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# Lichen Habitats

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## Lowland heath, dune and machair

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A survey and assessment by the British Lichen Society

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Nature Conservancy Council
Contract HF 3/03/266

# SURVEY AND ASSESSMENT OF LOWLAND HEATHLAND LICHEN HABITATS

A report prepared by the Heathland Lichen Working Party of the British Lichen Society for the Nature Conservancy Council.

NCC/BLS CONTRACT HF 3/03/266


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## INTRODUCTION

This report presents the fullest evaluation of sites of terricolous lichen interest ever to be made in the British Isles. It updates previous gradings of such sites carried out by the British Lichen Society in 1973 and 1978, which were, in any case, restricted to sites of International and National importance.

This revision and report has been prepared on behalf of the British Lichen Society by four experts on terricolous lichens through the BLS Conservation Officer who administered the scheme. Most of the work was carried out in the members' own time on a voluntary basis. This constraint, together with a requirement to complete the report in less than 12 months (from 7th March 1983 to 29th February 1984) restricted the amount of new survey data which could be collected. Fieldwork undertaken specifically for this project was invaluable in helping to obtain a clear focus on the quality of certain sites. It also revealed several unexpectedly rich localities.

This report is therefore a rapidly achieved assessment of all sites known to the working party (nearly 500 were assessed), based mainly on existing data of variable completeness and quality, most of which is compiled for the first time. Rigorous classification of habitats and communities, or performance of numerical analyses of grading criteria was not possible during the short time of the project.

Nevertheless, this assessment of 500 sites will, together with our summary of the sources available, help future workers to categorise the sites more objectively, and, of paramount importance, to take measures for their conservation.

## OBJECTIVES

As set out in Nature Conservancy Council
Contract HF3/03/266

"SURVEY AND ASSESSMENT OF LOWLAND HEATHLAND LICHEN HABITATS"

1. To list all sites of Lichenological importance in the UK on lowland heathland, dunes, shingle beach and machair.
2. To provide descriptions of the particular features of importance of the most outstanding sites together with summaries for the sites of lesser importance.
3. To grade all sites in terms of their International, National and lesser importance according to a scheme approved by the NCC.
4. To appraise existing information and to obtain new information by primary survey of the most important outstanding sites.

The objectives closely follow those of the Woodland Sites Survey Report submitted in February 1982. The grading system follows that approved by the NCC for that report but it was suggested that lesser emphasis should be placed on the concept of back-up sites. Also, there should be more grade 1 sites than grade 2, more grade 2 than grade 3 and so on. The grading system follows that adopted by the BLS in the grading exercize of 1973 except that the Nationally important grade is split into two and a grade 7 is incorporated, indicating sites evaluated and found to be of no lichenological interest.

All sites thought to contain terricolous lichens in the published Nature Conservation Review have been evaluated provided information was available. In addition, all sites communicated to us for evaluation have been dealt with, again provided that sufficient information was forthcoming. A significant amount of primary fieldwork was performed on sites offering particular promise.

Although based on the preceding Woodland Survey Report and it methods, the present survey offered some peculiar difficulties not encountered in the former report. Firstly, unlike the case of woodlands, no single working party member had a complete knowledge of all terricolous site types encountered because each tended to specialise in certain types of site or geographical region. Secondly, the site data was particularly scattered and a considerable amount of postal communication was necessary in order to gather all the information. Thirdly, because of the scattered nature of the information its quality is very variable and in some cases we have downgraded sites on account of the paucity of information about it while indicating that its potential interest may be great. Fourthly, the survey has revealed many large gaps in our knowledge, both of particular types of site and of particular geographical areas of Britain. Consequently we feel that this report must be read as a first primer, to be succeeded by one or more updated reports as new information comes to hand.

The following report presents

(a) criteria used for selecting sites

(b) criteria used for grading sites

(c) a summary of the grading system

(d) details of sites graded 1,2,3 and 4

(e) tables summarising grade 5 sites

(f) reference list

(g) an appendix summarising details held by the BLS on all sites considered.

It should be noted that sites graded 5 to 7 are merely summarised and are not dealt with in detail. In addition, an original classification of terricolous habitats is provided and significant sites have been incorporated within it.

# SURVEY AND ASSESSMENT OF LOWLAND HEATHLAND LICHEN HABITATS

## SELECTION OF SITES

Definition of Lowland Heathland.

The report is primarily concerned with lichens inhabiting soil in lowland Britain.

Lowland sites predominate in the S. and E. of Britain from sea level to about 300m altitude. Occasionally the altitude has been raised to accommodate sites of lowland character and heavy metal localities, particularly in the Pennines. Nearly all localities in Scotland, Wales and SW England are coastal. Sites selected for inclusion are not only those of heathland sensu stricto but encompass all areas of terricolous interest, including recently man-made habitats.

A synopsis of lowland terricolous site types is as follows.

Coastal sites.

Machair -unique ecosystems technically in highland Britain but bearing lichens of lowland character. The distinctive ecological elements favourable for lichens are calcareous (shell) sand, low in nutrients, and an oceanic climate, free of frosts. Sites are generally flat and more or less heavily grazed by sheep, hares, rabbits and wild geese. These sites support a dense and diverse phanerogamic flora upon which some, normally epiphytic, lichens can be found. The sandy soil supports many macrolichens (Cladonia, Collema, Catapyrenium, Peltigera, Leptogium, Solorina) with characteristic crustose lichens binding the soil (Toninia, Microglaena, Squamarina, Placidiopsis, Bacidia, Diploschistes). An important factor affecting lichen diversity is the presence of rocky outcrops partially covered, or periodically inundated by wind-blown sand. A distinctive saxicolous community then develops including Polyblastia spp, Cladonia firma etc. Machair appears to be an ecosystem unique to the British Isles.

Dunes - well-known maritime ecosystems occurring round the coast of Britain. Lichens are similar to those of machair but a wider variety of habitats may be represented. These include calcareous and acidic (grey dune, dune heath) soils, stable and unstabilised sand, epiphytic communities on dune phanerogams, coprophiles (principally on rabbit dung), and saxicoles on shingle, stones and sea shells. As with Machair, the presence of rocks protruding from the sand can allow a distinctive lichen flora to develop. Dunes can vary with ecological position. Those in eastern Britain are usually more acidic with little shell sand while those in the west are more calcareous. Generally speaking, dune systems with acidic habitats have a wider species diversity, particularly of Cladonia species, while those in the west have fewer Cladoniae but more cyanophilic lichens (Collema, Leptogium etc.) Dunes in S. and SW. Britain have "sun-species" such as Fulgensia while those in N. Britain have more "boreal" or montane

elements such as Solorina, Ochrolechia frigida, Psoroma, Thamnolia, Cladonia rangiferina etc, as well as an inherent acidic tendency, and more luxuriant macrolichen development due to cooler climate and higher rainfall.

Maritime Heath - cliff-top terricolous lichen communities. These communities occur around the entire coast of Britain and may be dominated by grassland or ericaceous vegetation. Normal maritime swards are poor in lichens except where rocks protrude. Then the soil-filled interstices become covered with characteristic lichens, principally Solenopsora, Pannaria leucophaea, Toninia etc. Many other lichens in these habitats resemble those from dunes. Calcaereous rocky shores may have characteristic calcicole lichens on the cliff-top soil (Squamarina, Psora lurida). The more acidic maritime sward may contain abundant macrolichens in suitable places. For example, epiphytes such as Lobaria, Pseudocyphellaria, Nephroma etc, and Teloschistes (in the south) are found on Calluna. Decayed Armeria can bear Rinodina, Caloplaca and Opegrapha species, some being unique to this habitat.

Raised Beach. These are a type of maritime heath, normally colonised by phanerogams (grasses) on boulder clay. A characte ristic maritime flora develops including Acarospora benedarensis, Catapyrenium, Polyblastia spp. Also included are miscellaneous soils occurring on cliff tops, perhaps best called "drift".

Shingle. Stabilised maritime shingle is a relatively rare habitat. It normally occurs in association with dunes and dune heath communities. In the South-east it provides the only appreciable saxicolous habitat for seashore lichens. Seawashed shingle typically has a depauperate rocky-shore flora, but muddy shingle in estuaries and salt marshes can bear a specialised community. This community, incorporating Lecania erysibe, Lecanora dispersa, Caloplaca flavorubescens, Xanthoria parietina, Verrucaria ditmarsica and Stigmidium marinum is tentatively identified as one associated with waters containing undecayed organic matter in high salt surroundings.

Inland Habitats.

Freshwater Shingle. This is found in river bends and is best developed in highland Britain. Few sites have been identified in the lowlands.

Heathland (Calluna-dominated)

Calluna heath is known to have its optimum development in Britain, though the species ranges from Western Norway to Portugal, and eastwards into Russia.

A peculiar problem is posed by the fact that many of our lowland sites have Calluna as a major component of the phanerogamic flora. For example, Dunes develop a Callunetum in the older, stabilised stages, while dunes on the E coast of Britain, being inherently more acidic, develop Calluna when quite young. Maritime heath is dominated by Calluna in wind- and wave- exposed places. We feel it to be unrealistic to adopt an entirely Call-

uno-centric habitat classification since terricolous sites of lichen interest can show all stages of intergradation, from parts which are Calluna-dominated to parts covered by grasses, bryophytes, Ulex etc. After much discussion, we have dealt with the problem by subclassifying sites separately, on the basis of their place in a Calluna-heathland hierarchy. For convenience we adopted the system proposed by Gimingham (201). But we realise that this classification is not entirely satisfactory. Table 1 shows our sites classified in this way. A problem is posed in that data frequently lacks phanerogamic information and classification becomes difficult or impossible for sites graded 5 or more.

The relevant categories described and numbered as in Gimingham are as follows.

A. Mountain Heaths.

6. Dryas heaths. These develop on calcareous soils at low levels in N Scotland. Invernaver is our best lichen-rich example.

B. Dry Heaths.

ii. Oceanic

2. Calluna-Erica cinerea, with Arctostaphylos uva-ursi, on maritime soils. In N Scotland, some of the Sutherland sites may fit, but we cannot be sure.

3. Calluna-Ulex gallii, ranges from SW England (Cornwall, Devon,Dorset, Hampshire and NW France).

4. Calluna-Ulex minor, less oceanic than 3, ranging from Dorset to E Anglia with counterparts in N France.

Classes 3 and 4 approximate to the "Anglo-Norman Heaths", exemplified by the New Forest heathlands.

5. Calluna-Erica vagans heath is restricted to extreme SW England, especially at the Lizard and Brittany,

6. Calluna-Scilla verna with Festuca ovina is not identified in our data but lichen-rich patches are known in the Lizard Peninsula.

C. Northern Heaths.

7. Calluna-Vaccinium, on peat and podsols in the north of Britain. Also present in the Midlands (Cannock Chase and the Shropshire and Leicestershire sites).

8. Calluna-Empetrum nigrum dry-heath, on coastal sand dunes in E Scotland, ranging through Denmark and SW Sweden. It is extremely lichen-rich, exemplified by Forvie, Cuthill Links, Ferry Links etc, but probably ranges through Lincolnshire to Norfolk. There are also lichen elements in Sussex heaths.

D. Humid and Wet heath

These are generally poor for lichens and are not felt to be relevant to us. They appear to be subsets of some of the categories described in sections A and B.

