracleum* and cowslip. Patches of nettle, bramble and rosebay. A thicket of *Prunus avium* derived from a handful of large trees on BR land.
R131	7 May	SP 651175	Piddington	Paddington-Birmingham (via Bicester)	NE	Cut(& Emb)	9.5-23.3	Herb and species-rich mixed grassland of *Poa*, *Festuca*, *Bromus erectus*, *Carex flacca* and *Dactylis*, with coarser *Arrhenatherum* on ballast below and on flat above with bramble, as well as general on the lower parts of the cutting. Recently burnt and with *Orchis morio*, as well as *Lotus*, *Pilosella* and *Plantago lanceolata*.
					SW	Cut & Flat	7.2-24	Herb and species-poor *Arrhenatherum* grassland, often very mossy with areas of bramble and mixed thorn scrub.
R132	8 May	SP 760508	Roade	Euston-Crewe	SW	Emb & Flat	13-43.5	Herb and species-poor *Arrhenatherum*, with *Viola hirta* and *Centaurea scabiosa* on disturbed slope to NW. Broad cinder flat has species-rich *Festuca/Poa/Bromus* grassland. Slope below has oak/hawthorn, and bramble/briar scrub with *Calamagrostis epigejos* near culverted ditch.
					NE	Emb(& Flat)	10.2-13.2	Large areas of *Equisetum telmateia*, locally mixed with *Arrhenatherum*, *Heracleum* and *Urtica*. Some coarse grassland and hawthorn scrub plus *Salix fragilis* by ditch.
R133	8 May	SP 772493	Ashton	Euston-Crewe	E	Flat(& Emb)	37-40	Large flat by signal box mainly bramble-covered with areas of herb and species-rich fescue grassland, and coarse *Arrhenatherum*. Hawthorn scrub on the slope. To the south the bank is more sloping and is crossed by a track. Coarse grassland of fescue, *Bromus erectus* and *Arrhenatherum*, with thistle and bramble, occurs.
					W	Emb	14.4-19	Coarse herb and species-poor *Arrhenatherum* grassland with rosebay and hogweed to north and below. Southern end has coarse *Bromus erectus* grassland. Scattered bramble and low thorn bushes.
R134	8-9 May	SP 714550	C~~a~~yton	Euston-Crewe	NE	Cut/ Flat	8-13.5	Mixed herb-poor grassland to the S of *Festuca rubra*, *Bromus erectus*, *Poa*, *Arrhenatherum*, cocksfoot and bent. In the N some coarse areas and some forb-rich turf with *Centaurea* and *Plantago*.
					SW	Cut/ Flat	14-70	The narrow S end has bramble thickets with nettle and *Arrhenatherum*, previously burnt. The lower slopes to the N are similar with rosebay. There is tall oak woodland with thorn bushes over *Holcus mollis* etc near the top of the slope. The broad flat *Urtica*, rosebay and *Arrhenatherum* over thick moss.
R135	9 May	SP 739555	Collingtree	Roade-Northampton	E	Emb/ Flat	3.5-4	Bramble patches. Nettle stands and coarse *Arrhenatherum* grassland. Some fescue/*Poa* with *Anthriscus* and *Potentilla reptans* by line. *Sanguisorba* and *Cirsium acaule* occur.
					W	Emb/ Flat	3-4.2	Very similar to east and like it passing from flat in N to low embankment in S. Nettle rather commoner and less bramble. Hawthorn bushes are occasional and *Galium aparine* is common.
R130	9 May	SP 746530	Courteenhall	Roade-Northampton	E	Cut/ Flat	34	Stepped cutting with herb-poor coarse *Arrhenatherum* on ballast dumping on upper slope, on broad flat above and generally to N. Areas of *Pilosella*, *Festuca ovina*, *Agrostis* and *Polytrichum* turf occur. The trodden area on the upper flat has forb-rich turf. Hawthorn hedge and invading rosebay.
					W	Cut/ Flat	41-52	Less regular bank with areas of landslip and retaining walls. Low calcifuge grassland with scattered oak trees to the N. A shelter belt of pines on the upper most flat. The S grassland is coarser with *Arrhenatherum*, rosebay, *Dactylis* and bramble patches. *Ceterach* on bridge.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R137	10 May	SP 735666	Chapel Brampton	Northampton-Market Harborough	W	Cut(& Flat)	9.6-10.6	Generally herb and species-poor *Arrhenatherum* grassland with sub-dominant *Festuca rubra/Poa* and frequent woody growth of ash, hawthorn and bramble. Some richer patches with sorrel.
					E	Cut(& Flat	10.7-11.8	Similar but poorer and coarser with bramble thickets more extensive and nettle patches. Hawthorn is common near the fence. The other common herbs are *Galium aparine, Centaurea nigra* and *Epilobium hirsutum*. There are a few plants of *Festuca longifolia*. A spring line with dripping cliff and marsh to the S.
BR NOTTINGHAM DIVISION								
R121	27 April	SP 807710	Finedon	Bedford-Kettering	SW	Flat/ Cut	4-4.8	Narrow verge with limestone ballast and cinder. Weedy *Arrhenatherum* grassland with mosses on cinder and nettles adjacent to fence.
					NE	Flat/ Emb	3-3.5	Uniform, low. *Poa angustifolia* and *Arrhenatherum* grassland with few herb species and litter throughout.
R139	21 May	SP 673042	Kibworth	St Pancras-Leicester	NE	Cut/ Flat	8.8-15.4	The eastern cutting is covered in bramble and hawthorn. Much of the rest is coarse herb and species-poor *Arrhenatherum* grassland. There is older shading nettle, goosegrass and hogweed in the tussocky eastern area and fescue/*Poa* plus other coarse grasses to W.
					SW	Cut/ Flat	19.8-21.8	More varied. The cutting has been burnt and leaves a rather patchy *Arrhenatherum* grassland with hogweed and bramble. There is elder scrub and nettle stands with thistle. The broad flat has foxtail and couch as well as *Arrhenatherum* and a ditch crossing it.
R140	22 May	SP 479960	Thorney Fields	Norwich-Birmingham	S	Flat/ Ditch	4.8-5.2	Almost denuded of vegetation because of drainage work. A few shoots of hawthorn survive in the ditch and grass by fence.
					N	Cut/ Flat	4-5.4	The east end is flat with patchy *Arrhenatherum* grassland and frequent bare cinders. *Festuca rubra/Poa* commoner near the line. Herb-poor and a few hawthorn bushes. The west end has dense hawthorn/elder scrub over an ivy carpet, with coarse grass, nettle and goosegrass along the edges. A wet verge to the west has *Ophioglossum, Sanguisorba* etc and the line edge has *Cerastium diffusum*.
R141	22 May	SK 514042	Kirby Muxloe	Leicester-Burton-on-Trent	NE	Cut/ Flat	19-28	The old track bed by the line has open herb-rich *Arrhenatherum* grassland plus fescue/knapweed. The slope has mixed thorn scrub with clearings of *Brachypodium sylvaticum*. The coarse grassland to the east is basicolous and quite rich. Coarse with bramble and nettle on flat above. A number of garden escapes.
					SW	Cut (Flat)	19.5-21.5	Some meadowsweet stands and coarse grassland but generally scrub covered especially near fence where hawthorn/elder over ivy is found. Elsewhere raspberry and bramble under tall ash and hawthorn.
R184	2 July	SK 671103	Brooksby	Norwich-Birmingham	N	Emb/ Flat	4.6-4.8	Mixed coarse vegetation of bramble thickets with nettle, *Arrhenatherum, Galium aparine* and thistle. A dry ditch, no scrub and frequent ballast tipping.
					S	Emb(& Flat)	3-4	Coarse *Arrhenatherum* grassland, herb and species-poor. Nettle, *Potentilla reptans, Galium aparine* and locally bramble are frequent. Scattered sycamore and hawthorn.
R185	3 July	SK 269295	Derby Airport	Stoke-on-Trent-Derby	S	Flat(& Cut)	20	Disused sidings, well colonised with coarse herb-poor *Arrhenatherum* near line with fescue and *Deschampsia cespitosa* and clumps of *Symphytum* x *uplandicum*. Most of the area is dense sallow scrub over *D. cespitosa, Juncus* and *Poa trivialis* with scattered hawthorn. Foxtail, hogweed and nettle are common. Waterlogged with *Lychnis*, sneezewort, *Carex ovalis*