The classification is poor from the point of view of Western, lichen-rich heath (such as Laggan and Gwaun Valley area) which does not fit into any of the above classes but may be nearest to 7. The Midlands heath also fits best into class 7 but is very different in character. The Berkshire, Hertfordshire and Wiltshire sites do not easily fit anywhere. The Dorset sites especially, have very "eastern" lichenological tendencies, while the more easterly New Forest and Sussex heaths have a number of "oceanic" lichens. The E Anglian heaths, while expected to classify with the New Forest heaths, have many lichens in common with sites in E.Scotland.

Grassland.

Two types of grassland are important for lichens.

Acidic Grassland.

Typically dominated by Festuca spp, this develops in many places under nutritionally depleted conditions. It may form a transition towards Calluna heath as the two often occur together. Areas of industrial dereliction, occurring in lowland Britain, are important for these lichen communities and may be of County or Regional status.

Calcareous grassland.

Chalk. Such grassland is restricted to SE Britain and bears a small but distinctive lichen flora. A few outstandingly rich sites are known, associated with long-undisturbed conditions. Of additional interest is the lichen cover on flint and chalk pebbles. This habitat type is rapidly disappearing.

Limestone. A richer flora is found in these grasslands,which are also more widespread. Few Cladonia spp. are present, but a wide variety of crustose lichens may be found.

Breckland. This particular variety of calcareous grassland is found only in Norfolk and Suffolk. It appears to be a continental community developing in areas of particularly low rainfall. The characteristic species are Buellia asterella and Squamarina lentigera together with other species of calcareous dunes.

Man-made habitats.

Man-made, or sites of industrial/urban dereliction are important refugia for lichens in the midlands and south of Britain. Such places are often neglected and consequently untrampled and unburnt, and support a variety of wildlife, especially rabbits. Nutrient enrichment is minimal so that many sites present communities akin to acidic grassland or dry Calluna heathland.

Railway cuttings. These "acidic grasslands" support many Cladonia and Peltigera, especially P.spuria. Small boulders used for stabilising the sides develop heathland communities with Rhacomitrium and Stereocaulon.

Spoil Heaps. Coal and shale tips can develop a Calluna heath including Coelocaulon and many Cladonia spp.

Heavy-metal sites. Spoil heaps surrounding mineral workings may have an exceptionally rich flora of species rarely encountered in "natural" environments (189). For example, Bryophagus gloeocapsa, Vezdaea and Stereocaulon spp. develop on soil. Only heathland found on serpentine rocks in undeveloped areas may have a similar lichen flora. Old lead workings and copper workings are particularly valuable.

QUALITY OF DATA

The data were gathered from a wide variety of sources, especially the BLS Conservation Officer's files and data held by various individuals. Occasionally published sources were used. The data were obtained, firstly by circulating a wide network of individuals known to have an interest in lichens of lowland heathlands, requesting a simple list of sites. Secondly, individuals were re-contacted regarding sites for which further information was needed. Many of the NCC Regional Officers also provided lists of sites of potential interest. The National Trust was particularly informative.

An attempt was made to standardise the quality of recording by preparing a special "proforma" (appendix A ). This has a box for each of the criteria used for site selection.

From an appraisal of these lists the working party decided upon a priority list of sites and regions which needed urgent investigation. Various individuals were then asked to survey sites, assisted by the grant provided by the NCC.

The quality of information presented and assessed has been very variable. In cases where primary surveys have been carried out by individuals selected by the working party the quality has been high. In other cases we have had to accept whatever quality was offered. Most of the sites graded 1 to 4 have been visited by one or more members of the working party. The quality of data depends on the recorder's expertise, the length of time spent at the site, the area covered and weather conditions prevailing. In addition, the rapid growth of taxonomic knowledge of terricolous lichens renders older records of rather lesser value. A further peculiarity of the terricolous habitat is the ephemeral nature of some of its lichens which may even be seasonal annuals.

The data available are almost entirely qualitative, though some brief written comments on luxuriance or scarcity of species have assisted site evaluation. Most of the data contained herein is quite up-to-date; practically all sites have been visited since 1969 and the majority of sites graded 1-4 since 1977. Many sites need revisiting in the light of modern knowledge.

The original sources of information are held by the BLS Conservation Officer, who should be consulted for further details. The extent of the data available is indicated in Appendix B, where the presence of a species list, map, proforma and reports/correspondance/published references to the sites are indicated.

## CRITERIA USED FOR GRADING SITES

1. Total Number of Terricolous Species. This is perhaps the most important single criterion to suggest a site's importance. It obviously varies with topography, geography, community types, area and habitat diversity. Generally more than 20 terricolous Cladonia spp. indicates an area worthy of serious consideration. Species are named according to the most modern checklist (ref 110).

2. Number of indicator species. There are no published scales of terricolous indicator species analogous to those for woodlands but we have been able to draw up a list from data in this report. Generally speaking the numbers of useful indicator species is low, often of fewer than 5 species per site type. This may be due to the narrow ecological amplitude of many terricolous lichens.

3. Number of rarities. High species totals in themselves do not indicate that a considerable number of rare species is present; also, some sites with low species totals have an unusually large number of rarities. Species can be rare nationally (fewer than 10 known sites) or rare in the region or county, perhaps being at the limits of their geographical range. Some rare crustose species known to us remain to be described in the literature. The presence of a single rarity has never qualified a site for a high grade; only several rarities will upgrade the site.

4. Extent of lichen interest. The size of the area containing the habitats of lichen interest is very important in determining the numbers of species present, the numbers of rarities, the potential for future lichen conservation and the minimum area capable of supporting a viable lichen population. In many cases, the proposed extent of the site is greater than the size of the lichen-rich area, in order to maintain a viable area ensuring the future of the communities. Occasionally, very small sites have been included but these are graded at no more than county (grade 5 ) significance. In a few cases "site complexes" have been described where lichen interest extends over a wide and scattered area.

5. Luxuriance. Extensive populations of fruiting lichens or obviously expanding populations of rare or threatened species contribute to an important site. It must be remembered, however, that terricolous lichens are naturally very scattered and the interest of a site may be very localised with respect to its component species. In addition, the ephemeral nature of some species, especially Cladonia, means that they may be poorly developed for some years though the potential for their development is there and must be preserved. Seasonal ephemerals such as Thelocarpon and Vezdaea may be present but unnoticed.

6. Habitat type and its rarity. In itself this is of no importance but it does affect other grading criteria. Our classification of site types is given in the next section. We have not consciously attempted to provide a top class site for each habitat type since these may not exist.

7. Geographical and topographical interest. Very few sites have been selected on the basis of their unusual geographical occurrence. Indeed, terricolous lichen sites seem to be remarkably consistent in their geographical locations (by contrast with woodlands). Occasionally criteria such as a site being at the edge of the highland line or containing species at the limits of their geographical range have been evaluated.

8. Age and continuity of the habitat. So far as we are aware there are no first class indicators of ecological continuity amongst terricolous lichens. However, the presence of features leading to a high grade (1 to 4) suggests that the habitat has been continuous enough to allow a full development. For certain communities, such as chalk grassland, a long period free from disturbance is required for the lichens to attain their maximum development. In urban sites, the habitat may be short-lived or of recent development (spoil heaps) and lichen floras may be a temporary stage in a succession to phanerogams. Shingle beaches are subject to random and catastrophic events, such as storms, which temporarily reduce the lichen interest, but they can be recolonised provided lichens have been be preserved nearby. Some "natural" heaths, such as the dry Calluna heaths, are subject to a fire and re-colonisation cycle maintaining a lichen population which is optimal for a disturbed environment. This process can take 12-13 years (184). Consequently we maintain that a degree of physical disturbance (trampling, controlled grazing, burning , reworking of mine spoil, etc) may be beneficial for lichen communities. We have not graded sites on the basis of their past floras which may now be extinct. But we have indicated the likelihood of future re-colonisation wherever possible.

9. Community types. There is no accepted classification of community types for terricolous lichens. Instead we have adopted those in use for phanerogamic vegetation.

10. Fragility. Sites subject to threats which appear to be unavoidable have been relatively downgraded. In all cases, the vulnerability of a site has been indicated, bearing in mind that some factors causing disturbance may in reality be beneficial.

11. Representativeness. A classification of terricolous lichen habitats is given in Table 1. An attempt has been made to place all of the highest quality sites within this framework but it must be accepted that some sites include several habitat types while others intergrade and are not clearly classifiable.

12. Historical factors. Although not an important factor in grading a site we feel it important to indicate when a site has received intensive study in the past. This is a very useful basis for assessing change.

13. Other factors. Terricolous sites are particularly influenced by geology. In a few cases the rarity of the geological substratum has influenced our grading of the site. Very occasionally rare or interesting lichens on rocks have influenced the grading on the basis that the rocks are an integral part of the habitat. This applies especially to maritime heath and machair.

## OUTLINE OF THE GRADING SYSTEM

GRADE 1. International Importance

The best examples of a particular community/assemblage in Europe - to the best of our knowledge. These grades are to be agreed by the IUCN Lichen Subcommittee.

GRADE 2. National Importance

The best example of a particular lichen community/assemblage in the British Isles. A wider range of criteria is used in determining this grade than for Grade 1, particularly ecology, habitat, geographical location and size of the site.

GRADE 3. National Importance - Back-up sites.

These are similar to those of grade 2 in quality but for various reasons are of slightly lesser value. They are conceived as replacement sites for those of grade 2 which become damaged. They may also be of slightly lower species diversity, site size, range of habitats etc.

GRADE 4. Regional Importance.

Sites showing the best lichen communities/assemblages, or with rare species or other features, in a context greater than county but less than national. They may be impoverished variants of grade 2 or 3 sites, or could be almost equivalent to them in quality but in a different geographical region. A wide variety of site quality is represented here. Many sites nominated are simply the best known in the region but are not noteworthy at any higher level. This is especially true for the very impoverished English Midlands Region.

The regional concept does not relate to any established classification other than a notional one used by lichenologists.

GRADE 5. County Importance.

The best heathland-terricolous communities within the pre-1974 system of counties. At this point it becomes difficult for a small committee to be certain about the importance of a site since small differences in species numbers or communities can up- or down-grade it. Generally, we have been conservative about the grade 4 designation so that a very wide range of quality is represented in grade 5. A few counties have no grade 5 site since we could not segregate the best site from the existing grade 6 sites.

GRADE 6. Local Importance.

Sites with common and widespread species for the County, useful for research and teaching purposes but in no way outstanding.

GRADE 7. Sites of no lichenological importance.

UNGRADED Sites for which data are lacking though many may well be of significance.

## THE CONCEPT OF BACK-UP SITES

A condition imposed during the Woodland Lichens Survey was that sites of National importance should be divided into two groups. The first group, grade 2, should be the prime site, while the grade 3 sites should be equivalent in type, but be less important with respect to species diversity, species interest, smaller area, or be damaged in some way. Wherever possible, this concept has been followed and indications are made to this effect in the site descriptions. It was found in practice, however, to be an oversimplified approach and it has proved impossible to be fully consistent and to categorise sites from the back-up point of view. The reasons are itemised as follows.

1. A number of sites, especially within grades 1 and 2 are unique in species composition or ecological features and there are no comparative sites elsewhere. Examples are heavy-metal rich shingle by the River Tyne, the Lizard heathlands etc.

2. Many, or even perhaps most of the sites represent a range of communities. Consequently large numbers of examples back-up other sites in part.

3. Lichen quality, being the primary criterion for grading, does not in itself allow the back-up criterion to be applied. Two sites may be of equivalent lichen quality but include different species or communities. Only by applying a non-lichen criterion such as habitat type or geographical location can the back-up criterion be applied. Consequently, within our terms of reference, the back-up concept must be of secondary importance.

4. Back-up sites cannot be restricted to grade 3 but are found also in grade 2, backing grade 1, or in grade 4 backing-up grades 3, or even 1 and 2. Here, they have affinities with sites of higher grade, but are notably of lower lichenological interest.

5. Sites in geographically separated areas of Britain may be apparently similar to each other, but their distance apart diminishes their relevance as back-up sites. Examples are the Brean Down/Great Orme/Balnakeil bay series, beach shingle at Ravensglass and Slapton Ley/Dungeness etc.

We have, however, made an attempt to provide back-up sites to be regraded if the prime site becomes damaged. by supplying the classification of sites graded 1 to 4 (Table 1).

TABLE 1. CLASSIFICATION OF SITES ACCORDING TO HABITAT.

| | | GRADE 1 | GRADE 2 | GRADE 3 | GRADE 4 |
|---|---|---|---|---|---|
| SHINGLE | Marine | | Dungeness<br>Ravensglass | Slapton<br>Point of Ayre<br>Orfordness | Chesil Bank<br>Cemlyn Bay<br>Blakeney Pt<br>Holy Island |
| | Freshwater | | Slaggyford | | |
| DUNES | Calcareous Shell-Sand | Stackpole Warren | Ravensglass<br>Penhale Sands<br>Appletree Banks | Point of Ayre<br>Newborough<br>Braunton Burrows<br>Sark | Ainsdale<br>Herm |
| | Acidic (cf Calluna Heaths) | Culbin Sands | Forvie<br>Ferry/Coul Links<br>Cuthill Links | Kinnaber Links | Tentsmuir<br>Whiteness (Nairn) |
| MARITIME HEATH | | | Bardsey Island<br>Skomer<br>St.Kilda | Aberdaron Coast | Rhoscolyn |
| | | | Nare Head<br>Castle Down<br>Lizard Heathlands | Bolt-Start Pt.<br>Strumble Head<br>Sark | Hartland Pt. |
| | Limestone | Stackpole Warren | Brean Down | Balnakeil Bay (in part)<br>Great Orme's Head | |
| BEACH/CLIFF SOIL | | | | | Hen Borth<br>RAF Bawdsey<br>Aberlady |
| BRECKLAND | | | Lakenheath Warren | Thetford Heath | Weeting Heath |
| MACHAIR | | Coll | Colonsay<br>Invernaver | Rhum<br>Oldshore-Sheigra<br>Balnakeil Bay | Dunnet Links |

| | | | | | |
|---|---|---|---|---|---|
| GRASSLAND | Chalk | | Porton Down<br>Tennyson Down | Box Hill<br>Butser Hill | Ivinghoe Beacon<br>Heyshott Down |
| | Limestone | | Brean Down | Balnakeil Bay<br>Great Orme's Head | Bwrydd Arthur<br>Dolebury Warren |
| | Acid | | | | Whiteness (Shetland)<br>Wytham |
| CALLUNA HEATH -Gimingham No | | | | | |
| Montane "Dryas" | A6 | | Invernaver | Balnakeil Bay | |
| Oceanic "Calluna/U.gallii " | B(1)3 | New Forest | Ambersham Common | Ashdown Forest<br>Lavington Heath<br>Thursley Common | Iping/Trotton Common<br>Hankley Common<br>Chobham Common |
| "Calluna/U.minor" | B(1)4 | New Forest | Ambersham Common | Ashdown Forest<br>Lavington Heath<br>Thursley Common | Iping/Trotton Common<br>Hankley Common<br>Chobham Common |
| unclassified | | | Studland Heath | Brownsea Island<br>Cawston/Marsham | Winfrith Heath<br>Snelsmore Common |
| "Calluna/E.vagans" | B(1)5 | | Lizard Heathland<br>Castle Down | Sark | |
| Northern "Calluna/Vaccinium"<br>? Maritime | B(2)7 | | Laggan Deer Forest<br>Bardsey Island<br>Nare Head | Gwaun Area<br>Aberdaron Coast<br>Bolt-Start Point<br>Strumble Head | Fingle Bridge<br>Rhoscolyn<br>Hartland Point |
| Dry-Dune "E.nigrum" | B(2)8 | Culbin Sands | Forvie<br>Ferry/Coul Links<br>Cuthill Links | Kinnaber Links | Tentsmuir<br>Whiteness (Nairn) |
| MAN-MADE Heavy metal spoil | | | Coniston | Parys Mountain<br>Nent head | Tideslow Rake<br>Holwell Steel Works |
| Others | | | | | Saxelby Cutting<br>The Brand<br>Hook Norton<br>Wytham<br>Holkham<br>Charterhouse |

## THE SITE DESCRIPTIONS

The following accounts summarise all the data made available to us. Sometimes important data simply could not be found in time to be included; of particular significance is the owner of the site. Through lack of data a very small number of sites remain ungraded. A number of other sites have been provisionally graded but data is too scanty or uncertain to be definite.

Sites of grades 1 to 4 are dealt with in some detail as befits their exceptional status. Grade 5 sites, although also important, are too numerous to allows extensive details to be given. Basic details of all sites are summarised in appendix B which shows what data the BLS possesses (species lists, proformas, maps), together with a literature source, if such exists.

Sometimes a large number of small sites have been aggregated into site-complexes, indicated by "A1" etc. Here, it is felt that although individual parts may not be of equal quality, the site-aggregate is homogeneous enough to form an entity which can be conveniently managed or administered. Of even greater importance, these aggregations of small sites, if specially protected, will encourage the spread of lichens throughout the site complex. We are only too aware that very small reserves may have the effect of isolating a community which then becomes of relict and non-viable status.

### Index to Grade 1 Sites

COLL Argyll GRADE 1
17/2--6--

Area:50 ha spread over three sites along the north-west coast.
Altitude: 0 to 30m
Geology:Lewisian Gneiss overlain with blown shell sand.
Owners:Various farmers
Total taxa:27 terricolous, over 100 on all substrata.

Some of the most natural machair sites known in the Hebrides back small, isolated bays, for example at Sorisdale and just east of A'Chroic. In this remote area, small patches of machair have not been so intensively farmed as elsewhere where ploughing and re-seeding, or very heavy trampling and manuring, have destroyed most of the lichen interest.

The most interesting communities occur in association with low rock outcrops which may themselves have discouraged intensive agriculture. In these sites, the density of lichens is high and in bryophyte-rich areas Catapyrenium lachneum, Microglaena muscorum, Placidiopsis custnanii, Polyblastia gelatinosa, P.wheldonii, Solorina saccata, S.spongiosa and an undescribed Verrucaria sp. may occur. The best sites are probably slightly flushed by water movement as they are on steep slopes where blown sand thins out against the outcrops. Common species include Peltigera neckeri, P.canina, Agonimia tristicula, Bacidia muscorum, Toninia aromatica, and T.lobulata. In addition the acid-rock outcrops in the machair support unusual assemblages of saxicolous lichens as they are affected by dry flushing from shell sand and by base-rich water during rain. Characteristic species include Acrocordia macrocarpa, Collema multipartitum, Lecanora andrewii, Leptogium plicatile, L.turgidum and Verrucaria glaucina.

The "standard" machair of the Hebrides is not a lichen-rich community. Only when combined with a lower intensity of land use and rock outcrops does it improve dramatically. As the machair is a peculiarly British type of habitat it was thought appropriate that the best known example should be given International status. It is possible that more intensive survey work in Harris (Outer Hebrides) will result in the discovery of sites equal to, or exceeding those in Coll in importance, but for the moment this locality, closely followed by Colonsay (grade 2) is the richest machair lichen site known.

The site was intensively surveyed by a BLS party in April 1983.

Ref: 174,183

NEW FOREST HEATHS — Hampshire and Wiltshire
41/19 to 46,04 to 16

Area:12000ha — Altitude:30 to 120m
Geology: gravels, sands, clays
Owners: The Crown
Total taxa:33 terricolous

The New Forest heaths form part of the series, known informally as the "Anglo-Norman" heaths, which stretch from Normandy to Wiltshire, Hampshire and Sussex. Gimingham (201) refers to these sites as "Lowland-Oceanic' with Calluna/U.minor/Erica cinerea". The wet-heath facies are also present. We cannot place these heaths exactly since quantitative angiosperm studies do not accompany any of our lichen data. It is estimated that less than 1200ha of these heaths remains in Normandy in a natural condition, and much of that is threatened. We consequently feel justified in according an international status to these sites.

The best sites are at Handy Cross to Backley Plain (41/2107), Plaitford to Furzley Commons (41/2718 to 2815), Rushpole Warren from Foxhill to Fair Cross (41/3009), the Heaths about Beaulieu Road Station (41/3307 to 3605) and Ridley Wood area (Harvest Slade Bottom)(41/2106). Plaitford-Furzley is topographically diverse with wet and dry areas, is well grazed and is away from major tourist roads and concomitant fire hazards. The Handy Cross and Ridley Wood areas are comparable but more at risk. Foxhill-Fair Cross is also good but small in extent. Patches of lichen-rich heathland occur throughout the New Forest area.

Cladonia species are numerous and luxuriant. Notable species include C.arbuscula, C.ciliata, C.glauca, C.subulata, C.bacillaris, C.subcervicornis (unusual away from the western coastline), C.strepsilis and Pycnothelia papillaria. Wetter soil bears Lecidea icmalea and L.oligotropha. Coelocaulon aculeatum occurs on barer soils.

The area benefits from management patterns where grazing is intense and reduces the fire risk, and Calluna is unburnt and allowed to reach over-maturity, making it non-flammable and offering open substrata for lichen colonisation.

The site is backed-up by Ambersham Common and other Sussex heaths. It is well protected, though recent efforts to explore for natural gas are disturbing since sulphur dioxide "burn-off" and nutrient-rich dusts would be catastrophic to the lichen interest.

Ref; 46,157

GRADE 1

CULBIN SANDS Moray and Nairn 26/92-60-

Area:3180ha Altitude:0 to 30m
Geology:Shingle ridges with acidic sand dunes
Owners: Forestry Commission
Total Taxa:about 50 terricolous

The largest sand dune system in Britain but now extensively afforested with conifers (especially Pinus sylvestris and P.nigra var. maritima), dating from 1839. Amongst the forest cover are areas of shingle and sandy ridges on which trees remain stunted. This provides open, yet sheltered environments for one of the finest examples of lowland, acidic lichen-heath in the British Isles, in terms of both luxuriance and floristic diversity.

27 species of Cladonia have been recorded. It is the most westerly European, and the only British site for the boreal-continental Cladonia uncialis subsp.uncialis (the oceanic subsp. biuncialis being common in Britain). The rare Stereocaulon condensatum is extremely abundant here, is richly fertile and often hosts the rare lichenicolous fungi Polycoccum trypethelioides and Scutula stereocaulorum. The often taxonomically difficult pair, Coelocaulon aculeatum and C.muricatum present no problems here as they occur in discrete, abundantly fertile cushions, unaffected by trampling or exposure. Other noteworthy terricoles include Cladonia carneola, C.coccifera f.ochrocarpia, C.cornuta, C.rangiferina, C.zopfii and Ochrolechia frigida. However, the lichenological importance of Culbin lies not so much in its rarities, but more with its unique and well documented history and consequent luxuriant lichen communities. It is of immense potential interest for studies in ecology, dynamics, phytosociology and biosystematics. There is no comparable site in Britain, with the minor exception of the much smaller, and only recently planted, Kinnaber Links in Angus. Furthermore, we are not aware of any closely similar site in mainland Europe (eg Denmark); some pine forests in Sweden or Finland may be superficially similar but lie within different climatic and phytogeographical regions.