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					N	Flat(& Cut)	25-26	Drier and grassy, almost throughout. Ballast and cinder produces shallow soils with *Aira caryophyllea* and *Luzula campestris*. Generally coarse *Arrhenatherum* grassland with fescue, *Trisetum*, couch, *Poa*, *Holcus lanatus*, bent locally important in the herb-poor sward. Patches of bramble and *Cirsium vulgare*. T4 has low cutting at edge with thorn thicket. Some markedly base-poor areas have a lot of *Rumex acetosella* s.s.
R186	3 July	SK 328309	Stenson Fields	Derby-Birmingham	S	Flat/ Cut/ Emb	10-12	Flat with ridge behind suffering much dumping of limestone ballast. Tall rosebay stands are common and coarse herb and species-poor *Arrhenatherum* is the other major cover. *Lotus* is common on the ballast and *Holcus mollis* with hawthorn on the untipped upon part near the fence. *Sanguisorba* and *Lathyrus montanus*.
					N	Flat/ Cut	7.2-7.4	Rough, herb-poor *Arrhenatherum* grassland with a little fescue and couch. Patches of *Trifolium medium* are common. There is abundant ballast dumping on many parts and low bramble is beginning to colonise it, with hogweed and *Senecio sylvaticus*.
R187	4 July	SK 286515	Deighton Hill	Wirksworth branch (from Duffield)	W	Cut/ Flat	7	Coarse and overgrown but recently sprayed near line. Woody growth of ash, hazel, *Rosa arvensis*, bramble and *Rubus* near fence over mercury, nettle, *Galium aparine* and a few shade species. Rosebay stands are common. Rough *Arrhenatherum* grassland with cocksfoot and herbs derived from scrub occurs by line.
					E	Cut/ Flat	9.6-9.8	Including a stagnant ditch which had no aquatic flora but had abundant *Silene dioica* and meadowsweet along the banks. Alder and *Acer* spp are common near the fence and by the ditch over *Galium aparine*, nettle where damper and rosebay, bramble, *Holcus mollis* where drier. Rough *Arrhenatherum* locally near line.
R188	4 July	SK 339532	Cromford Canal	Matlock branch (from Ambergate)	S	Flat	2-4.5	Narrow ballast flat to wall colonised by young trees of birch, ash, larch, sallow and *Viburnum opulus*. Partly shaded by trees on neighbouring land too. *Arrhenatherum*, *Rosa arvensis* and *Centaurea nigra* are occasional colonising bare ballast, and *Mycelis* is found sparingly.
					N	Cut/ Flat	2-4	Narrow ballast bank to wall covered in ivy. The ballast has young oak and ash, plus a lot of bramble. Sycamore and *Chamaenerion* grow in the W where patchy grassland of *Arrhenatherum* and tall rosebay stands give significant cover.
R189	4 July	SK 388569	Toadhole Furnace	Derby-Chesterfield	NW	Emb	13	Slope largely covered in dying elm scrub over an unstable ballast scree. Ash is locally important, as are hawthorn and alder but there is little ground cover except fallen twigs. Nettle and *Allium ursinum* survive near bottom, and the track edge has patches of *Arrhenatherum* with bramble and clover. *Silene dioica* and rosebay under hawthorn.
					SE	Emb(& Flat)	15-16	T3 has dense bramble thickets with emergent rosebay. Patches of damp coarse *Arrhenatherum* are found by a ditch at the foot of the slope. An area of quite rich grassland with *Tanacetum* and *Potentilla* survives in this area where the elms have been removed. T4 is however very similar to the NW, but *Poa trivialis* is frequent under the elm, ramsons is commoner on the flat below.
R190	5 July	SK 446495	Stoneyford	Long Eaton-Chesterfield	S	Cut(& Flat)	10-11	Very herb and species-poor grassland with abundant matted litter. A mixture of *Holcus mollis*, *Agrostis tenuis* and *Arrhenatherum*. *Hieracium* sp (group Sabauda) is common and *Linaria vulgaris* is frequent on dumped ballast with rosebay and *Tussilago*. Bramble patches and sycamore scrub are locally important plus oak.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					W	Cut(& Flat)	15	Grassland very similar to that on E but with very little *Arrhenatherum*, and rather more extensive bramble patches which are associated with rosebay. *Holcus* grows with hawkweed, *Centaurea nigra* and rosebay. Bent is found with *Rumex acetosella* and *Arrhenatherum* with bramble, *Linaria* and *Leucanthemum*. Polluted? Bramble burnt.
R191	5 July	SK 484546	Kirkby Mine	Pye Bridge-Shirebrook	NE	Flat/ Cut	7.2-7.6	Coarse herb and species-poor *Arrhenatherum* grassland with much litter. Bramble patches occasional and a lot of low hawthorn is colonising, occasionally with elder. Bent picks out the less disturbed parts and is common there. *Linaria vulgaris* is frequent on ballast. Flat to SE, cutting to NW.
					SW	Flat/ Cut	6-10	The cutting slope and flat here have a vegetation similar to NE but with more bramble and associated rosebay, plus occasionally cleavers. Invading hawthorn is restricted to T4. Some more herb-rich parts are found where burning has happened with *Vicia cracca* and *Pimpinella major*.
BR BIRMINGHAM DIVISION								
R138	11 May	SP 498323	Aynho	Oxford-Birmingham	W	Flat	4-4.8	Very disturbed and ballasted with a long species list. Hawthorn bushes occur, nettle and *Galium aparine* with coarse *Arrhenatherum* grassland. The more open flat is species-rich *Festuca/Poa* turf with areas of *Bromus sterilis* plus ephemerals Some burning has occurred.
					E	Emb/ Ditch	4.6-4.9	The slope is coarse *Arrhenatherum* with nettle and *Tanacetum*. Some places have cut regenerating scrub of hawthorn with nettle, cleavers, *Alliaria* and *Glechoma*. The ditch has a good wetland vegetation and the edge by the fence a rich grazed turf. A long species list with *Dorycnium*.
R142	23 May	SP 464470	Cropredy	Paddington-Birmingham (via Bicester)	W	Emb/ Flat	11.5-15	Patchy coarse vegetation with much recent heavy ballast tipping Bramble and nettle, coarse herb-poor *Arrhenatherum* and intermediates. Briar and hawthorn are also common.
					E	Emb/Flat	7.6-12	There is a small ballast flat by the line with *Vulpia bromoides* and *Filago* with *Poa/Festuca* or *Bromus erectus*, *Arrhenatherum* and *Leucanthemum* in coarser edges. The slopes are covered in a bramble and *Lonicera* thicket with abundant emergent nettle. Some coarse grass does grow on the slope to the N where ash is common.
R217	6 August	SO 837743	Hoobrook	Droitwich-Kidderminster	W	Cut/ Flat	7.2-9.4	Flat by the line turns from herb-poor *Arrhenatherum* at T1 with nettle, *Vicia cracca* and *Poa* to a *Bromus erectus* grassland with sub-dominant fescue and scattered *Poa* and *Convolvulus* at T2. The slope at T1 is *Holcus mollis* grassland with young oak and that at T2 is *Agrostis tenuis* with *Holcus mollis/ Arrhenatherum*.
					E	Flat/ Cut	6.4-8.2	The broad flat at T3 is *Poa/Festuca rubra/Holcus mollis* grassland locally herb-rich with abundant *Senecio*. T4 has considerable ballast dumping and a patchy surviving vegetation of coarse *Arrhenatherum* plus a handful of young oaks. *Trifolium arvense* and *Senecio viscosus* present.
R218	7 August	SP 022711	Alvechurch	Redditch branch (from Barnt Green)	E	Flat	2-2.5	Overgrown and woody with bramble thickets going over to young hawthorn, oak and ash with briar in a mixed deciduous scrub. *Convolvulus* on scrub margins and patches of coarse *Arrhenatherum*, fescue, couch and *Holcus lanatus* by line and fence.
					W	Flat	3-4.8	Also generally scrubby with ash/oak and elder scrub plus dense bramble thickets. The line side has rough *Arrhenatherum*/ fescue grassland or patches of nettle and *Galium aparine*. Rosebay and briar are occasional.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R219	7 August	SP 106720	Wood End	Birmingham-Stratford-upon-Avon	E	Flat/ Cut	15-30	Cutting to S has coarse herb-poor fescue/*Arrhenatherum*/*Poa* grassland with briar colonising. The broad flat above more herbs with couch, hawthorn plus meadowsweet, thistle, *Sanguisorba*, cowslip, *Serratula* and *Alchemilla*. The broad flat at T2 has mixed willow scrub over nettle, *Deschampsia cespitosa*, *Epilobium hirsutum* and meadowsweet. There are good species-rich damp clearings.
					W	Cut/ Flat	10-12	Generally herb-poor *Arrhenatherum* occasionally with *Festuca rubra* important, or *Alopecurus*, *Cirsium arvense* locally common. Large areas of dense blackthorn scrub with nettle on the edges. Strong symptoms of spraying on a wide scale.
R220	8 August	SK 104041	Shenstone	Lichfield-Birmingham	W	Flat	3-4	The northern part is mixed herb-poor calcifuge grassland of *Holcus mollis/Festuca rubra* with couch and *Agrostis tenuis*. Sparse nettle occurs. Southward it runs by a copse and has bramble, *Symphoricarpos*, nettle and *Galium aparine* in partial shade of pine, poplar, *Acer* and elder in copse. T2 is beyond this but similar with *Calystegia*/hogweed and a great deal of coarse *Arrhenatherum*.
					E	Flat	4.2-4.8	Generally grassy with the northern end similar to T1 but with less *Holcus* relative to the fescue and bent. *Potentilla reptans*, *Hieracium* spp and *Cirsium arvense* occur. The southern portion is coarser grassland, *Arrhenatherum* with patches of finer turf. Nettle, *Cirsium arvense* and hogweed are common with occasional low bushes.
R221	8 August	SP 112971	Lady Wood	Water Orton-Walsall	SW	Cut/ Emb/ Flats	8.8-15	The low cutting and flat at T1 has birch woodland with oak and sallow understorey. Ground cover of ivy and sparse grasses especially *Holcus mollis*. Bracken and bramble in open undergrowth. To SE on embankment and flat below is oak/birch woodland over hawthorn and older with an undergrowth of bramble and a ground cover of *Holcus*, *Deschampsia flexuosa*, nettle, hogweed, etc.
					NE	Cut/ Flat	3.2-8	The medium cutting at T4 has open oak woodland giving way above to hawthorn/sycamore scrub of hedge. Bramble, coarse grass sparse underneath T3 is a dense hedgerow of hawthorn/oak/ash with a little bramble/grass by line.
R222	9 August	SJ 682055	Dawley Parva	Horsehay branch (from Lightmoor & Madeley Junctions)	SW	Flat/ Cut	6-9	The northern area is a flat of hawthorn scrub with a little *Arrhenatherum* under it. The cutting to the south has coarse grasslands of *Arrhenatherum*, *Dactylis* and *Holcus mollis* with scattered birch and rosebay. The flat above is *Deschampsia flexuosa* grassland under a hedge of birch, oak and hazel. with *D. cespitosa*, ivy, *Agrostis tenuis* and *Holcus mollis* in lower lying parts of the flat.
					NE	Flat/ Cut	15.5-19.5	Broad flat by T4 is covered sallow scrub giving way near fence to sycamore woodland. Woundwort, nettle, bramble and *Galium aparine* below and hawthorn hedge at boundary. Rough *Arrhenatherum* and *Mentha rotundifolia* by line. The cutting at T3 is similar to T2 but with *Deschampsia flexuosa* dominant on upper bank. The 4m either side of the line have been heavily sprayed - grass dead.
R223	9 August	SJ 670050	Woodside	Buildwas branch (from Madeley Junction)	S	Cut/ Flat	6-7	Much of the side is a high retaining stone wall almost bare of vegetation except a few acrocarpous mosses and fine grasses. It runs adjacent to a canal bank and has some wetland plants on the wall top. T2 is just beyond the wall end; has an overgrown hawthorn hedge with sycamore and rough *Arrhenatherum* by line.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					N	Cut/ Flat	8-27	The flat at T4 is ballast and has recently cut privet under a sycamore tree. A little *Arrhenatherum*, ivy and *Calystegia* survive. T3 has been cut and sprayed, as well as ballasted by the line, but the upper slope is birch, sycamore and oak woodland over *Salix*, *Corylus*, oak and hawthorn near line, and *Ilex*, bramble and bracken above.
R224	10 August	SJ 805051	Albrighton	Shrewsbury-Wolverhampton	S	Cut (Flat/ Emb)	4.7-11.2	Ridges at T1 have herb-rich but species-poor *Arrhenatherum* grassland with mats of *Convolvulus* and nettle stands, *Arrhenatherum* and some bramble. The higher cutting at T2 etc has *Holcus mollis/Arrhenatherum* grassland with ballast and *Equisetum* below; couch/fescue and young elm scrub with bramble above and on flat.
					N	Cut (Flat/ Emb)	4.6-11.3	Ridge at T4 is heavily ballasted with *Arrhenatherum*, bramble, nettle and *Leucanthemum*. Toward T3, the slope is essentially like T4 but fescue is also significant and there is much bare ground, plus a little elm scrub. The flat above here is *Agrostis tenuis/Poa/Arrhenatherum* grassland. *Brachypodium pinnatum* by coss to W.
DR CREWE DIVISION								
R159	5 June	SJ 564442	Oss Mere	Crewe-Shrewsbury	E	Cut/ Emb	9.6	Cutting to S has areas of coarse mixed often quite herb-rich grassland of *Arrhenatherum*, *Poa*, *Festuca* and *Dactylis* with *Achillea millefolium*, cowslip, *Centaurea nigra* and hogweed common. Low bramble thicket above and spreading. Embankment to N has coarse grass by line: couch, *Holcus mollis* and fescue bramble thickets below and a dense nettle stand at foot.
					W	Cut/ Emb	7-8	Cutting mainly covered in high dense bramble thicket with emergent hawthorn. Track-side has coarse herb-poor mixed grassland. The embankment has a low bramble thicket, which has been recently sprayed.
R162	7 June	SJ 348663	Saltney	Chester-Holyhead	NE	Flat/ Ditch	9.8-11.2	Coarse herb-poor grassland of *Agropyron* and *Arrhenatherum* with *Poa*, *Dactylis*, fescue and occasional horsetail and nettle. Deep and wide still-water ditch with bramble festooning banks; locally with cleavers. Bare soil banks with moss by water.
					SW	Flat	5.6-6.6	Nettle stands mixed with coarse grasses: *Agropyron* and *Arrhenatherum*, plus cleavers and *Lathyrus pratensis*. Some bramble and an alder bush. *Euonymus* present. The bank is by a farm and a number of arable weeds grow here, *Senecio vulgaris* forma *lipulatus*.
R163	7 June	SJ 298601	Black Brook	Wrexham-Birkenhead	W	Flat	4	Tall thick hawthorn hedge over *Galium aparine* and *Urtica*, with scattered bramble. Patches of *Alliaria* and *Veronica sublobata* are also present. The front edge by the line has coarse *Arrhenatherum* grassland, herb and species-poor.
					E	Flat	4-9	Narrower S part has mixed rough vegetation of *Festuca rubra*, bramble and *Arrhenatherum* with low hawthorn bushes. The track side at T4 is similar but is *Festuca/Poa* grassland. The bulk of the flat however is covered in rosebay, bracken and *Holcus mollis* with patches of *Mercurialis*, *Endymion* and primrose. Bramble, couch, hogweed and *Arrhenatherum* in patches. Low hedge by fence.
R164	18 June	SJ 117838	Talacre	Chester-Holyhead	SW	Flat	4.2-5.6	Disturbed cindor and ballast with bunkers and huts. Open low bramble and grass especially *Vulpia myuros*, *Poa pratensis* and *Arrhenatherum*. Some low sallow bushes. *Cochlearia danica* on ballast of used line.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					NE	Flat	3.7-4.7	T3 is a low open bramble thicket with *Arrhenatherum*, *Armoracia* and scattered *Galium aparine*. There is then a signal box. A long hedge of *Salix fragilis*, pine and larch goes behind T4. Ivy forms a carpet with *Armoracia*, bramble, *Geranium pratense* and coarse grass. Elm is also common with garden escapes and *Sisymbrium orientale*.
R165	19 June	SH 916783	Llanddulas	Chester-Holyhead	S	Emb/ Flat	13-16	Mixed rough vegetation with open ballast grassland by line rich in species. The bank is bramble thicket with abundant bindweed, nettle, *Galium aparine*, *Cirsium arvense* and scattered hawthorn. A little *Epilobium hirsutum* is on the flat at the foot of T2. *Chamorhinum*.
					N	Emb/ Flat	14	The ballast flat by the line has ivy carpets and patches of *Centranthus*, with *Equisetum telmateia* where it is coarser. The slope at T3 has reed and bramble with *Galium aparine*. T4 has tall sycamore scrub over a continuous ivy carpet with nettle. *Poterium*, *Sagittaria* and a few other basicoles occur.
R166	19 June	SH 802767	Bryn Eistoddfod	Trawsfynydd branch (from Llandudno)	W	Flat	0.5	Very narrow ballast flat to wall by River Conwy. Very sparse vegetation of ephemerals, sycamore shoots, *Sedum* spp. North of the site it widens to give a broad rocky grass flat with abundant *Anthyllis*, *Lotus* and *Armeria*.
					E	Emb/ Flat	9.8	The bank is coarse grassland of *Arrhenatherum*, with *Festuca/ Poa* and *Dactylis*. Large patches of bramble; also *Bromus repens* and *Vicia hirsuta*. The foot of the bank has a muddy saline flat with fescue grassland on edge giving way to *Plantago maritima*, *Juncus gerardii*, *Triglochin maritima* and *Cochlearia*; and *Puccinellia* etc. *Spartina* clumps are out on the mud itself.
R167	19 June	SH 787717	Tal-y-cafn	Trawsfynydd branch (from Llandudno)	SE	Cut (Flat)	9.8-13	T1 has recently cut elm scrub, now with negligible plant cover on lower slope bar adventive bramble. It still is intact with a bramble briar undergrowth near the fence. T2 has mixed forb-rich coarse vegetation of bramble, nettle, ferns and hogweed, with patches of *Arrhenatherum*. *Vicia tetrasperma* of broad flat to S in area between T1 and T2 with *Leucanthemum*. Bryophytes common.
					NW	Flat/ Emb	5.4-7.8	T3 above river has coarse *Arrhenatherum* and couch/fescue with *Ononis laciniata*. T4 has open patchy dry grassland to a wall with *Holcus mollis*, *Geranium lucidum* and *Lepidium heterophyllum*. Ivy and *Arum* by wall. *Teucrium* and bramble elsewhere.
R168	20 June	SH 738780	Dwygyfylchi	Chester-Holyhead	N	Cut/ Flat	11-12	Most of the site is a dense high bramble thicket. T1 however is more open and has herb and species-rich dry mixed grassland of *Arrhenatherum/Poa/Festuca* plus abundant *Leucanthemum* and *Anthyllis*. Much ballast dumping near the line support *Hyoseris arvensis* and *Cardamine hirsuta*.
					S	Cut/ Flat	10-17	Again the W part is bramble-covered, but with emergent sycamore. T4 is generally bramble thicket also but much lower and more open (c 70% cover) with *Arrhenatherum*/fescue in the gaps.
R169	20 June	SH 549709	Menai Bridge	Chester-Holyhead	S	Flat/ Cut	32	Broad cinder flats of old sidings with sparse grassland of *Vulpia* spp., *Agrostis tenuis*, *Arrhenatherum*, *Hieracium* sp with frequent Musci. There are scattered birch and *Buddleja* bushes. Further from the line, the cover is more extensive but similar in make-up if richer in species. There is then a low cutting slope covered in deciduous scrub of sycamore with ash, elm and birch over an ivy carpet with nettle and *Dryopteris* scattered.
					N	Flat	3.2-3.5	Rough calcifuge grassland of *Holcus mollis* and *Arrhenatherum* with patches of low oak scrub, especially *Quercus cerris* plus bramble.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R170	21 June	SH 411876	Penrhyn	Amlwch branch (from Gaerwen)	W	Flat/ Emb	2-4	T1 has mixed grassland of *Poa pratensis*, *Dactylis*, *Anthoxanthum*, *Deschampsia cespitosa*, *Festuca rubra*, *Holcus lanatus* and *Arrhenatherum*. It is herb-poor with a little low bramble. Some hawthorn scrub by stream valley over *Dryopteris* and *Geranium laevidum*. T2 is coarse bramble and *Arrhenatherum* mixture on a low embankment. *Ophioglossum* recorded.
					E	Flat/ Emb	1.6-3.2	The flat of T4 has very similar grassland to T1 but drier with bent instead of *Deschampsia*. T3 on the embankment is also mixed grassland but with fescue most common. Hawthorn scrub as W. *Hypericum humifusum*.
R171	21 June	SH 421009	Dwygir	Amlwch branch (from Gaerwen)	SE	Cut/ Flat	3.2-4.4	Coarse herb-poor grassland dominated by *Dactylis*, with *Poa*, *Festuca rubra* and *Holcus lanatus*, plus some *Arrhenatherum*. A few hawthorn and bramble areas. *Jasione* and *Cochlearia officinalis* in shorter grassland, plus *Hypericum humifusum* on cinder edge.
					NW	Cut/ Flat	4-4.8	Similar but with *Dactylis* and *Anthoxanthum* co-dominant. There are a number of gorse bushes and a little bramble.
R172	21 June	SH 441787	Ty-mawr	Amlwch branch (from Gaerwen)	SW	Cut/ Flat	4.7-6.6	T1 in a low cutting with a runnel at its base full of *Silene* seedlings, *Lemna* and *Nasturtium*. The bank is coarse mixed grassland of *Dactylis*, *Arrhenatherum*, *Poa trivialis*, *Silene dioica* and *Geranium robertianum*, plus *Dryopteris*. This and T4 cleared of scrub in 1978. T2 is flat with a narrow water ditch and similar grassland to T1.
					NE	Flat/ Cut	1.8-5	T3 is a very narrow flat, grazed to produce a quite rich turf of fescue/bent with *Carex flacca*, *Hira* etc. T4 scrub stumps and much *Silene dioica*, *Tamus*, *Geranium robertianum* and ivy. Thorn regenerating.
R173	22 June	SH 349723	Ty-croes	Chester-Holyhead	NE	Flat/ Emb	1.2-9	Narrow flat toward station is cinder with herb and species-rich *Poa*/fescue/bent grassland with much *Hypericum* and rosebay. Embankment is mainly bramble, briar and thorn with patches of coarse *Arrhenatherum*.
					SW	Emb(& Flat)	6-9	Much very dense blackthorn scrub with no ground cover. Patches of elder scrub, also with bramble, nettle and *Galium aparine*. Grassy areas have coarse *Arrhenatherum* with fescue, *Teucrium* and *Hieracium*. *Lepidium heterophyllum* with *Pilosella* and *Anthoxanthum* on cinder above. Stone walls on both sides have small ferns etc. *Carex arenaria* on cinder by line.
R174	24 June	SJ 346109	Westbury	Shrewsbury-Aberystwyth	S	Cut/ Emb	3.5	T1 is a low cutting to W with coarse *Festuca rubra* grassland by the line and bramble/nettle near fence. T2 is a low embankment with hawthorn scrub, bramble, horsetail and some more coarse grassland.
					N	Flat	3.2-5.6	Cinder flat with *Vulpia myuros* grassland. *Festuca rubra* and *Agrostis stolonifera*, with *Trifolium dubium* and *Medicago lupulina* plus ribwort making it forb-rich. T1 is considerably coarser and has *Arrhenatherum*/*Dactylis* dominant with bramble and clover. A large patch of *Centaurium* and some *Helictotrichon pratense*. Barer cinder covered in moss and lichens.
R175	24 June	SH 534122	Upton Magna	Shrewsbury-Wolverhampton	S	Cut(& Flat)	10-13	Bramble thickets, some dense and some more open or colonising *Arrhenatherum* coarse grassland, with *Cirsium arvense*, fescue, *Tussilago*, hogweed, horsetail, couch and *Anthoxanthum*. Upper edge by fence grazed and shorter grassland with similar species, richer and much ribwort.
					N	Cut(& Flat)	10.5-12	Very similar but bramble generally denser and more extensive, with large nettle patches plus *Cirsium arvense*. *Arrhenatherum* is coarse with *Silene alba*. Some soil disturbance allows in arable weeds. Probably polluted from agricultural runoff.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R176	25 June	SJ 381263	Henbarns	Wrexham-Shrewsbury	NE	Cut/ Emb	4.2-4.8	Low ridge covered in dry mixed grassland of *Arrhenatherum* and *Poa pratensis*, plus *Dactylis*, fescue and some low bramble. Locally herb-rich with *Linaria repens* and *Centaurea scabiosa*. A number of annuals on ballast at foot of slope.
					SW	Cut/ Flat	6-6.3	Coarse grassland of couch with *Arrhenatherum/Poa* plus bramble/briar. Locally herb-rich with little couch, and much *Tanacetum* and *Centaurea scabiosa*. Many grass species have significant cover values.
R177	25 June	SJ 433222	Baschurch	Wrexham-Shrewsbury	SW	Cut/ Emb	4.6-4.8	Both the cutting to the NW and embankment to SE have coarse mainly herb-poor *Arrhenatherum* grassland, locally with fescue common. Bramble is encroaching and *Tanacetum/Silene alba* are common with *Bryonia* and nettle/*Glechoma* in coarser parts. *Equisetum* locally common.
					NE	Cut/ Emb	4.2-4.8	Genetally similar but richer in herbs and more heterogenous. *Lathyrus pratensis*, *Plantago lanceolata*, *Leucanthemum*, yarrow with nettle and *Anthriscus* in ranker areas (embankment) are the common forbs. Locally *Centaurea scabiosa* and *Knautia* are abundant.
R178	25 June	SJ 293350	Pentre Aaron	Wrexham-Shrewsbury	W	Cut(& Flat)	7-8	Area of fairly recent ballast and cinder tipping colonised by abundant *Equisetum* with *Arrhenatherum*, *Agrostis stolonifera* and a number of tall herbs quite common. Bramble is occasional and *Chamerhinum* has significant cover value.
					E	Cut(& Flat)	6.6-8	More diverse. There are some areas with essentially the same vegetation, but much of it is dry herb and species-rich basicolous grassland. *Arrhenatherum* and fescue with *Knautia*, *Centaurea scabiosa*, *Vicia sativa* ssp *nigra*, hogweed and some low bramble. *Prunus spinosa* has a large clump at T4. *Knautia*, *Fragaria* and *Linum* locally common.
R179	26 June	SO 195970	Montgomery	Shrewsbury-Aberystwyth	N	Emb(& Flat)	5.8-6	The site has had a great deal of ballast tipping and shows signs of burning. The main cover is bramble, generally in a low open thicket with emergent nettle and thistle. Ash is occasional and *Arrhenatherum* grassland local near fence.
					S	Flat & Emb & Cut	9-10	Low cutting slope in W at T3 has coarse *Arrhenatherum* grassland with fescue and bramble, plus hogweed and some cowslip. Couch and bramble occupy the flat above with thistle, foxtail etc. The embankment at T4 has mixed coarse vegetation of bramble, oak bushes, *Arrhenatherum*, *Galium aparine* and nettle, the latter becoming dominant at foot of slope.
R180	26 June	SO 164951	Abermule	Shrewsbury-Aberystwyth	W	Cut/ Flat	7-8	By the line herb and species-poor *Arrhenatherum* grassland often with *Poa pratensis* co-dominant. Patches of *Ficaria bulbifera*, plus fescue occasionally common. Above and on flat turns to low oak scrub with a locally thick undergrowth of briar and bramble. *Glechoma* and *Pteridium* common. Meadowsweet and damp grass by fence.
					E	Cut/ Flat	10-10.5	Generally a scrubby bank with oak, rose and hawthorn dominant over bramble and a good variety of forbs underneath. Damp acid to neutral grassland occurs near the line and where grazing keeps bushes down by the fence. *Arrhenatherum*, *Dactylis*, *Anthoxanthum* and fescue etc. *Linaria repens* *Allium vineale*.
R181	27 June	SO 466961	All Stretton	Shrewsbury-Newport	E	Cut(& Flat)	9.6-10	Species-rich mixed grassland made up of *Poa pratensis*, *Arrhenatherum*, *Anthoxanthum* and *Holcus lanatus*. Herb-rich with *Leucanthemum*, *Hypochaeris*, *Trifolium pratense*, *Centaurea nigra* and *Cirsium arvense* all locally common. Some low bramble invading. Ant-hills increase diversity. Grassland very heterogenous.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					W	Cut(& Flat)	7-7.6	Generally much coarser and poorer with rosebay/bramble/ briar thickets, and ranker fescue grassland. However local areas have very rich turf with *Festuca rubra, Plantago lanceolata, Fragaria, Agrostis tenuis, Rhinanthus, Leucanthemum, Viola riviniana,* yarrow and *Anthoxanthum* all common.
R182	27 June	SO 442912	Little Stretton	Shrewsbury-Newport	W	Flat/ Ditch	8.6-9.6	Site dominated by rank nettle stands with meadowsweet, thistle, *Silene dioica*, hogweed and locally *Arrhenatherum* and bramble in a eutrophicated tall herb vegetation. A clear fast-flowing stream passes along the bank, but with little or no specifically wetland vegetation.
					E	Flat	2.7-3.3	Much more species-rich, being a coarse *Arrhenatherum* or fescue/couch grassland with *Viola riviniana* common as well as the rank nettle, *Stachys sylvatica, Cirsium arvense*, bramble, horsetail and goosegrass more typical of the W. A few elder bushes.
R183	28 June	SJ 286374	Cbirk	Chester-Shrewsbury	E	Cut(& Flat)	11.5-14.6	Coarse *Arrhenatherum/Festuca rubra* grassland rather species-poor but often herb-rich with *Potentilla reptans, Leucanthemum*, hogweed and yarrow passing into a bramble thicket on the upper slope. Locally there are species-rich patches of *Poa, Trisetum, Anthoxanthum* with *Geranium pyrenaicum* etc.
					W	Cut(& Flat)	10-12	Much of the bank is covered in tall rosebay stands, with thistle, couch and bramble. Slopes near the line are more grassy and locally species-rich having *Arrhenatherum*/fescue with *Ranunculus acris, Centaurea nigra*, hogweed and *Hypericum maculatum*. Ballast tippings have *Tussilago* and coarse grasses.
R192	9 July	SN 648797	Capel Bangor	Vale of Rheidol Light Railway	SW	Flat	1.5-2.7	Generally herb and species-rich mixed and grazed calcifuge turf. *Agrostis tenuis*, fescue and *Anthoxanthum* with *Lotus* yarrow, clover and buttercup. The rougher E part has bracken and bramble with *Galium aparine* and nettle emergent. *Holcus mollis* grassland is found by the ccas!
					NE	Emb/ Flat	2	Flat at T3 has *Vulpia bromoides* and *Potentilla anglica* by ccas. The fescue/*Anthoxanthum* forb and species-rich calcifuge grassland with yarrow and bryophytes. A more intensely grazed area near the fence has *Trifolium repens, Agrostis* and ribwort Good flora with milkwort, bilberry, *Veronica officinalis, Aira* spp. The bank at T4 is unstable with bramble and blackthorn and generally coarser grasses.
R193	10 July	SN 677784	Abermant	Vale of Rheidol Light Railway	SE	Cut	2.5-6	Higher W part has mixture of herb and species-rich calcifuge grassland and encroaching scrub. Fescue/bent and *Anthoxanthum* with tormentil etc and tufts of coarser grasses. Oak/hazel scrub with bramble and apply coming in. Eastward line goes into oak wood and BR bank is *Anthoxanthum/Solidago/ Deschampsia flexuosa* grassland with much moss, fescue and patches of *Melampyrum, Galium* also here.
					NW	Flat	1.5-1.7	Western part is calcifuge turf of fescue/Bent, herb-rich with tormentil, *Lotus* and *Leontodon*. Some bramble and heather. In the woodland T3 is an open bramble thicket with honeysuckle and ferns plus birch. Good species list for a small site.
R194	10 July	SN 728777	Rhiwfron	Vale of Rheidol Light Railway	S	Cut	4-5.7	Unstable rocky slope with patchy vegetation of calcifuge grasses (bent, *Anthoxanthum* and *Deschampsia flexuosa*), tall herbs (foxglove and *Teucrium*) and sparse bushes (oak and birch). Tormentil common. In burnt areas *Vaccinium myrtillus* and *Calluna*, plus *Molinia* and Musci are common. Cut into side of hill and line goes round bluff.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					N	Emb	2.8-12.2	Generally similar vegetation on shale scree and ballast slope. Fern tufts are common and the higher slope has a more or less continuous vegetation cover of low birch scrub over mosses. *Teucrium* and *Viola riviniana*. The lower edge has *D. flexuosa* dominant under oak from adjacent woodland. *Anemone* and *Oxalis* present.
R195	11 July	SH 694398	Trawsfynydd	Trawsfynydd branch (from Llandudno)	E	Flat/ Cut	14-21	Damp calcifuge grassland with patches of fern and tall herb. Bent, fescue, *Anthoxanthum*, *Sieglingia* and *Carduus* plus rushes, sneezewort, tormentil, *Holcus mollis*, *Hypericum maculatum* and *Platanthera chlorantha*. Disturbed areas have much *Epilobium montanum*, cleavers and sorrel. Sallow scrub occurs near T2 over orchids, wetland forbs and *Carex pallescens*. Some hawthorn, *Rubus spp* and bracken. *Carex arenaria* on cinder.
					W	Flat/ Emb	24-30	Broad cinder flats covered in open turf of clover, *Agrostis stolonifera*, *Prunella* and *Leontodon autumnalis* plus *Catapodium rigidum* and *Vulpia myuros*. Coarser with low bushes near the line. By buildings at S end (T4) mixed turf with much *Cynosurus* and ferns on old platform. Embankment at W edge mainly bracken over *Holcus mollis*.
R196	11 July	SH 463374	Glanllynnau	Pwllheli branch (from Machynlleth & Shrewsbury)	N	Flat	6.6-11	Generally mixed dry calcifuge grassland of *Holcus mollis*, *Arrhenatherum*, *Dactylis*, *Festuca ovina*, *Agrostis tenuis* and *Poa* spp. There are large patches of *Teucrium scorodonia* and some areas have been burnt recently. *Cytisus* especially has suffered. Some bramble patches and dry sandy bare places with *Carex arenaria*, *Tipuna drucei* and *Sedum anglicum*.
					S	Cut(& Flat)	2.4-8.4	Bank to low cliff top above beach. Generally coarse and overgrown with bramble, bracken, *Erica cinerea* and gorse. The grassy areas are often herb and species-rich *Dactylis/ Poa/Holcus mollis/Festuca* plus *Viola cracca* and *Teucrium*. *Aira* is common in open sandy places and *Luzula sylvatica*, *Hedlichia*, *Polypodium* and *Juniperus* grow at the bottom of the cutting in more sheltered area.
R197	12 July	SN 623880	Dolybont	Aberystwyth branch (from Machynlleth & Shrewsbury)	NE	Cut/ Emb	8-9.4	A ridge with low cutting by the line, then a slope down to fence. The vegetation by the line has been recently cut back. Coarse *Arrhenatherum* grassland with *Pteridium* clumps. Bracken stands merging into tall forb communities of *Eupatorium* and meadowsweet. Some bramble and tall ash, sycamore and hazel scrub along fence.
					SW	Cut(& Flat)	9-14	Slopes up to road mostly covered in low, dense and impenetrable scrub of blackthorn, hazel plus hawthorn, gorse, bramble and briar. The lower edge has been cut back and a number of shade species occur. T3 is waterlogged and has *Oenanthe crocata* over a turf of *Chrysosplenium* with ferns and *Phalaris*. T4 has bracken and species-rich coarse grass.
R198	12 July	SN 626934	Afon Lori	Aberystwyth branch (from Machynlleth & Shrewsbury)	N	Emb(& Flat)	4-4.2	Coarse herb-poor *Arrhenatherum* grassland with bramble patches. Poached zone by line patchy grassland of *Festuca rubra*, *Anthoxanthum* and *Holcus lanatus* with *Plantago lanceolata*. Good populations of *Linaria repens* and *Trifolium arvense* on cinder here, with *Vulpia bromoides*.
					S	Flat(& Emb/ Ditch)	19-22	Bank by line has similar vegetation to N. Then a broad flat covered in bramble thicket, reed-bed or sallow scrub. The latter has a little bramble, buckler fern, reed and *Holcus lanatus* underneath. Deep ditch recently dredged has some reed, *Agrostis stolonifera* and *Schoenoplectus tabernaemontani*. Spoil heaps to fence and colonised patchily with mixture of wetland and coarse grassland species.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R207	29 July	SJ 888640	High Bent	Macclesfield-Stoke-on-Trent	NW	Cut(& Flat)	14.5-19.1	Coarse tall herb rough grassland of rosebay, *Arrhenatherum* and *Trifolium medium*, with bramble and hogweed, or thistle. Scattered trees of sycamore and ash, plus hawthorn and sycamore bushes. Locally less coarse especially above with little woody growth, more couch, forbs and bent etc.
					SE	Cut(& Flat)	14.5-19.8	Similar but with rosebay more abundant and often dominant. Large areas of *Arrhenatherum* with *Agropyron*, bramble and hogweed. Much scrub colonisation by briar, sallow and oak with hawthorn abundant on and near flat at top. *Holcus mollis* significant on flat also.
R208	29 July	SJ 897660	Ladderstile	Macclesfield-Stoke-on-Trent	SE	Emb(& Flat)	13-23.5	A mixture of tall herbs - rosebay and meadowsweet with much low bramble locally becoming dominant. Nettles become common near the foot of the slope and sallow is colonising site. Flat by the line has coarse mixed grassland and grazed flat below is quite rich in low forbs.
					NW	Emb(& Flat)	13.4-21.2	More variable. Coarse grassland of *Arrhenatherum* etc with areas of forb-rich vegetation, with *Trifolium medium*, hogweed, *Centaurea nigra*. Elsewhere tall herb vegetation of nettle, rosebay and *Vicia cracca* with invading *Rubus* spp. A sycamore tree but few bushes. Grazed flat below.
R209	30 July	SJ 861607	Upper Hulme	Macclesfield-Stoke-on-Trent	NW	Cut(& Flat)	7.9-10.6	Much dense impenetrable bramble over thick ballast and cinder dumping. Areas of *Solanum dulcamara* occur and rough *Arrhenatherum* and couch by line. Flat to fence well grazed with mixed grasses especially *Agrostis tenuis* and *Holcus mollis*, plus clover, sorrel and *Potentilla anglica*.
					SE	Cut(& Flat)	7.4-10	Less woody with main cover a very coarse mixed grassland of *Arrhenatherum*, *Dactylis*, *Agropyron* and *Alopecurus*. A little *Trifolium medium* and *Holcus mollis*. Some bramble patches near T4 and richer there.In tall herbs: rosebay, meadowsweet and *Cirsium arvense*. Flat by fence as NW.