Culbin Forest is of additional interest for studies on epiphytic lichens as it is a site with relatively old, planted Pinus sylvestris, remote from existing native pinewoods, and as such is valuable for the determination of old woodland indicator lichen species for the native pinewoods.

The most important areas for terricolous lichens dicovered so far lie at 26/997630, 36/015645, 36/026641, 36/020627. Other areas undoubtedly await discovery.

The site is well preserved, indeed the woodlands are planted as a soil-conservation measure. Possible dangers include fire and damage through timber extraction when the main blocks of timber are felled.

Ref:174

GRADE 1

STACKPOLE WARREN Pembrokeshire 11/98-94-

Area:50ha Altitude:0 to 35m
Geology:Dunes and blown shell sand over outcrops of Carboniferous limestone.
Owners: National trust (in part), NNR
Total taxa:58 from all habitats, at least 20 terricolous

This extensive area of dunes and sand blown over outcrops of Carboniferous Limestone is outstandingly rich in terricolous lichens. It has been visited by lichenologists since 1801 when Fulgensia fulgens was first discovered by Adams and Milne. A low intensity of land use, coupled with habitat diversity and rabbit grazing, which has prevented the spread of scrub, have maintained a stability to the habitat. The richest areas are are the sandy cliffs. Here, open, sandy areas, rock crevices and on ledges, and in the nutrient deficient grassland on top of the slopes,the following species can be found; Cladonia foliacea, Diploschistes muscorum, Psora decipiens, Toninia caeruleonigricans, Fulgensia fulgens, Squamarina cartilaginea, Bacidia herbarum, Microglaena muscorum, Placidiopsis custnanii, Polyblastia gelatinosa and many other calcicoles. The site is large, complex, and difficult to explore thoroughly. Every micro-habitat is rich in lichens, whether it be a rocky surface, scrub (bearing Ramalina portuensis), open patches or stab ilised grassland. The high habitat diversity and nutrient deficiency of the highly calcareous substrata render this site well buffered against change. It is likely to have remained partly open throughout the forest period so the communities may be regarded as of relict status. The site is unique and no back-ups can be proposed. Though some of the limestone crevice and ledge communities also occur at Brean Down.

Some of the better communities are on the trampled parts.

Ref:191,228

## Index to Grade 2 Sites

GRADE 2

SANDS OF FORVIE Aberdeen 48/03-27-

Area:810ha Altitude:0 to 57m
Geology: Mica-schist
Owner:NCC lease holder
Total taxa:111 all substrata, 38 terricolous

The fifth largest and one of the least disturbed large sand dune systems in Britain. The dune area, especially at the north end, comprises extensive Calluna-Empetrum lichen-rich heath. This accords with Gimingham's "northern Calluna-Empetrum nigrum" heath, restricted to dunes in N.Scotland Denmark and SW Sweden.

The floristic diversity of the terricolous lichens is rather low with only about 20 Cladonia spp., although several additional species occur as epiphytes on the dwarf shrubs. The lichen communities are most noteworthy for their undisturbed nature and abundance of Cetraria islandica, which seems to be strangely absent from the acid dunes further north in NE Scotland. C.islandica was once an important component of lowland heaths in E England but is now extremely rare owing to habitat destruction. Small populations are known at Linwood Warren (Lincolnshire) and Ling Common (Norfolk). The species is still found at Kinnaber Links and Barry Links in Angus but is not so well-developed as at Forvie. Other noteworthy species include Cladonia arbuscula, C.ciliata var.tenuis, C.mitis, C.anomaea, C.scabriuscula, C.zopfii. Dwarf shrubs are colonised by epiphtic Bryoria fuscescens and Evernia prunastri. Micarea nitschkeana and M.prasina are found on dead Ammophila culms and several common microlichens occur on pebbles. Small Alnus, old fence posts (with abundant Cyphelium inquinans), the ruins of Forvie church and sea-cliffs with many ornithocoprophiles add to the lichen interest of the site.

The site is well managed and under no serious threat. Ploughed fields border the reserve and dangers could arise from over-liberal application of chemicals, especially wind-borne fertilizer dust.

The site was intensively visited by members of the working party in August 1983. There are no satisfactory back-up sites.

Ref;174

COLONSAY Argyll GRADE 2
16/3--9--

Area:200 ha
Geology: Sandstones, Mudstones, raised beaches with pebbles, overlain with wind-blown shell-sand.
Altitude:0 to 30 m
Owners:Lord Strathcona
Total taxa:61 at Loch Breac

Machair forms the most outstanding habitat on Colonsay. The best sites are at Oronsay (16/3487), Loch Breac, Traigh nam Barc (16/3691), Tobar Fuar (16/3593), Killoran Bay, Traig Ban (16/4097), and Leac Bhuidhe (16/4299).

The Loch Breac area is the richest and most extensive (400ha) but other sites are almost equally rich (about 35-40 species). Traig Ban is subject to tourist pressure.
The short turf is intensively grazed by rabbits. Many of the lichens are typical of calcareous grasslands in southern England, but Solorina saccata and Squamarina cartilaginea occur locally. As at the Coll sites, shell-sand overlaying siliceous rocks provides conditions for a very unusual flora. On Colonsay it contains Collema multipartitum, Dermatocarpon miniatum, Lempholemma myriococcum, Leptogium plicatile, L.sinuatum, Protoblastenia rupestris, Thelidium decipiens, Toninia aromatica, Collema flaccidum and C.furfuraceum (in turf). Placidiopsis custnanii occurs at Traig Ban. Opegrapha pulvinata (on Dermatocarpon miniatum) and Rinodina milvina were found here for the first time in Britain (in 1978-81).

The island's machair supports fewer rare species than Coll for which it forms a suitable back-up site. Agricultural pressures are minimal so the outlook for conservation is good.

Ref; 192

GRADE 2

LAGGAN DEER FOREST, MULL Argyll 17/6--2--

Area: 2000 ha Altitude:sea-level to 370m
Geology: Basalt.
Owners:
Total taxa: 77 lichens from all substrata.

A very large area of Oceanic, Calluna-dominated heathland with a mixture of dry and wet habitats, valleys and patches of mineral rich (lead) rocks. It would qualify in Gimingham's scheme as "Northern Heath with Calluna/Vaccinium" but is subject to oceanic climatic factors and has extensive wet facies. It is managed, by burning, for deer stalking, but is otherwise unspoiled.
Lichen luxuriance is noteworthy and the natural Calluna-cycle is maintained giving an abundance of lichen habitats, from fresh to mature and over-mature. The site does not abound in great rarities, only Cladonia capitata and C.fragilissima can be cited, but C.sulphurina is unusual for this type of habitat. A good range of wet heath "Omphalina" species has been noted.

The site is considered to be a fine example of its type and is notified on the basis of its very large area, undisturbed character and absence of any known threats. It is likely that sites may exist which are richer in species but they are unlikely to offer such promise for future conservation.

The site is backed up by the Mynydd CarnIngli and the Gwaun Valley area.

Ref; 142

BARDSEY ISLAND Caernarvonshire GRADE 2
23/32-20-

Area: 200 ha Altitude: sea-level to 165m.
Geology: Breccias of the Mona Complex, mostly metamorphosed chlorite schists containing a wide variety of siliceous and basic components including local patches of limestone. The site is significant on its geological features alone. The soils vary from acidic brown-earths to boulder clay and sea-washed maritime areas.
Owners: NCC, Bardsey Observatory Trust, North Wales Naturalists Trust.
Total taxa: 298 species from all habitats

This isolated island has very good examples of maritime heath at a number of points. In conjunction with the excellently developed maritime saxicolous lichen flora the site merits a National designation.

Sea-washed maritime heath is best developed on the southern part of the island. A dense terricolous flora of Cladonia foliacea, C.rangiformis and C.furcata with Anaptychia fusca and other foliose lichens on Armeria maritima tufts is present. On the more sheltered eastern parts the Armeria bears Opegrapha ochrocheila, Lecanora dispersa f. zosterae, Caloplaca cerina, C.stillicidiorum and Rinodina confragosa. The northern end of the island at about 45-60m has a Callunetum incorporating Teloschistes flavicans in fine condition. The island summit has a good flora of Bryoria fuscescens, Cladonia spp., Coelocaulon aculeatum etc., typical of more acidic soils. Wall tops, principally of soil and turf, bear many interesting species including Nephroma parile, Leptogium and Collema spp. The entire eastern half of the island is of steeply-sloping boulder clay, potentially interesting for lichens but as yet unexplored in detail. Much of the Calluna heath on the west side of the mountain resembles that of the Mynydd Carningli-Gwaun Valley area being a Northern Calluna-with-Vaccinium, but has strong oceanic tendencies.

The site is noteworthy for its combination of lichen communities comprising both northern and southern elements. The species list is very high for the area considered. It should be contrasted with Skomer Island which lacks northern elements and has an exceptionally well developed bird-influenced lichen community. The site is eminently preservable with little agricultural activity. Tourist activity could present a threat as the heathland areas are particularly vulnerable to trampling damage. Increase in bird populations could also damage the lichens locally; the Salix areas used for bird ringing have already suffered from excessive bird-manuring.

Ref: 194,195

GRADE 2

LIZARD HEATHLANDS (Site complex) Cornwall 10/7--2--

Area: Altitude:0 to 100m
Geology:Serpentine and locally, gabbro, considerably overlain by peat
Owners:
Total taxa: 60 on all substrata.

The western coastline of the Lizard Peninsula contains a range of unique heathland and grassland habitats developed over serpentine. Cliff tops, where the Calluna alternates with rocky outcrops, gorse and patches of scree, are particularly important for terricolous lichens. It is the most southerly part of the British mainland and so, many lichens have southern affinities. The Kynance Cove area (10/6918) is the only British locality for Cladonia mediterranea which is a component of the dry grassland, together with many other Cladonia spp. Small, gravelly areas, which have a higher pH due to the proximity of serpentine, support Squamarina cartilaginea. On boulders and cliff ledges the rare Heterodermia leucomelos and H.obscurata can be found.

The Lizard coastline is long, complex, and not well known lichenologically. It has been given Grade 2 status on the results of only a small amount of fieldwork which suggested, however, an extremely high potential. It is known from studies elsewhere that serpentine holds rich and unusual lichen communities. The areas surveyed so far include Main Dale, Crousa Downs and Goonhilly Downs NNR's and Kynance Cove. The sites are of Euoceanic, Calluna/Erica vagans type. They are under continuing threat from fire

Ref: 185

NARE HEAD Cornwall GRADE 2
10/91-37-

Area: 20ha Altitude:0 to 100m
Geology: Basalt,gabbro, serpentine and sandstone.
Owners: National Trust
Total taxa:180 from all substrata.

An exposed, rocky headland bearing extensive maritime heath of Northern Calluna/Vaccinium type but strongly oceanic. A wide range of maritime communities is known with 21 terricolous Cladonia spp. including C.arbuscula, C.conoidea, C.subcervicornis, and C.subulata. Trapeliopsis wallrothii grows on soil with Solenopsora holophaea, Leptogium teretiusculum and a good range of Peltigera species. The maritime rocks are extremely rich with Roccella phycopis, Sticta fuliginosa and S. sylvatica, Acarospora opaca and Lecanora praepostera. Rinodina subglaucescens grows on Armeria.