R210	30 July	SJ 797658	Madeley Heath	Holditch colliery branch	NW	Flat	0.7-1.5	Cinder flat covered in open *Festuca rubra*/*Dactylis* grassland with rosebay and *Hypericum maculatum*. Scattered low broom, briar and sallow. Narrowing to SW and under shade of birch trees on adjacent land. Here is a narrow band of ivy with *Lathyrus pratensis* and a few forbs.
					SE	Flat/ Emb	5.9-12.1	The flat by the line has a similar vegetation to the NW but with more regenerating and colonising low sallow. The T3 embankment is coarse *Dactylis*, *Arrhenatherum* and *Holcus mollis* with rosebay, *Rubus* spp and lilac. T4 is ash, oak and sycamore woodland over poplar, *Arrhenatherum*, mercury, ivy and violets.
R211	31 July	SJ 750519	Casey Bridge	Euston-Crewe	W	Cut(& Flat)	9	Mixed dry calcifuge grassland of *Agrostis tenuis*, *Festuca rubra*, *Dactylis* and *Holcus mollis*. Rarely coarser with *Arrhenatherum*. Herb-poor with *Lotus*, *Centaurea nigra*, *Vicia cracca*, yarrow and hawkweed. Bare sand colonised by *Cerastium arvense* and *Lepidium heterophyllum*.
					E	Flat(& Cut)	36-65	Uneven area of old sand extraction with mosaic of communities. Forb-rich turf of fescue/bent and *Aira* with *Lotus* especially abundant. Many lichens and acrocarpous mosses. Coarser couch and *Arrhenatherum* grassland and tall rosebay stands. Mixed grassland with abundant *Potentilla anglica*. Bramble patches and areas of aspen and sallow scrub. *Cerastium arvense* locally common, as are *Lepidium* and *Verbascum nigrum*.
R212	31 July	SJ 762539	Oakhanger	Crewe-Kidsgrove	N	Cut/ Emb/ Flat	6.2-8.4	Cutting to E (T1) has very rank herb-poor *Arrhenatherum* grassland with *Dactylis* and couch. On the flat above *Holcus mollis*, nettle, *Anthriscus* and *Galium aparine* also occur. A low ditch by the line here is covered in *Phalaris*, T2, the embankment, is dominated by raspberry and/or nettle with a flora of coarse species like T1, goosegrass being especially common with nettle on flat below.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					S	Emb/ Flat	7.8-8.0	Fescue/*Holcus mollis* grassland by line giving way to bramble/ briar with tall herbs - *Myrrhis* and *Equisetum arvense*. Near the fence couch and *Holcus mollis* become commoner with nettle. T4 to the E has denser bramble and purer nettle stands. *Cardamine pratensis* grows by the line at T4.
R213	1 August	SK 000489	Consall	Oakamoor branch (from Leekbrook & Stoke-on-Trent)	E	Flat/ Emb	3-15	T1 is narrow cinder flat to canal wall covered in open birch/ sallow scrub over patchy fescue/*Poa* grassland. T2 has a horsetail stand by the line; male fern, rosebay, nettle, butterbur and bramble on the embankment and *Glyceria maxima* on flat by canal.
					W	Flat/ Emb	24-29	The broad flat by the old station is dominated by butterbur and rosebay with *Galium aparine* and occasional patches of herb-rich dry grassland. The slope down to the R. Churnet has woodland of *Salix fragilis* over ash and hawthorn, plus mercury and nettle. Where the slope leaves the shore ash is dominant with *Prunus padus* over ivy and mercury and a broad flat occasionally flooded below it has butterbur and tall grasses. Alder, *Impatiens glandulifera* etc by river.
R214	2 August	SJ 892356	Meaford	Stafford-Stoke	E	Cut(& Flat)	9.8-16	Dense thickets of rosebay and bramble with scrub cut back recently - some left and some regeneration. Nettle locally common with *Silene dioica* in the *Rubus*. Elm bushes commoner to north and on flat above local areas of *Holcus mollis* grassland with *Agrostis tenuis*. Generally disturbed and some bare sand.
					W	Cut(& Flat)	7-12	The S (T4) is rather similar to the E side but with rather denser more extensive bramble and more *Galium aparine*. T3 is scrub-covered with sallow, sycamore and young *Prunus avium*. below and tall cherry and elm trees on the flat above. Bramble bracken, mercury in scrub; ivy, bluebell under tall trees.
R215	2 August	SJ 886393	Wedgwood	Stafford-Stoke	E	Emb(& Flat)	12.6-14.2	Mainly scrubby and overgrown. Alder with occasional sycamore along lower slopes. The remainder bramble, briar, raspberry, rosebay and nettle in various impenetrable combinations. The track-sides are ballasted and possess a greater variety of forbs. A culvert goes under the line at T2.
					W	Emb(& Flat)	9-13	Fewer tall trees but more hawthorn and denser thickets with *Rosa arvensis* notably common. T1 had ash scrub over a scree of ballast with some nettle and hawthorn. The lower edge has some marshy grassland on the flat but only *Stellaria alsine* and *Alopecurus geniculatus* among less frequent species.
R216	3 August	SJ 967278	Pitt's Column	Colwich-Stone	S	Cut/ Flat	9.4-10	Rather varied. Areas of rosebay; *Arrhenatherum* grassland with foxglove, nettle stands; *Holcus mollis/Agrostis tenuis/Festuca rubra* grassland on flat above. T1 has some partially cleared elm/ash/hawthorn scrub with a great deal of moss, *Silene dioica*, foxglove, ivy, bramble and nettle.
					N	Cut/ Flat	7-8.6	Generally rather open bramble thickets with patches of coarse *Arrhenatherum* and *Senecio sylvaticus* on bare soil, especially near the disturbed track edge. Scattered scrub occurs, and there is a good variety of annuals. The flat above T4 is a hogweed/nettle/rosebay community with thistle.
DR LIVERPOOL DIVISION								
R143	28 May	SJ 605872	Statham	Liverpool-Stockport (via Widnes & Warrington)	S	Cut(& Flat)	8.0-9.8	Very poor and disturbed with ballast dumping. Open bramble and *Arrhenatherum*. Near the AP to the W is a raspberry thicket with emergent sallow and nettle. There is a narrow strip of *Holcus mollis* grassland by the fence with rosebay but most of the site has been obscured by broad spread calcareous ballast.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					N	Cut(& Flat)	6-8.6	Almost all dense high bramble thicket. Rather more open in the W where ballast dumping supports *Tussilago*, *Arrhenatherum*, *Centaurea nigra* and *Holcus mollis*. A number of garden escapes.
R144	29 May	SJ 688879	Rushgreen	Liverpool-Stockport (via Widnes & Warrington)	N	Flat	3.2-3.4	*Holcus mollis* grassland, poor in species and forbs with yarrow and fescue. Some coarser ground with rosebay, *Arrhenatherum* and *Ranunculus* in the W. Quite a lot of bracken in patches.
					S	Flat	3.2-3.7	Coarse herb-poor *Arrhenatherum* grassland with *Dactylis/Poa* or occasionally *Holcus mollis*, *Agrostis tenuis* and *Festuca rubra* co-dominant. Bramble patches are quite frequent and a ballast ridge by the line has *Hypochaeris*, *Rumex acetosa* and acrocarpous mosses.
R145	29 May	SJ 703882	Heatley	Liverpool-Stockport (via Widnes & Warrington)	S	Flat	3.3-3.7	Open rather disturbed cinder/ballast flat, quite species-rich. *Holcus lanatus*, *Hypochaeris*, *Hypericum*, *Agrostis*, *Plantago* with bramble, hawkweeds and *Arrhenatherum* at the more disturbed fence edge. Trampled areas from *Bromus sterilis*, *Taraxacum* and *Tussilago*.
					N	Emb/ Flat	4.6-4.9	Abundant dumped ballast with patchy vegetation of *Festuca rubra*, *Arrhenatherum* and bramble. The edge by the fence has nettle common. *Senecio vulgaris* forma *ligulatus* is common on the new ballast.
R146	30 May	SJ 684921	Glazebrook Moss	Liverpool-Manchester (via Warrington)	S	Cut/ Flat	9-10.6	Coarse *Arrhenatherum/Dactylis* grassland, herb-rich with *Viola riviniana* and *Stellaria holostea* giving way to couch on flat above with a little rosebay. To the W is an old walled bunker with mixed disturbed vegetation below and hawthorn on flat above.
					N	Cut/ Flat	8.4-9.6	Very similar to S but with the western end a normal slope covered in *Holcus mollis* grassland with raspberry and bramble below and rosebay above invading. There is a species-rich ballast flat at the foot of the bank to the E with birch, *Hypericum*, etc.
R147	30 May	SJ 525903	Bold Heath	Ditton-St. Helens	E	Cut/ Flat	8-9.8	Quite herb-rich *Festuca rubra/Arrhenatherum* grassland on slope with clover, yarrow, plantain, sorrel and tormentil, plus *Centaurea nigra* and *Hieracium* where coarser. Flat above is herb-poor with *Holcus mollis* and bent, and couch by the fence. Some bramble. *Carpinus* present.
					W	Cut/ Flat	9.8-11.4	Generally quite herb-rich mixed calcifuge grassland of *Agrostis tenuis*, *Holcus mollis* and *Festuca rubra*, with *Hieracium*, *Ranunculus*, *Lathyrus pratensis* and *Potentilla reptans*. Dense bramble thickets cover the southern end with coarser grassland. *Sedum telephium* occasional.
R151	2 June	SJ 521711	Mouldsworth	Northwich-Chester	S	Cut/ Emb	9.8-21.8	Cutting in the W has *Holcus mollis* grassland with several tall sycamore trees. A hybrid swarm of campions and disturbance due to rabbit burrows above. Grazed turf with more *Poa* as well as *Pilosella* and *Luzula* by fence. Some birch trees. Embankment is a bramble thicket with emergent rosebay especially below and a ditch with wetland species.
					N	Cut/ Emb	12.3-13.2	Cutting mostly bracken covered, with a few oak trees of *Holcus mollis* near the fence. A good patch of forb-rich calcifuge turf, once burnt W of site. Embankment covered in bracken; grass and *Viola* by line.
R152	2 June	SJ 527712	Spy Hill	Northwich-Chester	S	Cut/ Emb/ Flat	4.6-7	Cutting in west has mixed grassland of *Arrhenatherum*, *Festuca rubra* and *Holcus mollis* with low invading bramble and bracken. The embankment is mainly a bramble thicket with patches of grassland similar to but coarser than Cut. Slope goes down to pond in field.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					N	Emb/ Flat	1-4	By the bridge very narrow and in shade of oak on neighbouring land. Cinder with bramble and sparse fescue. T3 has a bramble thicket with coarse *Arrhenatherum/Holcus mollis* grassland and a nettle patch. Bank in between is sandy with *Cerastium diffusum* and *Myosotis discolor*.
R153	3 June	SD 501217	Cocker Bar	Preston-Liverpool	W	Cut/ Flat	4.5-4.9	Low bramble patches and hawthorn bushes with grassy patches by the line; some coarse, some good turf with *Carex flacca* and cowslip.
					E	Cut/ Flat	7-7.6	Old track bed has ballast flat with open grassland, rosebay and sallow in a very species-rich community with a lot of moss. Concrete guttering at foot of slope, filled with water. Slope has very good basicolous species and forb-rich turf with fescue, clover, cowslip and *Anthoxanthum*, as well as *Carex flacca* in big patches. Coarser in north and partially burnt. *Arrhenatherum*, bramble and *Centaurea nigra*. Wide marshy flat north of site with sallow scrub, *Typha* and *Glyceria* stands.
R154	3 June	SD 401143	Boscar Lane	Wigan-Southport	NE	Flat/ Emb	0.5-4.2	T2 very narrow by lorry park: bent grassland on ballast with *Aira praecox* etc. This occurs to the SE along top of T1 also, where *Polytrichum juniperinum* and *Hypochoeris* are common. Slope below is coarse *Arrhenatherum* with sallow.
					SW	Flat/ Emb	3.4-4.4	Mixed coarse calcifuge grassland of *Anthoxanthum/Agrostis tenuis* or *Arrhenatherum/Poa*, and intermediates. Herb-rich with abundant *Equisetum arvense*, *Potentilla reptans*, *Hypochoeris* (on ballast). Much naturalised *Euphorbia*. *Cerastium diffusum* on line, and *Carex arenaria* on cinder all along edge of line.
R155	4 June	SJ 685745	Lostock Gralam	Manchester-Northwich	S	Flat	1.3-2	Ballast verge to fence with coarse vegetation of bramble, *Arrhenatherum* and hogweed, thistle etc. Some moss on the ballast. Mainly rough grass.
					N	Flat/ Emb	4.8	Very similar but better developed. T3 is a bramble thicket with emergent nettle. T4 is coarse *Arrhenatherum* with scattered low bramble. A little rosebay and raspberry also occurs.
R156	4 June	SJ 651692	Moulton	Crewe-Preston	SW	Cut(& Flat)	12-15.6	Mosaic of calcifuge vegetation: *Agrostis tenuis* grassland, *Hypochoeris* patches, sallow/broom scrub and *Holcus mollis* swards. *Rumex* is frequent and *Trifolium medium* common. Fescue common near line. Narrow flat above has mixed coarse grassland and bramble.
					NE	Cut/ Flat	16-21	Generally poor recently burnt *Holcus mollis* grassland with some invading bramble and rosebay, plus charred broom and sallow. Some areas of *Arrhenatherum/Dactylis*, or *Agrostis*. Couch under broom. Bramble/*Pteridium* on flat of T4. *Dactylorhiza praetermissa* here.
R157	5 June	SJ 556703	Dolamore	Northwich-Chester	S	Cut/ Emb	4-4.9	*Holcus mollis* grassland with bracken on the cutting and more disturbed vegetation of *Poa/Festuca rubra* with goosegrass colonising bare ballast on the embankment, otherwise similar. Young birch scrub.
					N	Cut/ Emb	4-5.6	Essentially similar with however rather more bracken and birch, the latter apparently a hybrid population. *Corydalis claviculata* present.
R158	5 June	SJ 385720	Lea-by-Backford	Chester-Birkenhead	W	Cut(& Flat)	9.6-10	Markedly herb and species-poor *Arrhenatherum* grassland, with occasional patches of bramble and scattered bushes above, oak and hawthorn. Foxtail, clovers and *Poa* frequent. *Silaum* and *Pimpinella major* are among the less common species.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					E	Cut(& Flat)	9.96	Similar but with less scrub and a more mixed occasionally quite herb-rich grassland. *Festuca rubra*, *Poa* spp, *Alopecurus* are often sub-dominant. Frequent forbs are violet, *Centaurea nigra*, *Anthriscus* and *Cirsium arvense*. Cowslip, betony and *Trisetum* all grow here.
R160	6 June	SJ 284907	Bidston	Wrexham-Birkenhead	NW	Emb/ Flat	3.5-3.8	Rough disturbed vegetation: low bramble thickets, coarse *Arrhenatherum* and couch. Nettle, thistle and cocksfoot.
					SE	Flat	44-49	Open cinder flat with zone by line. Then broad marshy area with areas of sallow carr over open water. Reed-beds. Generally a wet tussocky *Arrhenatherum* grassland with areas of *Alopecurus*, *Juncus* and *Polygonum amphibium* are common. Water-filled depressions have *Agrostis stolonifera*. Bramble thickets occur on edge of carr and by fence. *Hydrocotyle* common. *Calamagrostis canescens* and *Dryopteris carthusiana*.
R161	6 June	SJ 347792	Eastham	Chester-Birkenhead	E	Emb/ Flat	18-29	Flat is old track bed covered in ballast, light colonisation of fescue, *Vulpia*, *Arrhenatherum*, rosebay and *Dactylis*. Slope is mixed deciduous woodland of elm, oak, ash, birch and sycamore over bramble thickets, grassland, ferns, ivy, sallow and hawthorn. Tall herbs such as *Silene*, *Anthriscus*, cleavers and nettle are common. Birch is colonising track bed.
					W	Emb(& Flat)	11-16	Mostly coarse *Arrhenatherum* grassland, herb and species-poor. Hogweed is quite frequent and *Poa*, fescue, *Anthriscus*, *Dactylis* and thistle occur. Bottom is scrub of sallow or briar/bramble or gorse, hawthorn and cleavers.
BR MANCHESTER DIVISION								
R148	31 May	SD 658048	Daisy Hill	Wigan-Manchester	S	Cut/ Flat	14.8-15.2	Flat by line is open ballast with sparse *Arrhenatherum*. The west end has *Polygonum bistorta* patches, and fescue/bent grassland on the slope. The cuttings east end has mixed calcifuge grassland with bent and *Holcus mollis*. A dip in between has coarse *Arrhenatherum*, sycamore and sallow
					N	Cut/ Flat	9.4-20	By the station the bank is disturbed grassland rich in garden escapes. Further E there is a dip similar to the S. The E slope has coarse *Arrhenatherum* and the flat above damp calcifuge turf with *Equisetum sylvaticum* and *Carex demissa* present.
R149	31 May	SJ 732979	Barton Moss	Liverpool-Manchester (via Earlestown)	N	Flat/ Emb/ Ditch	18.2-22	Mixed coarse vegetation: couch, cocksfoot and *Arrhenatherum* grasslands; nettle stands and bramble thickets. Finer damp *Holcus mollis* grassland with rosebay. Sallow and hawthorn thickets near ditch. *Agrostis stolonifera*, *Juncus* spp etc in ditch. Garden escapes near level crossing. *Tussilago farfara* also near ditch.
					S	Flat/ Emb/ Ditch	21.6-22	Essentially the same but with more *Holcus mollis* and rosebay on the flat. Elder is common on the slope and *Symphytum* x *uplandicum* near level crossing. *Aster* abundant E of the site.
R202	26 July	SK 098755	Peak Dale	Buxton-Peat Forest-Chinley	E	Flat	6-7.8	Edge of line is a forb and species-rich ballast flat rather open but with *Agrostis stolonifera*, *Poa compressa*, *Poa pratensis*, *Medicago* and *Prunella* as well as *Poa annua*, fescue and significant bryophyte cover. Coarser vegetation further from line is continuous with *Arrhenatherum*, hogweed, *Tussilago* ferns and a few bushes. Some parts near fence also open.
					W	Cut/ Flat	5-11	Much less disturbed. T3 is a coarse grass cutting of *Arrhenatherum* with fescue, rosebay, *Leucanthemum*, *Heracleum* and *Cirsium arvense*. There are limestone outcrops with *Scabiosa*, *Sedum acre* and *Arabis hirsuta*. T4 etc has a fringe of rosebay by the line and has sallow scrub over nettle to a small flat by the fence with coarse *Arrhenatherum* grassland.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R203	26 July	SK 094724	Woo Dale	Buxton-Peak Forest-Chinley	S	Cut(& Flat)	9-12.8	Damp cinder by line with *Deschampsia caespitosa* and sallow. Then sheer limestone rock cutting with sparse vegetation of *Festuca ovina*, *Potentilla*, *Mycelis*, hawkweed, *Leontodon hispidus* and including *Gymnocarpium robertianum*, *Galium sterneri*, *Asplenium viride*, *Cystopteris*, *Pinguicula* etc. The gentler cutting above has *Arrhenatherum*, *Dactylis* and *D. caespitosa* plus *Cirsium heterophyllum*, *Valeriana*, cowslip and sallow. The cutting at T2 has no rock exposures, considerable birch and moss, over a herb-poor but species-rich grassland.
					N	Cut/ Emb/ Flat	3-4.5	Low cutting and flat at T4 has impoverished grassland allied to T2, with a little bare rock. T3 is a gentle embankment with butterbur, *Arrhenatherum* and tall herbs.
R204	27 July	SK 058822	Chapel Milton	Sheffield-Manchester (via New Mills)	N	Cut(& Flat)	10.3-22.5	Very steep and rocky with patchy grassland of *Deschampsia flexuosa* and *Festuca ovina* plus scattered ash and oak trees. On flat at top *Holcus mollis* is dominant with bent. The rougher ground near the line has many more herbs and the lower slope of T1 bent grassland or foxtail/cocksfoot/ *Arrhenatherum*.
					S	Cut/ Emb/ Flat	50-59	Steep cutting slope up from line in very poor *Deschampsia flexuosa* grassland with *Arrhenatherum*, rosebay and sallow on lower bank at T4. These types continue onto the upper gentle slopes of the embankment down to the road; but to the south more mixed rich grassland with *Arrhenatherum*, *Holcus*, *Dactylis*, *Trisetum* plus abundant *Centaurea nigra*, *Lotus*, yarrow, raspberry and many other forbs, as well as bramble and sallow scrub.
R205	27 July	SJ 978864	Strines	Sheffield-Manchester (via New Mills)	NE	Cut	26-38	Coarse and overgrown with bramble and rosebay, tall sycamore trees, occasional patches of coarse *Arrhenatherum/ Deschampsia caespitosa* and some of *Agrostis tenuis* and *Trifolium medium*. Low oak scrub, briar thickets and nettle also occur locally. A mosaic of rank types with intermediates. *Mycelis* and aneozewort grow.
					SW	Emb/ Flat/ Cut	17	T4 is a stepped cutting with rank tall herb mixture on lower slope of rosebay and *Equisetum telmateia*. Mixed oak and hawthorn scrub, with sycamore in on the upper slope. Going NW the slope falls away to give a scrubby flat cleared occasionally by line of sycamore, ash and alder over *Agropyron caninum*. The slope down to the river here at T3 is covered in alder woodland with patches of nettle and mercury.
R206	28 July	SJ 841835	Styal	Gatley-Wilmslow	SW	Cut(& Flat)	12.6-14.2	Rough herb-rich grassland of *Arrhenatherum/Dactylis* with *Cirsium arvense*, *Centaurea nigra*, *Lathyrus pratensis*, *Vicia cracca* and rosebay. Some colonisation by oak and hawthorn, more so to the S where *Agrostis tenuis* common. Flat above and S area generally has more rosebay and *Holcus mollis*.
					NE	Cut(& Flat)	13.7-14.2	Rough grassland similar to that on SW but with locally abundant *Festuca rubra*. Herb-rich at T4 with flora like T1 etc, but poorer in the south. Bramble, hawthorn and birch colonising lightly. Flat by fence has *Holcus mollis* and *Agrostis tenuis*, plus horsetail and hawkweeds. *Ophioglossum* frequent.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
BR PRESTON DIVISION								
R150	1 June	SD 730k58	Chapeltown	Blackburn-Bolton	E	Flat	2.8-3.2	Cinder/ballast flat colonised by *Festuca rubra* grassland, *Holcus lanatus* and *Agrostis tenuis* plus *Trifolium repens* in abundance, and much moss cover.
					W	Flat/ Emb	22-31	Raised flat by line shored up with concrete slabs. Cinder/ ballast with moss and lichen colonisation, sorrel and bent in the north, *Holcus mollis* and *Poa* in the south where a continuous sward has developed and broom is colonising. Near the embankment top birch and sallow plus nettle and rose-bay are the chief cover. The slope is sallow scrub over rosebay and *Holcus mollis*, with alder, nettle coming in on flat. A small pond lies on BR in this scrub zone.
R199	23 July	SD 991535	Ellergill	Swindon brach (from Skipton)	SW	Emb(& Flat)	2.7-4.2	Coarse species-poor *Arrhenatherion* grassland with areas of low invading bramble. Often quite herb-rich with nettle. *Cirsium arvense* and *Lathyrus pratensis*, *Trifolium medium* and horsetail. Richer and healthy by fence.
					NE	Flat	1.3-2.2	A much better sidu and well-grazed to produce a forb and species-rich turf of fescue/bent plus *Pilosella*, *Lotus*, *Trifolium repens*, *Rumex acetosa* and *Centaurea nigra*, with a lot of *Rhytidiadelphus squarrosus*. By a small ditch the vegetation becomes coarser with *Deschampsia caespitosa*, *Carex hirta* and *Trifolium medium*. *Arrhenatherum* only really common by line.
R200	25 July	SD 859302	Walk Mill	Burnley-Hebden Bridge	N	Emb(& Flat)	22-33.6	Mainly calcifuge grassland. *Deschampsia flexuosa/Festuca rubra* with *Molinia* locally common. Tormentil abundant and patches of bilberry etc. Bracken dominant over sparse *Holcus mollis* to the W and *Quercus petraea* woodland with ash over raspberry, cleavers, bracken and *Holcus mollis* on flat etc below. The upper edge heavily and unstable ballasted with patchy *Arrhenatherum* and horsetail.
					S	Emb(& Flat)	20-30	More scrub covered with areas of dense hawthorn over bramble. Bramble / brier thicket with rosebay and foxtail occupy the edges. *Arrhenatherum* is also present where ballasting has occurred. The mid-slope has been burnt to leave almost pure *Deschampsia flexuosa* grassland with a little fescue and heather. Nettle on flat.
R201	25 July	SD 917257	Lydgate	Burnley-Hebden Bridge	S	Flat/ Emb	0.75-7	The low W embankment has stands of *Equisetum arvense* on the upper slope with *Calystegia silvatica* scrambling through. Hawthorn has colonised the lower edge over *Holcus mollis* with some surviving horsetail. Some coarse grassland and bramble to east then a narrow cinder flat with more horsetail to the viaduct.
					N	Cut/ Flat	4.8-9.6	Low cutting in west (T4) has mixed coarse vegetation of *Arrhenatherum*, *Calystegia* and *Festuca ovina*. Better dry grassland above has hawkweed and rosebay. The gentle embankment by the viaduct has rather open sallow scrub over *Heracleum* and *Calystegia* near line, with *Holcus mollis* and *Poa trivialis*. Bare and mossy elsewhere.
R225	21 August	SD 509723	Warton	Preston-Carlisle	W	Emb(& Flat)	9.8-10.8	Quite heavily ballasted slope covered in coarse herb-rich but species-poor grassland with low invasive *Rubus caesius* and bramble, plus hawthorn especially below *Arrhenatherum/ Festuca/Poa* spp with *Equisetum Centaurea nigra*, *Galium verum*, *Knautia* etc. Narrow strip by fence of very rich meadow turf. *Cynosurus*, buttercup, etc.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					E	Emb(& Flat)	9-10	Recently cleared slope with ballasting. Sparse grassland surviving of *Arrhenatherum* with dewberry and bramble. *Leontodon*, *Potentilla reptans*, *Galium saxatile* etc survive locally above, mercury and nettle with *Brachythecium rutabulum* below. Much bare ground: *Senecio lutea* etc colonising
R226	21 August	SD 474673	Heat Bank	Preston-Carlisle	NW	Cut(& Flat)	9.8-12.7	Generally covered in dense high bramble thickets, or locally *Rubus caesius* but some areas of herb-rich calcicolous grassland of *Arrhenatherum*, *Dactylis*, fescue and *Poa* do survive. *Carex flacca*, cowslip, *Linum*, *Centaurea nigra*, *Leucanthemum*, *Centaurium* are common. Flat above has dense nettle.
					SE	Cut(& Flat)	10-13.8	Very similar to the NW side, but with deeper and more extensive bramble plus *Arrhenatherum*, *Holcus lanatus*, *Galium aparine*, *Cirsium arvense*. There are a number of good areas of species-rich turf with *Carex flacca*, *Linum*, fescue and *Deschampsia caespitosa* common. Grazed immediately by fence.
R227	22 August	SD 603712	Malling	Carnforth-Skipton	E	Cut(& Flat)	20-39	Tall scrub of hawthorn with emergent sycamore. Lower edge tangled and overgrown with bramble/briar, *Arrhenatherum* and tall forbs. It opens out to an open undergrowth of bramble, brier, elder, ash and ivy. Ground mainly bare or bryophyte covered but with *Silene dioica*, *Dryopteris filix-mas*, *Geum urbanum*, nettle, *Stellaria media*, *Epilobium montanum*, *Geranium robertianum* and *Stachys* frequent. *Arrhenatherum* on flat above.
					W	Cut(& Flat)	20-28	Much more open with main cover a mixture of tall regenerated sallow, *Acer* and hawthorn; *Arrhenatherum* and *Holcus mollis* grasslands; patches of bramble and raspberry; *Dryopteris*, *Bromus ramosus* and other shade species; plus some exposed rocks, with a rich bryophyte flora. The flat above has areas of tall sycamore over elder scrub with bramble and nettle below. *Tellima grandiflora* and *Salix x laurina* grow here.
R228	22 August	SD 647694	Lower Bentham	Carnforth-Skipton	S	Flat/ Emb	1.8-5.3	Long area by T1 where BR fence is at top of embankment, leaving a narrow flat of species-poor *Arrhenatherum* with fescue, *Centaurea nigra*, *Potentilla reptans* and horsetail common. East of bridge over river at T2 is a cinder slope down to the river wall with patchy fescue grassland on edge of a briar thicket.
					N	Emb/ Flat	8.9-12.8	T4 has a bank of coarse tall herb grassland: *Arrhenatherum*/ *Dactylis* with *Centaurea nigra*, nettle, goosegrass and *Geranium pratense*. The broad flat to the wall below has a matted thicket of *Calystegia* and goosegrass over cut ash timber. Nettle and *Arrhenatherum* emergent. Garden escapes nearby. T3 has *Aegopodium* dominant near line with bramble, rosebay and raspberry on lower slopes.
R229	23 August	SD 774784	Ribblehead	Settle-Carlisle	NE	Cut/ Flat	2.9-3.2	Coarse mixed grassland of *Arrhenatherum*/fescue/*Poa*/*Dactylis* with much *Centaurea nigra*, *Leontodon hispidus*, ribwort and harebell. Bare rock to S.
					SW	Flat	7-10	Uneven flat with some ballast and dumped fine limestone spoil. Several areas wet. Much low *Salix phylicifolia* scrub, and mossy marsh. Fine turf on gravel of *Carex flacca*, *Primula farinosa*, *Selaginella*, *Thymus*, *Alchemilla* and *Lotus*. Coarser species near line: *Tussilago*, *Galium verum*, *Hypericum perforatum* and *Centaurea* with tall grasses. Good moss list in open calcicole gravelly flushes. Rarer plants also include *Pyrola r. rotundifolia*, *Scoleria*, *Coeloglossum* and *Galium s. sternerí*.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
R230	24 August	SD 597960	Lambrigg Head	Preston-Carlisle	N	Cut/ Flat/ Emb	5.6	Ridge covered in a mixture of coarse vegetation: raspberry, sallow and much meadowsweet; coarse *Arrhenatherum* with nettle and hogweed; *Hypericum maculatum* common and couch. Grazed and mossy near fence. *Cedum telephium* to E.
					S	Cut/ Flat/ Emb	5.5-6.8	Similar mixture but with more *Holcus mollis* in grassland and patches of mercury at T3. The bare areas caused by tipping have a lot of *Sagina* and mosses. The edge by the fence at T4 is grazed and a very rich turf of fescue with pleurocarpous mosses, *Trifolium repens* and *Centaurea nigra*. Marshy area on edge of BR between T4 and T3. A small *Symphoricarpos* thicket near T4.
R231	24 August	NY 608014	Low Borrowbridge	Preston-Carlisle	E	Emb	12.5-17	By bridge dense raspberry thicket with several tall sycamores and a great deal of *Galium aparine* festooning cones. Northward slope widens and especially below has extensive calcifuge grassland of fescue/bent/*Holcus mollis* with *Solidago*, *Viola tricolor*, *Jasione*, tormentil, *Succisa* in a rich turf. Some areas of low bramble and much coarse scrub on upper slopes. *Linaria repens* common on cinder scree.
					W	Emb/ Flat	2.4-19	Only broad area is at T4 by bridge where a mixed coarse vegetation of bramble, *Arrhenatherum*, *Galium aparine* and *G. mollugo*, *Silene dioica*, meadowsweet, rosebay, nettle, *Leucanthemum* and raspberry on a steep ballast/cinder slope. Narrows to a flat and ditch at T3 with raspberry and *Arrhenatherum* etc.
R232	25 August	SD 214847	Foxfield	Barrow-in-Furness-Carlisle	NE	Emb/ Flat	4-4.5	Herb-poor coarse mixed grassland of *Arrhenatherum/Holcus mollis/Poa* and fescue with scattered meadowsweet and horsetail, plus scattered briar. To the NW there has been recent ballast cleaning and a ridge of new spoil covers much of the bank with a line of surviving vegetation like T1 by the fence.
					SW	Flat	0.8-1.7	Narrow ballast flat to stone wall, mainly bare or with *Fumaria/Fagus* but by the MP broader with herb-rich but species-poor *Arrhenatherum* grassland with much *Dactylis*, nettle and *Vicia cracca*, plus cleavers. Wall has *Asplenium* and curtain of Musci below. To SE bank widens to give a broad area of sallow carr.
R233	25 August	SD 188833	Greenroad	Barrow-in-Furness Carlisle	SE	Flat	2.2-2.5	Much of the bank is covered in low bramble or regenerating scrub of sallow and *Salix purpurea*. *Holcus mollis*/fescue grassland and horsetail on ballast also occur. The central portion is mixed often rather damp calcifuge grassland with *Juncus* spp, *Molinia*, *Carex ovalis*, *Stachys palustris* and *Carex nigra*.
					NW	Flat/ Ditch	1.5-5.5	The bulk of this side is *Molinia/Holcus mollis* grassland with damp rush-covered areas and drier places with *Agrostis tenuis* etc. There are several patches of *Spiraea* scrub and T4 has a more ordinary herb-poor coarse grassland of *Arrhenatherum* with fescue, nettle and thistle. *Pilosella aurantiaca*.
R234	27 August	NY 034155	Parkside	Rowrah branch (from Whitehaven)	S	Emb	6.7-9.8	Steep ballast slope with much still exposed in W where open 'grassland' of *Hieracium* spp, *Senecio jacobea*, *Centaurea nigra*, horsetail, *Leucanthemum* and *Hypericum perforatum* plus *Arrhenatherum/Anthoxanthum*/fescue. The E part is completely vegetated with sycamore/ash scrub over coarse grassland of fescue/*Arrhenatherum* and *Dactylis* plus yarrow and *Leucanthemum*. Distort present.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					N	Flat/ Emb	9-16	Generally a broad completely colonised ballast flat with a mixed herb and species-rich basicolous grassland. Fescue/ *Arrhenatherum*/*Poa*/cocksfoot with *Centaurea nigra*, clovers, yarrow, *Tussilago*, hogweed, horsetail, ribwort, *Ranunculus acrimate* and including *Briza*, *Anthyllis*, *Euphrasia*, *Rhinanthus* etc. The short slope below T4 is covered in rosebay with coarse grasses and nettle.
R235	27 August	NX 993143	Scalegill	Rowrah & Bockermet branch (from Whitehaven)	SW	Emb/ Flat	4.6-7	Most of its length is a closed hawthorn scrub over ballast or low bramble/*Arrhenatherum*. *Galium aparine* scattered through and edge near fence with much *Ranunculus repens* and some grazed turf. The SE end opens out to a ridge with coarse *Arrhenatherum*/*Holcus mollis* and bramble thickets.
					NE	Cut/ Flat	6.3-11.7	The slope is mixed calcifuge grassland of *Arrhenatherum*/ *Holcus mollis* plus *Agrostis tenuis*/*Festuca*/*Poa*. Quite herb-rich with *Rumex*, vetches, hogweed and bushes of gorse. To the NW at T4 grassland similar on flat but coarser, more bramble. Flat by line has similar vegetation with *Ulex* and *Quercus*.
R236	28 August	NY 069372	Doerham	Darrow-in-Furness-Carlisle	S	Flat,	3.8-7.3	Edge of riverside alder scrub, cut back recently by line. Field layer of nettle near river and *Agropyron* by line. Hawthorn occasional and ivy common near fence. East to T2 narrower and completely cleared with more ash shading from adjacent land and patches of ivy, *Poa trivialis*, bramble, mercury and *Glechoma*.
					N	Flat(& Cut)	4.8-10.6	Most of it is a completely cleared ridge, with hawthorn timber over patchy *Arrhenatherum*, fescue, *Leucanthemum* and sorrel. *Allium ecorodoprasum* grows here. At T4 the bank widens to the old station yard with patchy mixed forb-rich grassland: horsetail, *Centaurea nigra*, *Tussilago*, bramble and garden escapes.
R237	29 August	NY 455436	Hoskot	Preston-Carlisle	West	Flat/ Emb	8.3-10.7	Broad flat by AP with cut *Castanea* stumps regenerating. Patchy vegetation on ballast of rosebay, *Holcus mollis*/couch grassland and bramble. Slope to S heavily ballasted to give mixed coarse vegetation of raspberry, nettle, *Galium mollugo*, *Arrhenatherum*, *Leucanthemum*, *Fragaria* and thick moss.
					E	Emb(& Flat)	4.4-11	Mostly scrub covered with tall ash, briar and bramble over nettle near fence, bryophytes and *Stachys*, *Rosa* and horsetail on limestone ballast near line. Nearer the bridge T4 is narrower and almost completely covered in rosebay. More notable species for site include *Lepidium heterophyllum* and *Senecio viscosus*.
R238	29 August	NY 506487	Lowhouse	Settle-Carlisle	NE	Emb/ Flat	5-9.5	T1 has tall bracken stand over nettle, horsetail and shade species with a little birch shading. The slope widens to include young birch and ash scrub with areas of nettle and coarse grass: *Holcus mollis* and *Arrhenatherum*. Bryophytes abundant under ash. Rank *Galium aparine*, hogweed etc by fence.
					SW	Cut/ Emb/ Flat	4.2-5	Cutting at T4 very similar to T1 but with bryophytes and rosebay near the fence. *Omalia* and *Lonicera* scattered under bracken. The low embankment at T3 is coarse mixed vegetation of bramble, nettle, couch and *Arrhenatherum*. Cowslip, *Ranunculus*, *Dianthus barbatus* and *Aquilegia* occur in turf nearer AP level crossing.
R239	30 August	SD 087942	Eskmeals	Darrow-in-Furness-Carlisle	E	Emb(& Flat)	7.7-8.2	Slopes were heavily ballasted and still generally bare but there are some extensive bramble thickets especially below and associated *Galium aparine*, horsetail and *Arrhenatherum*. Hawthorn is scattered. The lower edge has a flat fringe of salt-marsh species including *Oenanthe lachenalii*, *Limonium humile* in fescue/*Poa* turf.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	WIDTH M	NOTES
					W	Emb	5-5.7	Completely vegetated. Herb-rich and coarse grassland with abundant low bramble. *Arrhenatherum* with *Teucrium*, *Galium aparine*, *Torilis japonica*, *Tripleurospermum* and *Lathyrus pratensis* plus scattered hawthorn. Many fewer maritimes, retaining sloped wall at base does have *Sorbus* x *intermedia* however.
R240	31 August	NY 760148	Warcop	Warcop branch (from Appleby)	NE	Emb	10-10.8	Generally herb and species-poor rank grassland of *Arrhenatherum/Holcus mollis/Dactylis/Agropyron* with damper ground below where *Galium mollugo*, hogweed and abundant meadowsweet occur. T2 has a large butterbur stand with relict grassland of the type elsewhere. *Fialaris*, *Valeriana*, *Poa trivialis* and *Carex rostrata* grow near the fence with other marsh species. *Acinos* is found on cinder by line.
					SW	Emb/ Flat	13.2-14	Generally the slopes are similar but with more *Centaurea nigra* and less *Holcus mollis*. The T3 area is mostly *Carex riparia* on the slope giving way gradually to meadowsweet on flat. Couch is common on the flat with *Geum rivale*, *Juncus* spp and meadowsweet is general. At very end of Warcop branch.