The site appears to be typical of South Western Maritime heath, with fewer Lusitanian elements than sites in the Scilly Isles such as Castle Down, and fewer northern elements than Bardsey. It is backed up the Bolt/Start Point Complex. It is threatened by fire and particularly by trampling from visitors, but its large size should ensure complete recovery from fire at least.

The site was visited by the BLS in 1972 but would repay further study.

GRADE 2

PENHALE SANDS Cornwall 10/76-56-

Area: 15 ha in a 400 ha dune system
Altitude:0 to 80m
Geology: Raised beach with accretion of blown shell-sand
Owners:
Total taxa:29 terricolous

This is the most extensive and representative Fulgensietum in Britain with 20 lichen species in the calcareous parts and other terricolous species in more acidic places.

The site is an old raised beach which was formerly under more intensive cultivation, evidenced by old walls which cross the area. It forms the hinterland to a huge dune system but is not a part of those dunes. The substratum is consolidated mineral soil with a blown sand content; nutrient availability is low. Fulgensia fulgens is very abundant, together with Squamarina cartilaginea, Catapyrenium lachneum, Toninia caeruleonigricans, T.lobulata, Diploschistes muscorum and various Collema and Leptogium spp. The latter are best developed on the tops and sides of "whale-backed" mounds. Reports of Squamarina lentigera are almost cer tainly in error. Locally, where Calluna is present, the more acidic soils support Baeomyces rufus, Cladonia furcata and Lecidea oligotropha etc.

There are no obvious threats to this well studied area, but holiday chalets to the south of the site could increase the visitor pressure.

Braunton Burrows may provide a limited back-up site.

Ref: 191

Scilly

APPLETREE BANKS, Tresco Cornwall GRADE 2
00/89-13

Area: 500m long. Altitude: sea-level
Geology: Granite with shell sand dunes
Owners:
Total taxa: 65 from all habitats.

This is a sheltered dune system dominated by Calluna. The Calluna is extensively hummocked and offers a suitable substratum for lichens which exist epiphytically elsewhere. It may represent the Oceanic Calluna/Erica vagans community but is more Lusitanian in its lichen elements than the Lizard. Possibly more of the mainland Cornish maritime heathlands were like this at one time. The site could be unique in Europe too since no Lobaria-on Calluna sites are known in Brittany or Portugal.

The Calluna flora includes Lobaria pulmonaria and L.scrobiculata, Nephroma laevigatum, Heterodermia leucomelos and Pseudocyphellaria aurata. The sandy soils bear Cladonia firma and other Cladonia species, more or less luxuriant and widespread. The site resembles Channel Island sites. It is threatened by human trampling and fire, being near to the Abbey and the Tresco Gardens. It is backed-up by Sark in the Channel Islands.

Scilly

CASTLE DOWN-KETTLE POINT, Cornwall GRADE 2
Tresco ~~St. Martin's~~ 00/88-16-
Area:25 ha Altitude: sea-level
Geology: Granite
Owners:
Total Taxa: 45 from all substrata.

Coastal heathland, more or less exposed and windswept and dominated by Armeria and Calluna.

Armeria exists as ledges of semi-decayed tufts associated with soil, and bears very good examples of "decayed Armeria" lichen vegetation. The Calluna bears epiphytic Heterodermia propagulifera (the only European locality), H.leucomelos and H.obscurata, especially around Kettle Point.

The site is Oceanic heath with Calluna/Erica vagans, but the Heterodermia communities are very rare now in the SW of England. Only Pen-hir Point in Brittany is at all comparable. There are no satisfactory back-up sites for these communities which exist in fragmentary form at other dune and heath sites in the SW. Possibly Sark would be the best candidate.

The site is endangered by trampling.

GRADE 2

CONISTON LEAD MINES Cumbria 34/2998

Area:100 ha with scattered pockets of interest
Altitude:200-300m
Geology: Borrowdale volcanic rocks intruded with copper veins.
Owner:
Total taxa:

This part of the Coniston Fells has been extensively mined for copper in the past and the lower hillsides carry a plethora of old workings, waste-heaps etc. They were completely unknown lichenologically until October 1983 when the BLS visited the area.

The lichen interest is on rocks and soils, while river shingle besides Church Beck supports further mineral loving species. It is impossible to be certain whether the lichen flora is determined by the mining activity in the past, or if it is natural. Interesting species found include Stereocaulon nanodes (fertile for the first time ever), S.delisei, S.pileatum, S.evolutum, Acarospora sinopica, Lecanora epanora, L.handelii (new to Britain), Rhizocarpon oederii, Tremolecia atrata, Baeomyces roseus (fertile) and B.placophyllus.

The site requires further study since only about 10% of its area has been explored. It promises to be a metalliferous site with few equals in Britain. It is backed up by Parys Mountain and possibly Nent Head.

Ref: 199

RAVENGLASS Cumbria GRADE 2
34/0--9--

Area: Altitude:0 to 30m
Geology: Wind-blown shell-sand and stabilised shingle forming dunes in part
Owners:Cumbria Wildlife Trust
Total taxa:

The site include the Dunes of Drigg on the W.side of the Esk.

This site, which lies on either side of the estuary of the River Esk was discovered in October 1983 and is not fully explored. It represents an extensive, very natural and extremely fine example of west coast dunes interspersed with stabilised shingle. The dunes vary from calcareous to slightly acidic and support at least 22 species of Cladonia. In addition, the genera Peltigera (P.neckeri, P.spuria and P.canina), Collema, Leptogium, Toninia, Bacidia, Diploschistes and Catapyrenium are all represented. A feature of the dunes is normally epiphytic lichens growing on the soil, for example, Parmelia caperata, Evernia prunastri, Ramalina and Usnea spp.

Ridges of stabilised shingle, containing mostly siliceous rock pebbles, are exposed in low valleys which penetrate the dunes. The pebbles are well-covered with crustose lichens such as Sarcogyne privigna, Lecidea auriculata, Acarospora smaragdula, A.veronensis, Lecidea erratica, Buellia aethalea, B.verruculosa, B.stellulata and many maritime species. Bricks support Thelocarpon spp.

The site is backed up by Point of Ayre (Isle of Man).

GRADE 2

STUDLAND HEATH Dorset 40/01-84-

Area: Altitude:
Geology: gravels on chalk.
Owners:
Total taxa: at least 45 from all habitats

This extensive area contains dune habitats which range from unstable sand through to slacks, grey dunes and acidic dune heath dominated by Erica tetralix. It is hard to place it in any scheme of heathland classification since the lichen assemblages resemble those of eastern England, and to some extent Scottish sites, but the heath is in the SW of England. It may have no counterpart but the nearby Brownsea Island, though the heath is of the Anglo-Norman type. It is probably of the Oceanic Calluna/Ulex minor type. The dunes are atypical of those in SE England because they lack shell-sand and are very acidic.

The lichen flora was studied quantitatively and in detail by Alvin in 1960 (ref 188). The site also has pebbles and flints and a good lichen flora on Salix in the wetter areas.

The Cladonia development is exceptional and includes C.strepsilis and Pycnothelia papillaria, both of which are rare in the south of England; most species appear to be abundantly fertile.

The Salix in dune slacks bears a number of rarities including Usnea articulata. Pebble and flint lichens are also represented.

Ref: 124,161

GRADE 2

PORTON DOWN Hampshire 41/21-35

Area: Altitude:
Geology:Chalk
Owners: Ministry of Defence
Total taxa: 85 from all habitats

A large area of chalk grassland with Breckland-type areas of open turf intermixed with stony ground. Some bushes and scrub also bear lichens.

A very large terricolous flora has been recorded in a habitat which is now rather rare. Sixteen Cladonia spp. including C.conoidea, C.foliacea, C.portentosa, and C.ciliata var. tenuis, Collema auriculatum, C.tenax, Leptogium lichenoides, L.schraderi, L.sinuatum, Diploschistes muscorum, Catapyrenium lachneum, Microglaena muscorum, Verrucaria mutabilis (on pebbles), Toninia aromatica, Psora decipiens, Toninia caeruleonigricans, and five Peltigera species indicate an extremely rich and diverse flora. While superficially comparable with Breckland, many of the characteristic Breckland species are absent. The site may represent a lichen flora which was once common in heavily rabbit-grazed chalk downland in southern England.

It is backed up by the considerably more depauperate Butser Hill and Box Hill. The major threats are Military activities.

Ref: 179,204

GRADE 2

TENNYSON DOWN, Isle of Wight Hampshire 40/32-85-

Area:2 ha Altitude: 75-147m
Geology: Chalk, gravels
Owners:National Trust
Total Taxa:52 from all substrata

The complex includes the westerly extension, Headon Warren, up to 40/3385.

Along the cliff edge at Tennyson Down there is a narrow strip of ancient chalk grassland. This has been preserved due to its proximity to the cliff top and because minor land-slips have produced an uneven topography unsuitable for ploughing. The old grassland indicator Thesium humifusum is restrictd to this narrow strip. This is the only site where the Fulgensietum fulgentis is known on chalk, it was formerly present in two localities in Sussex. Sixteen terricolous species include Fulgensia fulgens (fertile), Squamarina cartilaginea, Cladonia foliacea, Diploschistes muscorum, Tonina lobulata, Psora decipins, Collema auriculatum and Toninia caeruleonigricans. Additional crustose species are found on pebbles and flints.

The important lichen communities occur scattered along 300m of the cliff top, they are subject to considerable trampling but can withstand this at its present intensity. Trampling may help prevent invasion by scrub. This is the most important Chalk Downland site in England for lichens.

The Headon Warren area is of Calluna heath with calcareous clays beneath acid gravels. A large number of lichens have been recorded with 22 Cladonia species and acidiphiles such as Coelocaulon aculeatum and C.muricatum, terricolous Evernia prunastri and Micarea peliocarpa. It is certainly the best heathland in the Isle of Wight and the best in Hampshire outside of the New Forest. It would deserve grade 3 status in its own right.

Ref: 179,191

GRADE 2

DENGE BEACH, Dungeness Kent 61/0--1--

Area:2500 ha Altitude: sea-level
Geology: Flints and shingle
Owners: RSPB, Ministry of Defence
Total taxa:138 from all habitats, plus 10 requiring confirmation.

The site, already scheduled as an SSSI, is a well-known example of shingle beach in an exposed situation. It exhibits a full range of habitats from bare stones to acidic, sandy heath, Prunus scrub only 10-30cm tall, to woodland dominated by Buckthorn etc.

The site has been frequently studied by lichenologists and a well-documented history of extinctions has been recorded. The site is an exceptional shingle beach area by virtue of its continuous range of habitats. Rare species include Bryoria fuscescens, Pseudevernia furfuracea, Cladonia mitis, Buellia aspersa, Lecidea insidiosa and Usnea glabrescens and U. inflata. It is considered that several northern species have persisted here as post-glacial relicts having survived the forest maximum in open areas of the beach. Lichens of the Lobarion once occurred here but all Lobaria, Sticta, Nephroma and Teloschistes spp. are now extinct.

The site is under considerable pressure and is deteriorating. Gravel extraction in the RSPB-owned area is thought to be lowering the water table throughout the botanically interesting parts of the reserve. Further extraction of gravel must be avoided. The building of additional power stations is likely to inhibit movement and replenishement of the shingle.

Ref: 57,200

SLAGGYFORD Northumberland GRADE 2 35/6--5--

Area: 7 ha in four localities Altitude:300m
Geology: Stabilised freshwater shingle composed of sandstone and limstone pebbles plus a lead/zinc/barium fraction.
Owners: various
Total taxa:35 terricolous.