APPENDIX 2. Biological Interest Survey sites 1979.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
BR WATFORD DIVISION								
B100	30 April	TL 021381	Ampthill Tunnel Top	London-Leicester		Flat	Info	The tunnel top supports a poor secondary mixed deciduous woodland of oak/beech/sycamore with a larch belt along the eastern side. The ground cover is ivy with some *Arum*. Burnt area near portal has colonising ephemerals.
B110	2 May	TL 127010	Bricketwood Common	St Albans-Watford	SE	Cut/ Flat	A/SSSI	Birch/oak woodland on cutting with understorey of bramble and honeysuckle. Diverse and species-rich damp cinder flat by line, with *Bryohumtia polymorpha*, *Lunularia cruciata* and *Cardamine flexuosa* abundant.
					NW	Cut		Birch/oak woodland, with nettles, bramble, rosebay and grasses where cleared.
B111	7 May	SP 670157	Rushbeds Wood	Banbury-High Wycombe	NE	Cut	A/SSSI	Low cutting with woodland of hazel, birch, oak, maple, thorn with varied calcicolous understorey, including orchids, betony, primrose and bluebell. *Brachypodium pinnatum* near tunnel, with patches of *Calamagrostis epigejos*. *Tetragonolobus maritimus* by line beyond tunnel.
					SW	Cut		Mainly birch scrub, with culverted stream supporting stickleback and golden saxifrage. Good calcicolous bryophytes.
B112	9 May	SP 746530	Roade Cuttings	London-Crewe	E	Cut		Large varied site, impoverished acid flora with much *Polytrichum juniperinum* towards north, becoming coarse species-poor *Arrhenatherum*, and then mixed deciduous scrub on shales, with flat areas supporting a good calcicolous turf.
					W	Cut		Coarse grassland with oak and pine shelter belt at north of site. Becoming calcicolous with areas of good limestone turf with sedges and violets between main lines. *Cotoneaster* on bridges. Hawthorn scrub above steep walled cutting to south.
B113	10 May	SP 723645	Dallington Heath	Rugby-Northampton	SW	Emb	Info	Low embankment with rough grassland and some scrub. Excellent population of meadow saxifrage on cinder.
					NE	Emb		In part comparable to SW, but also with extensive wetland area with much butterbur and tall herb, giving way to planted pine, spruce and larch, with a luxuriant undergrowth of grass, *Glechoma* and calandina. Alder near stream.
B114	11 May	SP 857360	Denbigh Hall	Euston-Crewe	NE	Cut	Info	*Bromus erectus* grassland, occasionally co-dominant with alsike clover. Good, species-rich turf; in places slipping and open with ephemerals. Some low bramble and hawthorn.
					SW	Cut		More varied than opposite slope, but much recently burnt. Coarse *Arrhenatherum*, with cowslips and rather more scrub.
B124	25 May	SP 419826	Nettle Hill	Euston-Crewe	N	Cut	Info	Slope with rough grassland and some bramble and hawthorn. Better grassland above.
					S	Flat		Adjacent to canal side. Mainly sallow/osier marsh with guelder rose, spotted orchids and twayblades. Some areas more open and dominated by meadowsweet or *Filipendula*, and some drier parts with rosebay. *Aira caryophyllea* on cinder.
B125	25 May	SP 38 66	Snowford Junction	Marton junction branch	N	Cut	Info	Deep calcareous cutting with shunting lines only. Good grassland with *Helictotrichon pubescens* and *Brachypodium sylvaticum*. Many cowslips. Invasive gorse of uniform age suggesting previous burning. Some hawthorn scrub.
					S	Cut		Comparable, with rather more scrub. Both *Cochlearia danica* and *Cerastium diffusum* grow on cinder between the tracks here.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
BR NOTTINGHAM DIVISION								
B108	27 April	SP 959033	Wymington	Bedford-Leicester	N	Cut	Info	Broad cutting recorded during preliminary year. Mixed grassland of *Bromus erectus* and *Brachypodium pinnatum* with some open scrub. *[illegible]* not recorded, but many better basicoles present. *Astragalus glycyphyllos* seen.
					S	Cut		Very similar, adjacent fast line briefly visited.
B115	21 May	SP 67 94	Kibworth Cutting	Leicester-Bedford	NE	Cut	Info	Species-rich *Arrhenatherum* grassland with areas dominated by *Brachypodium pinnatum*. Herbs include *Cirsium acaule*, *Poterium sanguisorba* and *Carex flacca*.
					SW	Cut		*Poa*/fescue grassland with much hawkweed and bryophyte. Species-rich. Scrub encroaching at top of cutting.
B116	22 May	SP 454950	Elmesthorpe	Birmingham-Norwich	N	Cut	Info	Rough grassland with patches of bramble, gorse and hawthorn. The grass is generally herb and species-poor *Arrhenatherum*/fescue/*Poa*, but there are some large areas dominated by *Brachypodium pinnatum*. Good population of cypress spurge.
					S	Cut		Coarse grassland and gorse with evidence of recent burning. *Alchemilla vestita* and *Sanguisorba officinalis* occur.
B117	22 May	SK 514042	Kirkby Muxloe	Leicester-Burton	NE	Flat/ Cut	Disc	Extensive cinder bed with *Marchantia*/*Vulpia*/*Linum catharticum*, giving way to steep well scrubbed cutting with ash/hawthorn. Understorey has coarse grass and bramble.
					SW	Cut		Steep wooded cutting with raspberry, orchids and archangel, below ash/maple. Some garden escapes, and meadowsweet/nettle community adjacent to line.
B118	22 May	SK 495043	Desford Tube Sidings	Leicester-Burton	N	Flat	Info	Narrow cinder flat with comparable species to south.
					S	Flat		Extensive area of cinder, largely colonised by *Vulpia*/lichens/*Hypochoeris*, with patches of coarser grassland and herb and species-rich areas on old track edges. Some colonising sallow, birch and hawthorn scrub and areas of continuous rank grass and rosebay. Much lupin and cranesbill near access.
B148	2 July	SK 620095	Thurmaston	Leicester-Syston	E	Cut	Info	Wide dry grassy cutting with some scrub and local base changes. Fescue/*Rumex acetosella* above, with *Bromus*/*Helictotrichon* grassland below. Good populations of *Cirsium acaulon* forma *caulescens*, *Inula conyza* and *Blackstonia perfoliata*.
					W			Comparable to east, but slightly coarser and with considerably more ash/maple scrub above.
B149	6 July	SK 41 21	Breedon Quarry	Worthington Bridge branch	W	Cut	A/SSSI	Low cutting with hawthorn, hazel and dogwood scrub, shaded by ash/elm on adjacent land. Damp understorey with *Angelica*, mint and horsetail. Area of tip from limestone quarry supports characteristic calcicolous species.
					E	Cut		Low cutting with comparable scrub to west side.
B150	7 July	SK 498553	Studford Triangle	Pye Bridge-Worksop	W	Cut/ Emb/ Flat	A/SSSI	Diverse and interesting but species-poor compared with adjacent disused lines on magnesian limestone. Dry calcicolous grassland with some disturbed and damper areas, and rank scrub with elder and garden escapes on cutting.
					E	Cut/ Emb/Flat		Predominantly dry, calcareous grassland, with harebell and knapweed on ledges of exposed rock cutting.
B152	8 July	SK 48 63	Pleasley	Pleasley branch	W	Cut	Info	*Brachypodium pinnatum* grassland with much litter covers the unstable slopes of this cutting fairly uniformly. A good population of the bee orchid, *Ophrys apifera* occurs and there is a little invasive hawthorn scrub.
					E	Cut		Very similar to west.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
BR BIRMINGHAM DIVISION								
B119	23 May	SP 43 52	Fenny Compton	Oxford-Birmingham	N	Cut	Info	Slope with *Bromus erectus* grassland with much hairy plantain above, becoming finer and herb and species-rich, and eventually rank near cinder and track. Invasive scrub.
					S	Cut		Damper and more wooded, with grassy areas rich in cowslips, marsh orchids, *Angelica* and marsh thistle. *Cerastium diffusum* on ballast.
B120	23 May	SP 38 60	Harbury Cutting	Oxford-Birmingham	NE	Cut/ Flat	SSSI	Excellent calcareous grassland with many spotted orchids and twayblades, sedges and carline thistle. Less well drained above, with much closed hawthorn scrub. Woodland and scrub towards west with ash, bird cherry and balm of gilead. Some birch and alder. Good cinder flat by line with, herb-rich grass, hairy oat and meadow saxifrage.
					SW			Narrower, with coarser areas of *Brometum* and much scrub.
B121	24 May	SP 29 65	Emscote Power Station	Leamington-Birmingham	N	Flat/ Emb	Info	Open flat of ballast, cinder and sea sand colonised by marram, sand sedge, soapwort and restharrow. Also many ephemerals and *Silene anglica*, *Cerastium diffusum* and *Erodium*. Embankment with tall willow, and *Caltha* and ferns on marshy flat below.
					S	Emb		Rough scrub with pine and cherry laurel.
B122	24 May	SP 172912	Water Orton	Birmingham-Norwich	N	Flat	Info	The extensive disused sidings are now, apparently, a local recreation area with much human pressure. They are fenced off from the permanent way and were not surveyed.
					S	Cut		The slope supports a mixture of acid communities with heather, bracken, bent/fescue turf with bluebells and foxgloves, and a developing woodland of oak and birch. Garden escapes at top of slope.
B123	24 May	SP 300912	Ansley	Birmingham-Norwich	N	Cut	Info	Deep, wide stepped cutting with grassy slopes and rather marshy flats supporting *Carex flacca*, *Acrocladium cuspidatum* and rushes. Basicolous grassland, locally open with *Arrhenatherum*, *Brachypodium sylvaticum*, zigzag clover and flowering milkwort. Some thorn scrub near tunnel.
					S	Cut		Comparable but with woodland giving way to open aspen/sallow scrub near access. Abundant orchids, bugle, hawkbit and patches of adders tongue.
B167	6 August	SO 847721	Torton	Kidderminster-Worcester	W	Cut/ Emb	Disc	Rough grassland, mainly *Arrhenatherum*, but with areas dominated by *Bromus erecta*, and smaller patches, on sand, of bent and *Holcus mollis*. Some invasive bramble, hawthorn and sallow.
					E	Cut/ Emb		As west but with cinder bed supporting weld, mullein, *Lepidium*, *Vulpia*, etc.
B168	7 August	SP 10 73	The Lakes	Sutton-Birmingham	E	Cut/ Emb	SSSI & Flora	Acid heath with Calluna and gorse, giving way to rough grassland with damp areas supporting *Achillea ptarmica* and *Succisa*, and invasive stands of poplar. Becoming woodland at MP 7½.
					W			Heath, grassland and woodland, with species from adjacent coppice, and touch-me-not in stream.
B169	8 August	SP 10 97	Sutton Park	Sutton-Aldridge	SW	Cut	ADJ SSSI	Tall birch woodland with some oak, and area of planted pine. Acid grass understorey with bilberry, *Calluna* and gorse and *Rhododendron* coming in near bridge.
					NE	Cut		Oak woodland with bramble, *Dryopteris* and ivy below. Bracken and rosebay frequent near line.
B170	8 August	SP 15 91	Minworth	Water Orton-Sutton	SW	Flat/ Emb	Info	Grassy flats with *Arrhenatherum* and much *Convolvulus arvensis*, giving way to hawthorn and bramble scrub, with elder and rosebay on embankment above sewage works and sludge lagoons.
					NE	Flat/ Emb		Comparable with southwest, but also having cinder flats with *Hypericum perforatum* and *Pimpinella saxifraga*.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
BR CREWE DIVISION								
B134	4 June	SJ 727594	Sandbach Flashes	Crewe-Manchester	W	Emb	A/SSSI	High embankment with much ballast tipped and recently disturbed by BR works. Little vegetation but patches of rough grass, low scrub and wormwood. Little influence from salt flashes below.
					E	Emb		Comparable to west but with scrub, tall herb and rough grass more frequent. Very heavily ballasted.
B136	5 June	SJ 563430	Oss Mere	Crewe-Shrewsbury	W	Flat		Rough herb-poor *Arrhenatherum* with areas of bramble, nettle, rosebay and raspberry. Couch locally dominant.
					E	Flat		Comparable to west, but with more extensive cinder supporting much *Equisetum arvense*. Some isolated hawthorn bushes.
B138	7 June	SJ 345552	Bingret	Wrexham-Chester	E	Cut	Disc	Young oak/maple/sallow woodland with excellent species-rich ground cover.
					W	Emb		Oak over ransoms with *Tellima grandiflora* near boundary and *Polygonum polystachium* and *Symphytum grandiflorum* near access. Cleared areas with scrub and cinder flats also occur by disused station.
B139	8 June	SJ 010709	Danes Moss	Stoke-Manchester	W	Emb	A/SSSI	Low embankment above *Molinia* bog. Some areas of rough grass, but mainly birch and sallow scrub above herbs, ferns and bramble. *Cerastium diffusum* on cinder.
					E	Emb		Similar to east but rather narrower, with more continuous scrub and less grassland.
B140	18 June	SJ 080837	Gronant Dunes	Chester-Holyhead	N	Flat	A/SSSI	Narrow sandy flat with dry grassland in which *Lepidium heterophyllum* and *Aeropyrum juncciforme* occur.
					S	Flat		Extensive cinder flat near access with characteristic ephemerals, giving way to wetland with *Phragmites communis*, *Rubus* spp and a cross breeding population of *Silene*.
B141	20 June	SH 545707	Menai Straits Shore	Chester-Holyhead	N	Cut	A/SSSI	Steep cutting with some exposed rock. Mainly low scrub and tall herbs with ferns including enle and harts tongue. An area of good basicolous grassland occurs above steep slope.
					S	Flat/ Cut		Vegetation very similar to north side, but with more extensive cinder flats and wet areas particularly good for bryophytes.
B142	22 June	SH 318752	Trewan Sands Crossing	Chester-Holyhead	NE	Flat	SSSI	Sandy flat near sea with dry grassland, sallow and some marram. Excellent population of *Equisetum variegatum* near bunker.
					SW	Flat		Not dissimilar to northeast.
B143	22 June	SH 436602	Maltraeth Marsh	Chester-Holyhead	NE	Emb	A/SSSI	Embankment with ash/sycamore and ivy/male fern, with areas of dense thorn and bramble. Borrow pits to either side have willow swamp and *Iris* scrub.
					SW	Emb		Scrub and grassland with patchy herb-rich vegetation. Orpine, *Trifolium medium* and *Salvia anglica* near track.
B144	23 June	SH 756538	Pont-y-Pant	Betwys-y-Coed-Blaunau Ffestiniog	E	Emb/ Cut	Disc	Embankment with boulder screo supporting *Racomitrium* heath above with ransoms, dryopterid ferns and welsh poppy under sallow and alder below. Cutting on west side with *Calluna* and many bryophytes.
					W	Cut		Cutting with excellent bryophytes, particularly liverworts where wet. Some mountain ash and *Calluna*.
B145	26 June	SN 930900	Talerddig	Shrewsbury-Aberystwyth	N	Cut/ Ditch	Info	Sloping cutting with acid heath and local base-rich area, giving way to high rock cutting, with much hawkweed and excellent bryophytes where wet. Many aquatics in ditch.
					S			Fescue/sheep bit or *Juncus* grassland, with sallow and hawthorn scrub, and oak/birch/mountain ash woodland on wide rock ledges.
B146	28 June	SN 72 99	Derwenlas	Shrewsbury-Aberystwyth	N	Flat/ Emb	Info	Oak/maple woodland over ransoms and dryopterid ferns, dropping to estuary by short steep bank. Cinder/grassland near track. Extensive tidal sallow thickets towards east of site.
					S	Emb/ Flat		Grassy embankment dropping to marshy land with much meadowsweet and nettle. *Polygonum cuspidatum* thickets near access.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
B147	29 June	SJ 491089	Bayston Hill	Shrewsbury-Ludlow	W	Flat	Info	Narrow flat opening into disused stone quarry around which BR fence partially extends. Extremely rank tall vegetation with much nettle and rosebay. Ash/hawthorn/ivy scrub developing in quarry.
					E	Flat		Very narrow flat adjacent cement works with almost no vegetation.
B153	11 July	SH 573297	Harlech	Pwlheli branch	W	Flat	Info	Stone flags and sea wall colonised by *Catapodium maximum* and *Plantago coronopus*.
					E	Cut		Forb-rich vegetation with undershrubs including gorse, heather and honeysuckle, and tall herbs usually associated with tunnels. *Lathyrus sylvestris* common particularly on dune area with marram/ fescue and *Rosa spinosissima*.
B154	12 July	SN 694069	Glandyfi	Aberystwyth branch	E	Flat	A/NNR	Sea wall with *Sedum anglicum* and some salt marsh below. *Vulpia* spp on cinder flat by line and better species, including *Asplenium* spp and *Linum catharticum* on wall by road.
					W	Flat		Rough, hummocky waste and grassland with abundant hawkweeds, gorse and broom. Couch grassland in damp depressions.
B155	12 July	SN 646967	Abertafol	Pwlheli branch	N	Flat/ Emb/ Cut	A/SSSI	Cinder flat by halt with *Aira* spp giving way to stone flags and sea wall with *Sedum* spp, and a low embankment with *Arrhenatherum* down to salt marsh. Small cutting by tunnel has fescue/bent grassland with sheeps bit and heather.
					S	Flat/Cut		Cinder and flagged flats and low cutting as on north side.
B156	13 July	SH 565030	Broadwater	Pwlheli branch	E	Emb/ Flat	A/SSSI	Low, rough grassy embankment with patches of bramble. Some salt marsh below, and *Catapodium rupestre* on dumped boulder area. *Anacamptis pyramidalis* in grass near bridge.
					W	Emb/ Flat		Similar to east side with *Trifolium scabrum* in rough grass. No salt marsh.
B157	13 July	SH 588390	Glaslyn	Pwlheli branch	N	Emb/ Flat	A/SSSI	Embankment with rough grassland and sallow scrub. Local areas of coastal species including *Scirpus maritimus* and *Eleocharis uniglumis*, also *Lathyrus sylvestris* and *Vicia tetrasperma*.
					S	Emb/ Flat		Somewhat disturbed and impoverished, but with well developed damp ground vegetation on flat.
B180	18 June	SJ 058803	Craig Fawr	Dyserth branch	E	Cut	A/SSSI	Limestone rock cutting with some scrub and excellent herbs including *Silene nutans*, *Orchis pyramidalis*, *Rubia*, *Helianthemum* spp.
					W	Flat/ Emb		The line, which is heavily colonised by woody species, also supports *Hieracium vernia* and *Geranium sanguineum*. The embankment below and near the access point has good oak woodland. The line is used as a recreation area but is still considered active BR property.
BR LIVERPOOL DIVISION								
B126	29 May	SJ 757791	Tatton Meres	Chester-Manchester	NW	Cut	A/SSSI	Acid site with mixed rough grasslands of bent, fescue, *Holcus mollis* and *Deschampsia flexuosa*, and extensive scrub of oak, gorse, broom, birch, poplar and bramble. Some drained open areas with woodrush, sorrel and catsear.
					SE	Cut		Very similar.
B127	29 May	SJ 707747	Ascoll Works Site	Chester-Manchester	N	Flat	A/LNR	Very narrow sprayed strip and abandoned siding supporting little vegetation. Some open sallow, birch scrub and sparse bramble/ cinquefoil ground cover.
					S	Flat		Little vegetation.
B128	30 May	SJ 670915	Risley Moss	Warrington-Manchester	E	Flat	A/LNR	Extension of adjacent peat moss. *Holcus mollis* grassland with bracken, *Molinia* and rosebay. A line of sallow and birch over fern runs beside the track.
					W			*Holcus* grassland with much bracken and evidence of recent burning.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
B129	30 May	SJ 440907	Huyton Station	Liverpool-St Helens	N	Flat	Flora	Old track bed with ballast colonised by open birch and sycamore. Much golden rod, michaelmas daisy and rosebay. Station platform with *Poa compressa* in crevices.
					S	Flat		Ballast with garden escapes and open scrub. No *Cerastiola litoralis*.
B130	1 June	SD 311122	Ainsdale Beach Station	Liverpool-Southport	E	Flat	Flora	Narrow flat with open sandy vegetation of grass and annuals. Becoming rank with invasive sycamore, ivy and dewberry to south of station.
					W	Flat		Closed grassland of *Holcus*/fescue or *Poa/Arrhenatherum* with scattered broom and creeping willow. Sand sedge locally dominant, many garden escapes. *Polygonum rail* absent from ballast.
B131	1 June	SD 291083	Freshfield	Liverpool-Southport	E	Flat	Flora	Generally poor, coarse *Arrhenatherum* grassland with some areas of fescue, locally herb and species-rich especially on sand. No sign of *Cerastiola litoralis* for which the site was known.
					W	Flat		Similar to east. Some ash scrub.
B132	2 June	SD 53 71	Delamere Forest	Chester-Manchester	N	Cut	A/SSSI	Acid woodland site. Oak/birch over *Deschampsia/Holcus*, with bracken, heather and bilberry coming in. Sandy, well drained, with *Carex binervis* on disturbed area.
					S	Cut		Comparable, but damper with sallow thickets, twayblade, bluebell and wood sorrel. Pines occasional, good bryophytes.
B133	3 June	SD 20 09	Ainsdale Dunes	Liverpool-Southport	W	Flat	A/NNR	Narrow sandy flat with sward of *Anthoxanthum*, bent and sand sedge and some interesting ephemerals including *Hypochaeris glabra*, *Ornithopus*, *Teesdalia*, *Viola canina* and *Vicia lathyroides*. However, all these plants are more common on the adjacent NNR.
					E	Flat		Very similar to west. Some areas of creeping willow.
B135	4 June	SJ 519779	Frodsham Cutting	Warrington-Chester	N	Cut/ Flat	SSSI	Cinder flat by station with *Vulpia myuros*, *Bryum* spp and *Barbula* spp gives way to high sandstone cutting supporting much *Pleurozella heteromalla* and with *Geranium lucidum* amongst sparse herbs below.
					S	Cut/ Flat		Comparable cinder flat and cliff, but with extensive area of elder scrub and nettle at cliff base with abundant ferns including *Athyrium filix femina*. Additional bryophytes on area of dripping rock near tunnel.
B137	7 June	SJ 302745	Burton	Birkenhead-Wrexham	E	Cut	Disc	Rock cutting with acidic grassland, gorse and much broom on ledges. Some ivy/bramble "curtains". Grassland above is fescue/ bent with more *Hieracium* on slopes.
					W	Cut		Similar to west but with area of dripping cliff supporting good bryophytes. Ephemerals and algae on cinder.
BR MANCHESTER DIVISION								
B165	26 July	SD 10 72	Wye Dale	Buxton-Peak Dale	S	Cut/ Emb	SSSI & Flora	Limestone cutting with *Pinguicula* and abundant ferns including *Asplenium viride* and *Gymnocarpium robertianum*, giving way to scrubby slope with *Cirsium heterophyllum* and *Galium sterneri*. *Hieracium* and *Parnassia* near junction with disused Millers Dale Line.
					N	Emb		Calcareous grassland and scrub, with much *Ctenidium molluscum* where damp and unstable, and an excellent population of *Draba incana*.
B166	28 July	SK 110847	Edale	Manchester-Sheffield	N	Cut	ADJ SSSI	Moorland cutting with acid grassland, including *Sieglingia decumbens* and *Nardus stricta*. Clumps of *Chamaenerion* near line.
					S	Cut		As north, but with much *Calluna vulgaris* and *Deschampsia flexuosa*. Bilberry abundant near tunnel mouth, with signs of previous burning.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
BR PRESTON DIVISION								
B158	23 July	SD 966595	Rylstone	Swindon branch	E	Cut/ Flat	Disc	Old station siding with coal yard, giving way to shallow grassy cutting, supporting ± neutral grassland, with rank and base-rich areas. Piles of limestone ballast with *Linum catharticum* and other calcicoles.
					W	Cut		*Briza/Helictotrichon* grassland above with meadowsweet, nettle and rosebay below.
B159	23 July	SD 974555	Hollin Wood	Swindon branch	E	Cut	Disc	Mixed grassy cutting, basicolous with extensive areas of rank and base-poor vegetation. *Briza media* grassland, with nettle and meadowsweet and patches of *Calluna*.
					W	Cut		Calcicolous grassland at top of cutting with ranker, damp vegetation below. Some hawthorn scrub.
B160	23 July	SE 001526	Embsay	Swindon branch	E	Flat/ Cut	Disc	The cinder flat at junction with disused line is colonised by calcicolous herbs and grasses, which give way to hawthorn/ sycamore scrub on cutting slope. *Ophrys apifera* and *Gymnadenia conopsea* occur in understorey.
					W			Calcicolous grass and scrub.
B161	24 July	SD 731394	Standen	Hellifield-Blackburn	E	Cut	Info & Flora	Excellent limestone grassland with many orchids and sedges, giving way to coarser, tall herb vegetation in spray/ballast zone near track.
					W	Cut		Coarse, tall herb vegetation with much *Agrimonia eupatoria* and nettle. Some rosebay and encroaching sycamore/hawthorn scrub.
B162	24 July	SD 770442	Chatburn	Hellifield-Blackburn	N	Cut	Info	Limestone rock cutting through village. Some scrub and domestic rubbish. *Rumex scutatus* near access. *Erinus alpinus* and *Fragaria vesca* beyond village (E).
					S	Cut		As north, with good mosses and ferns including *Phyllitis scolopendrium*, *Asplenium trichomanes* and *A. ruta-muraria*.
B163	24 July	SD 802472	Dudland	Hellifield-Blackburn	E	Cut	Info	Excellent limestone grassland. Species-rich with many orchids including *Gymnadenia* [illegible] and *Ophrys* [illegible].
					W			As east, but with wall supporting *Erinus alpinus*, and rocks with tufa forming mosses. *Taxiphyllum wissgrillii* recorded also *Campanula latifolia* amongst encroaching scrub, and *Chara* in drains.
B164	24 July	SD 830492	Gisburn	Hellifield-Blackburn	W	Emb/ Cut	Info	Mainly scrub, with some better herbs including *Primula veris*, *P. vulgaris* and *Gymnadenia conopsea*.
					E	Cut		Grassy cutting with *Calluna* and birch scrub developing on boulder clay. Much *Chamaenerion*. Some areas of limestone grassland.
B171	20 August	SD 47 75	Silverdale	Carnforth-Grange	E	Cut/ Flat	Info	Limestone cutting with cinder flats. The rock ledges support *Sesleria caerulea*, *Sedum reflexum* and *Rubus saxatilis*, whilst *Linaria repens* and *Origanum vulgare* are abundant on flats. *Epipactis atrorubens* present.
					W	Cut/ Flat		As east at access, but with extensive marsh supporting *Carex pseudocyperus*, *Mentha* spp etc towards south.
B172	21 August	SD 43 79	Meathop	Grange-Ulverston	NW	Cut/ Flat	Info	Disused limestone quarry and pavement on BR land with excellent flora including *Hippocrepis comosa*, *Potentilla norvegica* and the northernmost known site for the Lancashire whitebeam. Good limestone scrub and grassland.
					SE	Flat		Narrow, grassy flat above salt marsh, with *Poa compressa* on sea wall.
B173	23 August	SD 777778	Lodge Hall	Settle-Carlisle	NE	Flat/ Cut	Disc	Limestone cutting by access giving way to excellent grassland on flat, with pond, and northwards to tall herbs, including *Cirsium heterophyllum*, under ash/maple with planted horse chestnut. *Campanula latifolia*, *Cochlearia alpina* and *Asplenium viride* are amongst better plants found.
					SW	Cut		Low limestone cutting with good ferns and mosses.