Patches of heavy-metal rich shingle beside rivers are a habitat peculiar to the northern Pennines. These sites, which may have remained open throughout the forest period, carry a sparse vegetation which includes heavy metal tolerant higher plants, patches of scrub, and rare species of Epipactis. Lichens are abundant. Extensive examples occur by the River S.Tyne below Alston, particularly at Slaggyford, Eals Bridge and above the Lambley Viaduct. 15-28 terricolous lichens occur at each site. Luxuriant Baeomyces roseus, Cladonia coccifera, C.rangiformis, C.subulata, Coelocaulon aculeatum f.sorediatum and five Peltigera spp. are a feature of this habitat. Rarer species include Baeomyces placophyllus, Diploschistes muscorum, Peltigera leucophlebia, Sarcosagium campestre, Vezdaea aestivalis and the lichenicolous Epilichen scabrosus on Baeomyces rufus. Where the river flows past Barhaugh Park, Gyalidea lecideopsis (new to Britain) was collected in 1979 together with an undescribed Vezdaea species (V.acicularis ined.).

This complex of sites, which occur over 6 km of the river, cannot be considered fully surveyed. Together they provide a first class, unthreatened series of heavy metal-sites with a long history of continuity. Unusual higher plants reinforce the lichen interest.

Ref: 130

SKOMER ISLAND Pembrokeshire GRADE 2 22/23-09-

Area: Altitude: sea-level to 79m
Geology:Old red sandstone, mudstones
Owners:RSPB
Total Taxa: 179 (at least) from all substrata

An inshore island well known as a bird reserve. The entire island is of exceptional interest bearing a spectacular saxicolous lichen flora of south western type (Roccella spp.) and considerably affected by bird manure. Ramalina polymorpha reaches its best development in Britain at this site.

The terricolous interest is largely on Armeria tufts which bear Rinodina subglaucescens, R.confragosa and Caloplaca cerinella.

The site is well managed and under no threat. There are no satisfactory back-up sites. It should be contrasted with Bardsey Island (qv).

BREAN DOWN Somerset GRADE 2

31/2--5--

Area: 40 ha Altitude: 50m 31/2 5
Geology:Carboniferous limestone
Owners:
Total taxa:72 from all substrata.

This warm, south-facing slope of Carboniferous Limestone is famous for its higher plants of southern affinity. The soils, in cre vices of limestone, are "terra rosas". The site may have been a small, treeless refugium throughout the post-glacial forest period.

Fragments of the Fulgensietum fulgentis occur containing 15 species. These include Psora decipiens, Microglaena muscorum, Squamarina cartilaginea, Cladonia symphycarpia, Diploschistes muscorum and Fulgensia fulgens. It is unusual in being developed directly on Carboniferous limestone without the normal addition of blown sand. The site cannot be considered well worked and further surveys are likely to considerably increase the species total. The site has no equivalents in the UK, but limestone maritime heath occurs at Balnakeil and Gt Orme, both being northern variants.

Ref: 191

GRADE 2

VILLAGE BAY, St Kilda 08/09-99-

Area:6ha Altitude:0 to 30m
Geology: Igneous rocks, granite, basalt.
Owners: National Trust, NCC by lease
Total Taxa:194 all substrata

A rich terricolous lichen assemblage occurs in the heavily grazed maritime grassland at Geo Chille Brianan, Geo na h-Airde and Geo Oscar and at the east end of Village Bay. Up to 12 lichen species per sq m can be found here.

The steep Festuca rubra-Plantago coronopus grassland holds Bacidia arceutina, Caloplaca cerina, C.holocarpa, Cladonia rangiformis, Collema tenax, Lepraria incana, Leptogium sinuatum, L.teretiusculum, L.britannica, Moelleropsis nebulosa, Pannaria pezizoides, Parmeliella tryptophylla, Solenopsora holophaea and S.vulturiensis. Agrostis grassland at the E end of Village Bay has Catapyrenium cinereum, Lecidea hypnorum, Normandina pulchella, Pannaria leucophaea, Parmeliella atlantica, P.plumbea and Polyblastia gelatinosa. Only 3 of the above species are restricted to coastal soils in Britain, but many are restricted to base-rich soil, presumably enriched by seawater. Several species would be normally associated with woodland in N Scotland.

The St Kilda grassland is unusually favourable for lichens possibly because of the slow decay rate of dead grass which provides a suitably aged substratum. The long and unbroken history of sheep-grazing has formed a close-cropped the turf, keeping the habitat light and open.

The lichen interest of St Kilda is unique and there are no suitable back-up sites. It is potentially of Grade 1 status but there is nothing against which to compare it.

Ref:190

LAKENHEATH Complex Norfolk GRADE 2 52/7--8--

Area: 8 ha in 2000 Altitude:
Geology: Chalk, partly overlain by sands of varying depth.
Owners: Lord Iveagh (Lakenheath) Suffolk Trust for Nature Conservation (Wangford Warren)
Total Taxa: 47

Includes Wangford Warren (52/7584) and Foxhole Heath. An extensive area of heathland, historically a single unit, but now split, by forestry and airfield development, into several parts. Over most of this area the chalk is covered by sands of varying depth but in places wind-blows have removed this sand exposing the underlying chalk. The deeper sands support Cladonia communities whereas the chalk supports a Fulgensietum community. The Fulgensietum at Lakenheath is the best example of this community in Britain, but probably does not merit grade 1 status as there are many examples of this kind further south in Europe. The lichen communities at Wangford are also of considerable interest as they are associated with one of the few active inland dune systems left in Britain.

Although the main areas of lichen interest are concentrated in two parts of the Warren complex, other smaller areas of interest occur elsewhere. At Wangford, the blown-sand is covered with an extensive carpet of Cladonia arbuscula, C.ciliata var.tenuis, C.cervicornis subsp.verticillata, C.bacillaris, C.gracilis, Coelocaulon aculeatum, Baeomyces roseus and Stereocaulon condensatum.

The Fulgensia communities are mainly developed on the chalky ground just south of Warren Lodge. Here, there are about four acres of chalk soil covered with an open turf. The terricolous lichens grow on the bare soil amongst the turf and include a number of species confined in Britain to the Breckland, such as Buellia asterella and Squamarina lentigera. Other lichens in this community include Catapyrenium lachneum, Collema tenax, Diploschistes muscorum, Fulgensia fulgens (locally), Psora decipiens and Toninia caeruleonigricans. The flint and chalk pebbles add interest to the site with Protoblastenia rupestris, Lecidea watsonii, Sarcogyne regularis and Verrucaria spp. Sarcosagium campestre has been found elsewhere on the Warren.

With 40 lichens, this is the richest Breckland site. It suffers from a lack of grazing which is allowing Pinus to spread from nearby plantations; action is urgently needed to remove these from the grassland "A" area (cf map in 204). The site is backed up by Thetford Heath.

Ref: 149,154,204

GRADE 2

AMBERSHAM-HEYSHOTT COMMON Sussex 41/89-19-

Area:100ha Altitude:30-70m
Geology:Folkstone Sands
Owners:Lord Cowdray
Total taxa:41

A small Calluna-dominated heathland on well-drained, sandy soils with some wet areas. An example of Sub-Oceanic Calluna-Ulex minor or "Anglo-Norman" heath, backing up those of the New Forest complex. It is backed up itself by the Ashdown Forest, Lavington Common and Thursley Common, three being chosen because of their peculiar vulnerability to fire.

A good range of Cladonia species is reported (20) including C.strepsilis, C.arbuscula and Pycnothelia papillaria in considerable luxuriance. These are considered to be the finest Cladonia communities in SE Englandbecause it is larger than other sites of this type and it has escaped fire damage. It is threatened by Pine colonisation. It closely resembles Lavington Heath.

GRADE 2

CUTHILL LINKS Sutherland (East) 28/75-88-

Area:100 ha Altitude:0 to 10m
Geology:Shingle with non-calcareous sand and dunes
Owners:NCC lease -Dornoch Firth SSSI
Total taxa:111 at least

An old, stable, sand dune system on the north side of Dornoch Firth with a well-developed Calluna heath of the Northern, dry-dune Calluna-Empetrum nigrum type. Of special interest are sandy, shingle strewn basins surrounded by dune ridges, which are dominate by lichens over large areas. Extensive patches of Cladonia zopfii with Stereocaulon condensatum and the normally montane S.saxatile are present. Although only recently recognised as being a widely distributed species in Scotland, C.zopfii is not known in such abundance elsewhere except in Jutland (eg. Han sted Reservatet, NW of Thisted). In several places Leptogium palmatum occurs on the N side of slopes and hummocks. This species is more characteristically found on mossy rocks in the central and Western Highlands. Several species are confined to a narrow area just inland and running parallel with the seashore. Some of these are montane species such as Ochrolechia frigida and Thamnolia vermicularis, others, indicating base-rich conditions include Cladonia conoidea, C.foliacea, C.rangiformis, Collema tenax, Leptogium sinuatum, Peltigera leucophlebia, Bacidia muscorum and Polyblastia gelatinosa. Other notable species include Bryophaga gloeocapsa, Cladonia bacillaris, C.cornuta, C.gracilis, C.mitis, C.phyllophora, Lecidea oligotropha and Epilichen scabrosus (on Baeomyces rufus). The stabilised shingle pebbles and shell fragments are colonised by numerous microlichens, including Lecidea brachyspora and L.diducens, they deserve more thorough examination. Old Calluna and Ulex provide additonal species.

The site appears to be unique and no satisfactory back-up sites can be suggested. It is hardly threatened.

GRADE 2

FERRY-COUL LINKS Sutherland (East) 28/81-95-

Area: 300ha Altitude:0 to 10m
Geology: Shingle and non-calcareous sand dunes
Owners:NCC lease -Loch Fleet SSSI
Total taxa:138, 60 terricolous

The site complex includes two small dune systems lying on spits bordering the mouth of Loch Fleet. Much of the north side is afforested (Ferry Wood) but the southern tip, with raised shingle and sand ridges (Ferry Links) remains little disturbed. It contains an intriguing and varied mixture of basiphilous and acidiphilous, lowland and montane lichens, including Bryoria fuscescens, Cladonia arbuscula, C.ciliata var. ciliata and var. tenuis, C.crispata, C.phyllophora, C.portentosa, C.subcervicornis, C.verticillata, C.conoidea, C.foliacea, Coelocaulon muricatum, C.aculeatum (both fertile), Leptogium sinuatum, Collema auriculatum, Peltigera canina, P.leucophlebia, P.membranacea, P.rufescens, Psoroma hypnorum, Sphaerophorus globosus, Thamnolia vermicularis, Ochrolechia androgyna, O.frigida, Agonimia tristicula, Bacidia egenula (rabbit droppings), B.muscorum, Diploschistes muscorum, Micarea leprosula and Polyblastia gelatinosa.

Coul Links, on the southern side of the estuary mouth contains large, mobile dunes with a luxuriant terricolous flora. The following were only found at here; Cladonia anomaea, C.bacillaris, C.cornuta, C.glauca and C.scabriuscula. Coul Links is especially noteworthy for its lichens on stable shingle pebbles, stones and shell fragments. These include Buellia verruculosa, Caloplaca lactea, Lecidea auriculata, L.brachyspora, L.lithophila, Opegrapha parasitica, Rhizocarpon cinereovirens (only known British locality), R.distinctum, R.petraeum, Rinodina atrocinerea, Arthonia phaeobaea and Verrucaria amphibia.

The site is unique, of Oceanic Northern Dunes type and is reminiscent in some features of Culbin, Forvie and Cuthill Links. It stands alone however, no back-up sites can be suggested.

Ref: 174

INVERNAVER Sutherland (North) GRADE 2
29/6--6--

Area:200 ha Altitude:0 to 300m
Geology: schists
Owners: NCC NNR
Total taxa: 162 all substrata

This large area of machair is particularly interesting for its cover of Dryas octopetala above the seashore. It qualifies as the Mountain heath with Dryas of Gimingham and is the only substantial site of this kind that we know about.

The eastern part of the reserve has a good range of siliceous rock species which become progressively overlain with windblown shell sand as the sea is approached. A horizontal progression of lichen species ensues, from acid loving to base loving, on both rocks and soil. The machair is particularly interesting with Solorina saccata, Psoroma hypnorum, Pannaria pezizoides, P.leucophaea, Squamarina cartilaginea and Toninia caeruleonigricans. Gyalecta jenensis occurred on soil - an unusual situation. The western part of the reserve, beyond the impressive storm beach, has the best machair with extensive rock outcrops. Soils here, bore Arthrorhaphis citrinella var. alpina, Leptogium turgidum, Pyrenopsis fuscatula, Peltigera aphthosa and P.leucophlebia, Polyblastia wheldonii, P.agraria, Lecidea insularis, L.brachyspora, L.vorticosa, Lecidella prasinula (on Juniperus) and many others. Four Umbilicaria species, 6 Peltigera, Solorina spongiosa, 14 Cladonia spp., Diploschistes muscorum, and Pseudephebe pubescens are also noteworthy.

The site is unique and no back-up sites can be suggested. It has affinities with Balnakeil and Oldshore More but is very different in its lichen components.

## Index to Grade 3 Sites

GRADE 3

NEWBOROUGH WARREN Anglesey 23/40-64-
includes Aberffraw Dunes (23/65-35-)

Area:1300 ha + 200 ha Altitude: sea-level
Geology: Green Mica-schists, Pillow lavas, slates at Aberffraw
Owners:NCC, some common land
Total taxa: 47 terricolous

A very extensive area of calcareous sand dunes grading from mobile yellow dune through grey dunes and dune slacks to stabilised, acid heath dominated by Calluna and Gorse. Newborough Warren has been extensively planted with conifers, Aberffraw is unplanted.

The Newborough and Aberffraw dunes complement each other in having the same basic range of species but some are present only at one of the two sites. Newborough is the larger and more viable area and is a better prospect for conservation, but Aberffraw has some critical species in good condition.

These are the best sites in North Wales for terricolous Evernia prunastri and Ramalina farinacea, Diploschistes muscorum and Toninia caeruleonigricans, Collema and Leptogium species. Rinodina conradii grows on rabbit dung at Aberffraw, with Sarcosagium campestre, Thelocarpon impressulum and Arthopyrenia areniseda.

The best sites at Aberffraw lie in a 200m strip immediately E of the minor road to Bodorgan and are in some danger from car parking. It is also threatened with overgrazing by cattle.

The site complex backs up Ravenglass.

GRADE 3

PARYS MOUNTAIN Anglesey 23/44-90-

Area: 100 ha Altitude:100-147m
Geology: Copper-rich schists and granite
Owners:
Total taxa: 61, 28 terricolous

Disused copper workings with spoil heaps, now flattened and colonised with Calluna and some gorse on the deeper soils which are generally peaty and dry. The lichen flora is characteristic of old mine areas having a restricted number of very specialised species, often found nowhere else. Parys Mountain bears Acarospora sinopica, Trapeliopsis pseudogranulosa (ined.), Arthrorhaphis grisea, Bryophagus gloeocapsa and several Stereocaulon spp. A good Cladonia flora is also present. The rocks are relatively species poor except where they are used as bird perches.

The site remains to be fully explored, only the NW slopes have been covered while the E and S sides could provide older spoil heaps with more lichen species.

Threats to the site include re-working for copper, particularly the spoil heaps, and "improving" the land by seeding with copper resistant grasses.

The site backs up Coniston.

KINNABER LINKS Angus GRADE 3 37/73-61-

Area: 40ha Altitude: sea-level
Geology: Wind-blown sand over igneous rocks.
Owners: Joseph Johnston & Sons, Salmon Fisheries, Montrose
Total taxa: 72, 47 terricolous, 20 on pebbles

Extensive acidic dunes with slacks containing shingle ridges, sheltered on the eastern (seaward) side by a tall dune ridge. The site has lichen-rich Calluna heath with some parts planted with pines in recent years. The lichen flora is diverse and luxuriant with 27 Cladonia spp., including C.anomaea, C.bacillaris, C.cornuta, C.deformis, C.gracilis and C.mitis. Also present are Bryoria fuscescens, Cetraria islandica, Coelocaulon spp., Peltigera hymenina, P.membranacea, Pseudevernia furfuracea and Sphaerophorus globosus. A well-developed pebble flora includes the very rare Cetraria pinastri, Umbilicaria polyphylla and an unknown sterile species. Vulpicida pinastri

Terricolous lichens are best developed among the young, and appreciably stunted, pines where they are afforded extra shelter. The presence of pines is likely to remain beneficial to the lichens, provided the trees remain stunted, as at Culbin.

Although the site is smaller in area than Tentsmuir Point NNR and Barry Links, the lichen flora is more diverse and luxuriant. Kinnaber links partially acts as a back-up for Forvie sands NNR and for Ferry/Coul Links and Cuthill Links, although it differs from all of them in various floristic and historical (management) characteristics.

Ref: 220

RHUM Argyll GRADE 3 18/36-03-

Area:6 + 3 ha Altitude: 0 to 30m
Geology: Torridonian Sandstone
Owners:NCC
Total taxa: 47

The interesting areas are at Kilmory (18/3603) and Samhnan Insir (18/3704).

Small areas of machair with blown shell-sand overlying siliceous rock outcrops. It has remained unploughed since 1828; an unusual feature is the extensive grazing by red deer. The lichens are typical of machair, being calcicolous but acidiphiles are found on moss cushions. Examples include Agonimia tristicula, Bacidia muscorum, Collema furfuraceum, C.undulatum, Leptogium britannicum, L.schraderi, Pannaria pezizoides, Moelleropsis nebulosa, Psora lurida, Peltigera neckeri, Toninia caeruleonigricans and T.lobulata.

The site was well worked in 1981 and 1982. It is regarded as a back-up site for Coll and Colonsay.
Ref: 221

GRADE 3

ABERDARON COASTLINE Caernarvonshire 23/32-20-
includes Braich y Pwll (23/3220) and Pen y Cil (23/3524)

Area: 400 ha cliff top Altitude:150m
Geology: Mona schists, slates
Owners:
Total taxa:142 from all substrata

An elevated cliff-top edge, primarily a maritime-heath dominated by Calluna and Ulex gallii, very exposed and wind-swept. The site is more acidic than the nearby Bardsey Island. The heath is of Northern Calluna-Vaccinium type but is very oceanic. Terricolous species include Rinodina conradii, R.gennarii and R.confragosa. Teloschistes flavicans and Bryoria fuscescens grow on low, sheep-grazed Calluna, as at Bardsey. The rocks are also very interesting with a full range of maritime species.

The site would repay fuller investigation. It is a back-up to Bardsey Island being less species-rich and in more danger from burning and human trampling. Some low-level agriculture takes place nearby.

GRADE 3

GREAT ORME'S HEAD Caernarvonshire 23/75-84-

Area: 3 km sq Altitude: 0-679m
Geology: Carboniferous Limestone
Owners:
Total taxa: 71 from all substrata

A large, exposed headland with a great variety of habitats. The terricolous interest lies on boulder clay overlaying maritime, limestone cliffs, and heathland with thin soils on the headland plateau.

The site has been visited a number of times yet remains considerably underworked. Noteworthy lichens include Bacidia muscorum, Cladonia foliacea, C.subrangiformis, C.pocillum and C.rangiformis. Collema spp. are frequent, spilling over from rock to soil and include C.auriculatum, C.cristatum and C.multipartitum, but curiously, Leptogium spp. have seldom been recorded; only L.plicatile (or possibly a form of L.turgidum) has been found. On stones among soil are Polyblastia albida and P.gelatinosa, Thelidium decipiens and T.incavatum. Squamarina cartilaginea, Toninia aromatica, T.caeruleonigricans and T.lobulata are abundant in crevices. Belonia nidarosiensis, Vezdaea aestivalis complete the interesting species.

The Great Orme is under no great pressure. It should be contrasted with Brean Down and Balnakeil Bay as it is in an intermediate geographicai location.

GRADE 3

SARK Channel Isles

Area: Altitude: sea-level
Geology: Granite
Owners:
Total taxa:

The north end of the island is of interest because of its Calluna dominated maritime heath, of the Eu-Oceanic south western Calluna-Erica vagans type. It is similar to Appletree Banks in lichen flora but is less rich. Pseudocyphellaria aurata grows on heather, the normal habitat in Britain for this very rare species. Rich Cladonia and Armeria-tuft species are present; it is the best example in the Channel Isles.

GRADE 3

NENT HEAD Cumberland 35/78-43-

Area:80 ha Altitude: 480m
Geology:Heavy-metal spoil mixed with limestone, shale and sandstone of Carboniferous age
Owners:
Total taxa: 30 terricolous.

A site intensively mined for zinc and lead until 60 years ago. The plant cover is sparse still, with patches of Agrostis and Festuca with bryophytes, but lichen cover is dense. Five species of Peltigera, including P.leucophlebia and P.neckeri grow on mineral soil, and 14 Cladonia species occur. Characteristic associations are of Baeomyces roseus, Cladonia scabriuscula, Coelocaulon aculeatum f.sorediatum, Micarea leprosula, Pannaria pezizoides, Sarcosagium campestre and Vezdaea aestivalis.

The site could be considered as a back-up for Coniston Copper mines but has a different range of habitats.

Ref:187,199

GRADE 3
20/7--3--

## BOLT HEAD-START POINT Devon

Area: 2000ha linear feature Altitude:0-100m
Geology: Schists
Owners: National Trust
Total Taxa:141 from all substrata

A very extensive length of maritime heathland interspersed with siliceous rocks. It is very exposed and insolated. The terricolous lichens are patchily developed, as is often the case on maritime heaths. Most often, the lichens are close to rocks where the soil is thin and phanerogamic plants remain stunted and do not shade the lichens.

Nineteen Cladonia spp. have been recorded from the area, including C.convoluta. Other noteworthy terricolous species include Normandina pulchella (normally an oceanic species), Trapeliopsis wallrothii, Teloschistes flavicans, Solenospora holophaea, Parmelia reticulata and on rocks, Roccella fuciformis and R.phycopis.

The area needs investigating in detail.

Ref:197

GRADE 3
21/45-35-

## BRAUNTON BURROWS Devon

Area: 0.5ha Altitude:17m
Geology: Blown shell-sand forming dunes and heath
Owners:
Total taxa: 60

An exhaustive survey showed that only a very small area at the landward end of the dunes is important for terricolous lichens. Elsewhere, the substratum is too unstable, has a high water table, or is colonised by rank growth and scrub.

The ground is composed of low mounds of compacted mineral soil, the tops of which carry a Fulgensietum community. It is marginal to the main dune system. 18 terricolous lichens were recorded, most of them expected, but Parmelia caperata, Evernia prunastri and Usnea articulata were found on soil.