REF	DATE	GRID OF ACCESS	SITE NAME	RAILWAY LINE	SIDE	FORM	SOURCE	NOTES
B174	24 August	NY 57 10	Shap	Carlisle-Preston	W	Cut/ Emb	Disc	The site comprises two large moorland cuttings with a low embankment between. Although mainly acid with *Calluna* heath and mallow scrub, there are base-rich areas with *Linum catharticum* and coarse grassland on the embankment with *Cirsium heterophyllum* and *Sanguisorba officinalis*. *Epilobium brunescens* was recorded on the cutting wall.
					E			Comparable with west side.
B175	25 August	SD 240747	Dalton-in-Furness	Carnforth-Barrow	SE	Cut	Info	Limestone cutting with sloping and sheer faces. Excellent species-rich grassland with better herbs and some ash/hawthorn/ spiny plum scrub.
					NW	Cut		Calcareous scrub/woodland with some areas of species-rich grassland, including *Gymnadenia conopsea*, *Rhinanthus minor* and *Gentianella anglica*.
B176	28 August	NY 055369	Ellen Bank	Carlisle-Barrow	S	Emb	Info	The embankment supports coarse damp vegetation including meadowsweet and butterbur, amongst which grows the local sandleek, *Allium scorodoprasum*. Woodland with better grasses (*Melica uniflora*, *Milium effusum*) occurs where the site abuts onto the R. Ellen.
					N	Cut/ Emb		Cutting with hawthorn and bramble, embankment comparable to south side.
B177	28 August	NX 97 21	Lowca	Carlisle-Barrow	E	Cut	Info	Large unstable cutting below spoil heaps with fescue/*Holcus*/ *Genista tinctoria*/*Betonica officinalis* grassland, areas of *Lathyrus sylvestris* and *Sedum telephium*, and extensive toxic stretches without vegetation. Colonised shingle/waste ground.
					W	Flat		Sea wall with *Schistidium maritimum*.
B178	29 August	NY 513437	Baron Wood	Settle-Carlisle	W	Cut	Info	An extensive sandstone cutting with excellent moss flora including *Odontoschisma denudatum*. *Pyrola minor* growing amongst *Sphagnum* on ledges. Cleared felled area with bramble above.
					E			Well drained slopes with *Calluna* and *Ajuga reptans* (probably excellent for reptiles) with semi-natural pine/birch woodland occurring on cutting ledges.
B179	30 August	NY 04 00	Seascale	Barrow-Carlisle	W	Cut	Disc	Low, sandy cutting with *Calluna*, *Ulex* heath and *Molinia* grassland. *Viola tricolor* spp *curtisii* occurs where sand is exposed, and garden escapes, including *Mentha spicata* and *Aquilegia* sp are frequent.
					E	Cut		Coarse, sandy heath as on west, with extensive patch of *Crocosmia* near access point.