The site has been well studied but Fulgensia has not been found by all parties. Previous parties have recorded additional species including Sarcosagium campestre. It appears likely that here, as with most terricolous lichen sites, a cyclical phenomenon may be taking place whereby lichens vary in abundance from year to year.

Ref:29,191

GRADE 3

SLAPTON LEY Devon 20/825441

Area:187 ha Altitude:sea-level
Geology: Slates
Owners:
Total taxa: 275 on all substrata, 56 on shingle ridge.

A long shingle bank in a fairly sheltered situation facing SE. The seaward side is of typically unstable and lichen-free pebbles. The ridge is more stable, with a small flora but the landward face is stabilised with extensive lichens and some shrubs. Decorticated logs have accumulated on the landward side and bear lichens.

Thirty-six lichens were found on pebbles, 14 on logs and 6 on twigs on angiosperms on the ridge. The lichen flora is not particularly unusual but well-represents a typical shingle vegetation. Only a limited sandy-soil or dune development takes place so the site is less rich than Denge Beach and is different in character to Studland Heath. It should be considered to back up the former. The saxicolous and particularly the epiphytic floras are more interesting and the site has was highly rated by the Woodland Lichens Working Party on those grounds.

The shingle is said to be stabilising and becoming overgrown with angiosperms, since 1978-9, near to the car park owing to a recently built sea wall which inhibits fresh shingle recruitment. The site also suffers from human trampling.

ref:196

GRADE 3

BROWNSEA ISLAND Dorset 40/02-88-

Area: 2km sq Altitude: 20m
Geology:Eocene gravels
Owners:
Leased by Dorset Naturalists Trust
Total taxa:41 from all substrata.

A flat, heathy island much planted with conifers and Rhododendron, supporting heath on the south side. It is open to holiday-makers for day visits. A very diverse lichen flora is represented in all habitats. Soil species are not outstanding but the normally peat-loving Cladonia incrassata is common, C.portentosa, Bacidia vezdae (on mosses), C.bacillaris, C.caespiticia, C.crispata, C.subulata, Lecidea erratica, Peltigera praetextata, Cladonia conoidea, C.anomaea, Lecidea aeruginosa (on lignum) are also recorded.

The site appears to have some affinities with Eastern and Scottish Dunes, as with Studland Heath. It backs up the latter site.

It has been well studied.

GRADE 3

BUTSER HILL-OXENBOURNE DOWN . Hampshire 41/71-19-

Area:50ha (Butser) Altitude:150-215m
Geology: Chalk grassland with flints
Owners:
Total taxa:43

South-facing chalk downland, and ancient field-system on the lower slopes of Butser Hill.

Local representative chalk grassland flora has Agonimia tristicula, Bacidia herbarum, B.muscorum, B.sabuletorum, Cladonia convoluta (in the field system), C.rangiformis, C.furcata f.subrangiformis, C.pocillum, Collema auriculatum, C.tenax, Catapyrenium lachneum, Diploschistes muscorum, Peltigera rufescens, Leptogium schraderi and Polyblastia gelatinosa. Of additional importance are areas of "Chalk-Heath" with Cladonia cervicornis, C.foliacea, C.portentosa, C.ciliata, Coelocaulon aculeatum and Hypogymnia physodes.

This complex has some of the finest development of lichens on chalk stones and flints, including on chalk, Lecidea metzleri, Petractis clausa, Placynthium nigrum, P.tantaleum, Polyblastia dermatodes, Staurothele hymenogonia, Thelidium incavatum, T.microcarpum and Verrucaria spp. On flints are, Caloplaca cf.atroflava, Aspicilia contorta, A.gibbosa, Huilia spp., Ochrolechia parella, Lecidea erratica, Rhizocarpon concentricum, R.distinctum, Trapelia placidioides ined. and Verrucaria mutabilis.

The site is under considerable pressure from trampling, clearance and reduction in rabbit-grazing. It backs-up Porton Down.

Ref:179

GRADE 3

POINT OF AYRE Isle of Man 25/40-00-

Area:200 ha in 1000 Altitude: 0 to 20m
Geology:shingle with shell sand
Owners:
Total taxa:

An extensive line of shingle extending along the north coast of the island bears abundant lichen growth. The two most interesting areas appear to be at Rue Point-Ballaghennie where an extensive Cladonia community is described, and at Point of Ayre to Ballaghennie where Usnea articulata is found on soil. This is the most northerly British locality for this uncommon species. Other species recorded are Pycnothelia papillaria and Bryoria fuscescens on soil-detritus. Shingle bore Lecanora fugiens (indicating great stability since this is a rock-crevice species), Caloplaca albolutescens, Rhizocarpon riparium, Buellia aethalea and Coelocaulon muricatum.

The geographical situation, and maritime nature of the species list, suggests that this may back up Ravensglass for the moment.

Ref:94,222

GRADE 3

CAWSTON-MARSHAM HEATHS Norfolk 63/16-23-

Area:80 ha Altitude:30m
Geology:Glacial sands and gravels
Owners:
Total taxa:30 terricolous

One of the best representatives of the "Anglo Norman" type of heath in East Anglia and the one with the richest lichen flora. The vegetation is dominated by Calluna vulgaris and Ulex gallii with some Erica cinerea in places. The lichen flora is well developed and notable for the abundance of Cladonia glauca. Two species not found elsewhere in E.Anglia are Pycnothelia papillaria and Cladonia sulphurina (near its southern limit). Cladonia cervicornis subsp.verticillata, C.gracilis, C.uncialis and Coelocaulon aculeatum (fertile) are abundant. Calluna has epiphytic Platismatia glauca, Pseudevernia furfuracea and Usnea inflata. The relative richness of its lichen flora and extensiveness of the heathy area , despite half of Cawston being lost in 1969, make this a good candidate for a back-up site to Ambersham Common. It has many features in common with NE Scottish heaths too, principally Forvie.

The site has been intensively studied. It is threatened by invading birch and possible developments for a golf course.

Ref:223

GWAUN VALLEY (area) Pembrokeshire GRADE 3 22/0--3--

Area:1000 ha Altitude: 60-300m
Geology: Slates and mudstones
Owners:
Total taxa:98 from all habitats, 38 terricolous

Includes Mynydd Carn Ingli.
A very large, undulating area of low hills, more or less dry Calluna heath with peat deposits and some wet areas, extending in a triangle from 22/0530-22/1038-22/0037. It is related tothe northern Calluna-Vaccinium heath but is much more oceanic. It is poorly grazed and lacks intensive management and some parts appear to be unburned. Rock outcrops at various places, add further interest to the site. Calluna shows a full range of development so that lichens exhibit a variety of community types depending on its age It is certainly one of the best sites for pollution-free Calluna communities in Wales. The lichens show some south-western and oceanic tendencies.

Cladonia spp. are well represented with the rare C.firma, C.merochlo rophaea and Pycnothelia papillaria. Lecidea aeruginosa and L.carrolli are also present; Cladonia luteoalba is on rocks.

The site is selected to back up Laggan Deer Forest. It was visited by the BLS in 1973 and by various individuals since. Parts could repay further exploration.

STRUMBLE HEAD Pembrokeshire GRADE 3 12/89-41-

Area: Altitude:
Geology: Basalt, gabbro, serpentine
Owners:
Total taxa: 112

A large, maritime headland, which is very exposed to south westerly gales.
It is dominated by Calluna and Ulex, with many cliffs and outcrops, and Calluna heath above. The maritime lichen flora is rich and diverse, of a type typical of much of Wales. It lacks SW elements such as Teloschistes and Roccella, but Solenopsora spp., "Omphalina" spp., eight Cladonia spp., including C.anomaea and C.ciliata var.tenuis, and Trapeliopsis wallrothii are abundant.

It is less rich than the Aberdaron headlands, but forms a back-up to Nare head, at least in part.

It was visited by the BLS in 1973.

GRADE 3

ORFORDNESS Suffolk 53/397460

Area:100ha Altitude:0 to 5 m
Geology: shingle-spit developed across the mouth of the river Alde, composed largely of flint and a little sand.
Owners:NCC in part
Total taxa: 36

This is the second largest vegetated area of shingle in the British Isles and has extensive areas of lichen heath, though this is rarely luxuriant. The most interesting feature is the presence of Parmelia caperata and Evernia prunastri on soil. The Cladonia list is not exceptional, but shingle includes Buellia punctata, Lecidea erratica, Caloplaca citrina, C.holocarpa and Protoblastenia rupestris. Driftwood has a number of lignicolous species. At low levels the shingle is dominated by Rinodina gennarii and Xanthoria parietina.

Despite its lack of rarities, this is the best back-up site for Dungeness and Slapton.

GRADE 3

THETFORD HEATH Suffolk 52/84-79-

Area:81ha Altitude: 30m
Geology:chalk covered by sands but exposed in places due to excavations in 1945.
Owners: Norfolk Naturalists Trust
Total taxa:29

An area of Breckland heath which has many of the lichen communities present at Lakenheath Warren but on a less rich and extensive scale. The most important part is the area of disturbed chalk in the south eastern corner. Here a flora has developed similar to grassland "A" at Lakenheath and has good populations of Buellia asterella, Cladonia pocillum, Collema tenax, Catapyrenium lachneum, Diploschistes muscorum, Toninia caeruleonigricans and Squamarina lentigera. However, Fulgensia fulgens and Psora decipiens are absent. Chalk pebbles and flints bear Sarcogyne regularis, Verrucaria spp. and Petractis clausa. Cladonia cariosa and Verrucaria melaenella were recorded in the 1950's but have not been seen recently, possibly through reduction in rabbit grazing due to myxomytosis.

It is a back-up site for Lakenheath Warren.

BOX HILL-JUNIPER TOP Surrey GRADE 3
51/18-52-

Area:3-4 ha Altitude:100-200m
Geology:Chalk with flints
Owners:National Trust
Total taxa:32

This famous site, much used for teaching purposes, carries a considerably depleted example of a chalk downland lichen flora, backing up Porton Down. Lichens are not luxuriantly developed but are best developed at the Burford Bridge Ridge (17/6516) and on Juniper Top (18/4526). Noteworthy species include Toninia caeruleonigricans, Placynthium tantaleum, Petractis clausa, Verrucaria mutabilis, Catapyrenium lachneum, Psora decipiens, Lecidea watsoni, Leptogium biatorinum, L.turgidum, L.pusillum, L.subtile, L.cretaceum, L.microscopicum, L.lichenoides, Lemmopsis arnoldiana, Thelidium microcarpum, Arthopyrenia monensis and Staurothele hymenogonia. There are some ancient woodlands here and some woodland has colonised formerly cultivated areas since 1820.

The site has been well studied but lists vary considerably, possibly through the rarity of many of the species. It is under severe pressure from trampling, though this may keep the vegetation cover open.

Ref: 181

THURSLEY COMMON Surrey GRADE 3
41/90-41-

Area: 100 ha Altitude: 50-100m
Geology:Wealden sands
Owners:NCC -NNR
Total taxa: 47

An area of wet and dry Calluna heathland of the New Forest type, in a much larger area of sandy heathland, much invaded by conifers. The lichen cover is luxuriant, but much of it was devastated by fire in 1976 (3-4 ha survived and recolonisation is promising). The lichens resemble those of Ambersham Common, with Cladonia arbuscula, C.bacillaris, C.cervicornis subsp.verticillataC.crispata, Pycnothelia papillaria, C.strepsilis, C.uncialis, Lecidea icmalea, L.aeruginosa (on lignum) and L.oligotropha.

The site is well preserved and under no threat but fire.