SCOTTISH

LONDON MIDLAND

EASTERN

WESTERN

SOUTHERN

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REGIONAL BOUNDARY

URBAN AREA

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KILOMETRES

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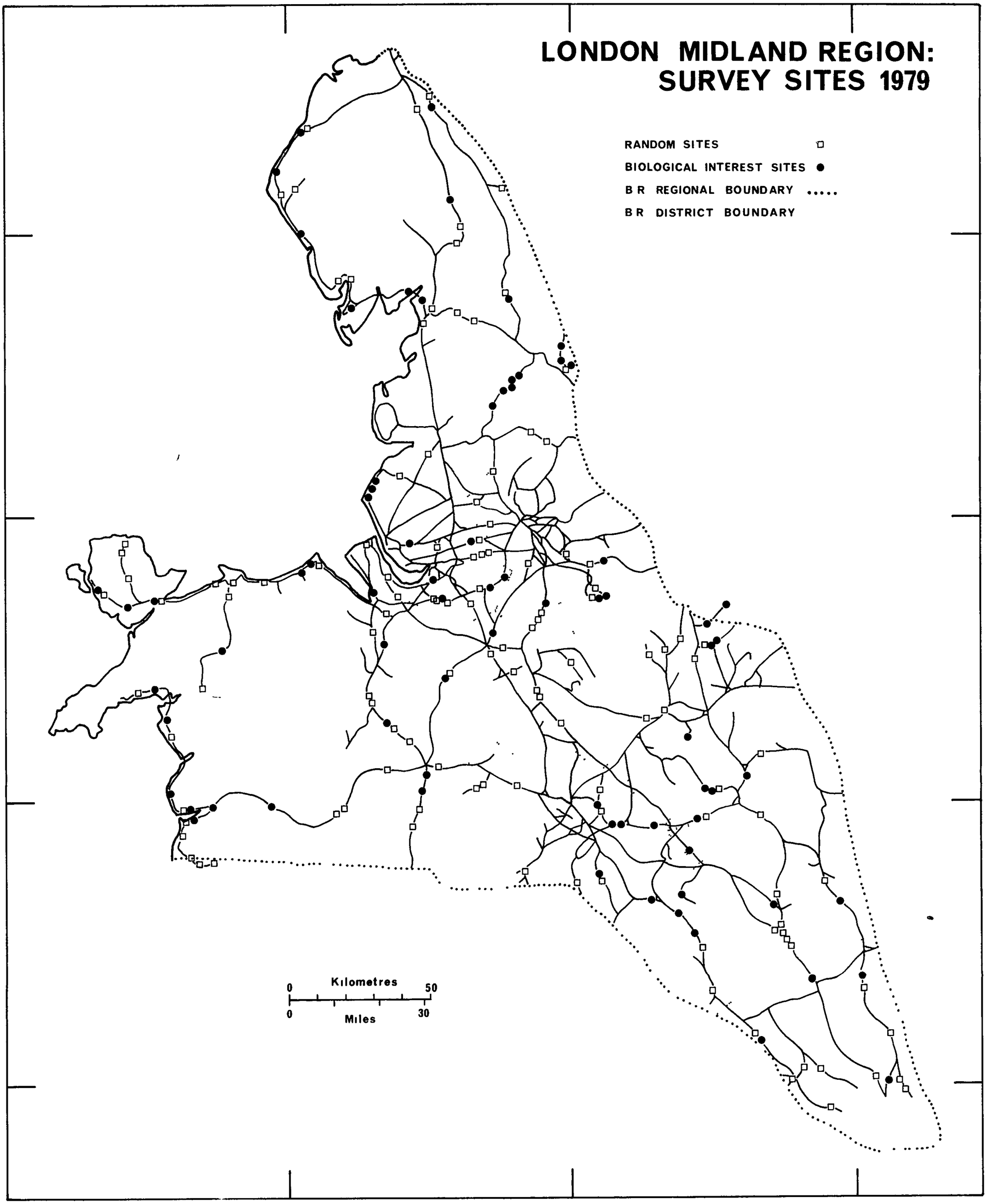
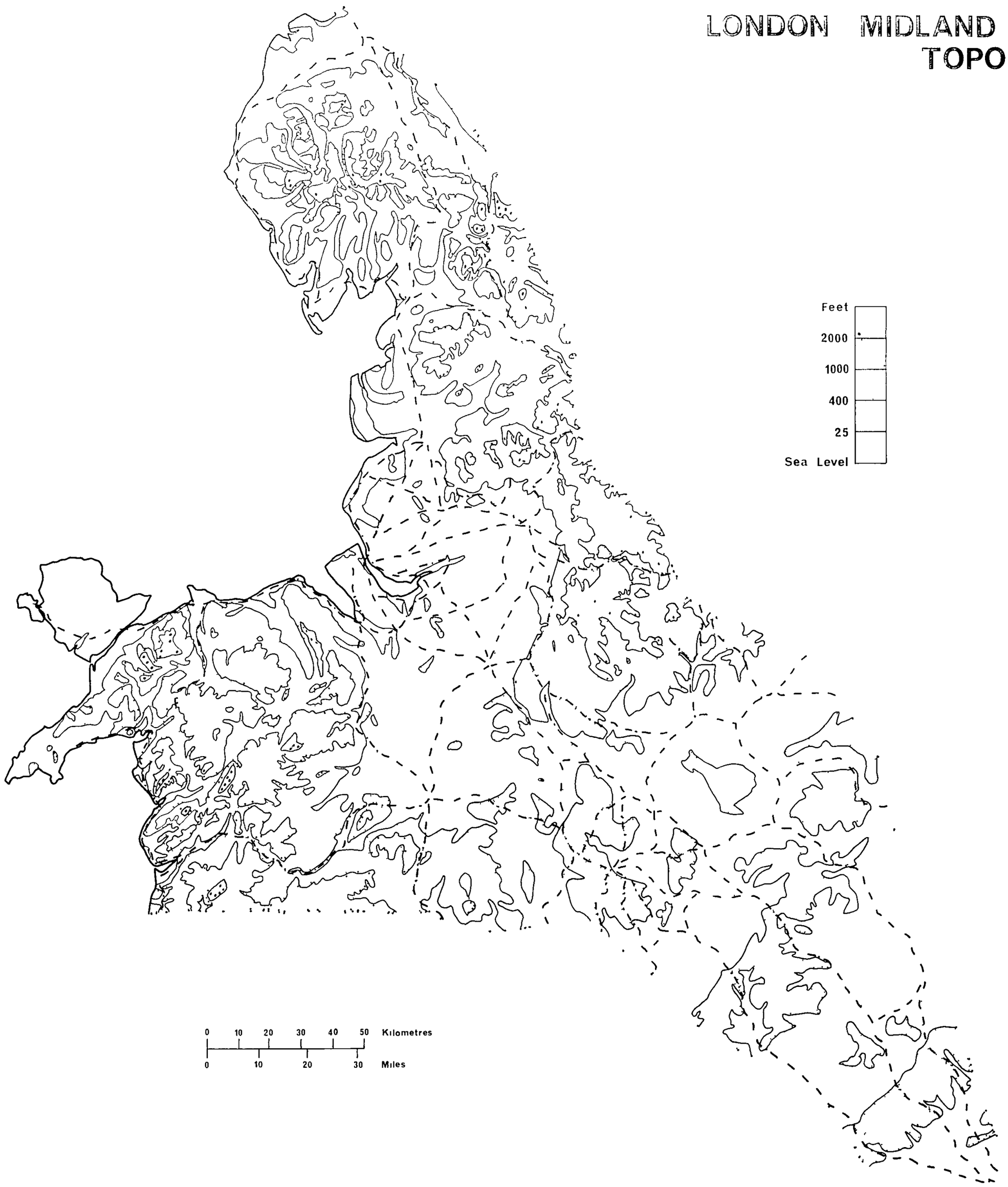
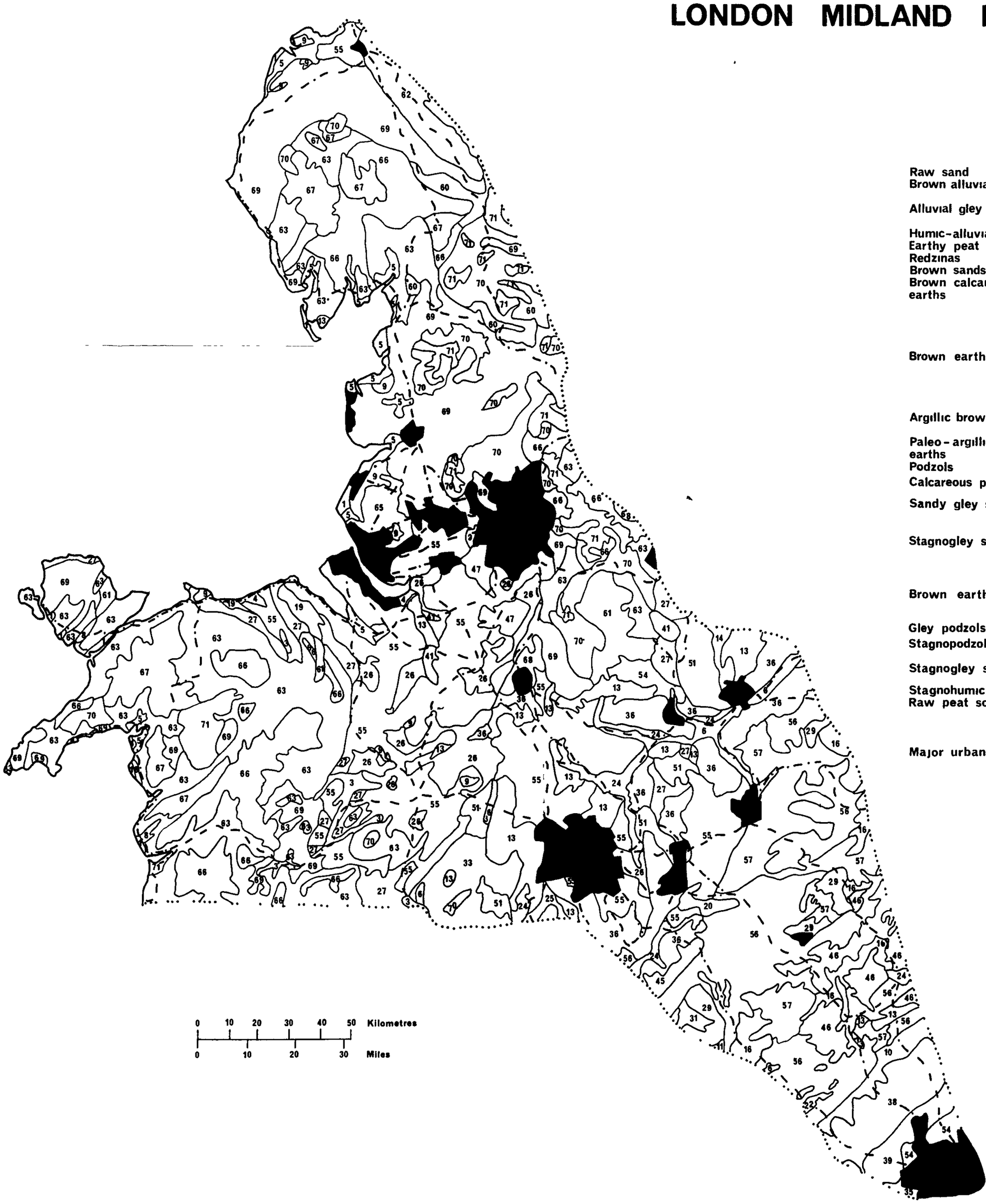
LONDON MIDLAND REGION: SURVEY SITES 1979



LONDON MIDLAND REGION: TOPOGRAPHY



LONDON MIDLAND REGION: SOILS



Raw sand	1
Brown alluvial soils	3
Alluvial gley soils	4, 5, 6
Humic-alluvial gley soils	8
Earthy peat soils	9
Redzinas	10
Brown sands	13
Brown calcareous earths	14, 16
Brown earths	19, 20, 22, 24, 25, 26, 27, 29, 31
Argillic brown earths	35, 36
Paleo-argillic brown earths	38, 39
Podzols	41
Calcareous pelosols	45, 46
Sandy gley soils	47
Stagnogley soils	51, 54, 55, 56, 57
Brown earths	60, 61, 62, 63
Gley podzols	65
Stagnopodzols	66, 67
Stagnogley soils	68, 69
Stagnohumic gley soils	70
Raw peat soils	71
Major urban areas	

LONDON MIDLAND REGION: GEOLOGY