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Centre for Agricultural Strategy

Peatland utilisation in the British Isles



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DM Bather and FA Miller

Twin Cities Campus



CAS Paper 21

Peatland utilisation in the British Isles

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Introduction

This book is based on an independent study carried out by the Centre for Agricultural Strategy for the Peat Producers' Association as a result of the current public awareness of their environment and conservation in general and a changing attitude to bogs and mires in particular. Current interest has largely centred around campaigns opposing the cutting of peat, particularly from lowland raised mires, for horticultural purposes.

The Peat Producers' Association (PPA), formed 35 years ago, represents the interests of 28 peat producers, based in the UK and the Republic of Ireland. Between them the members of the PPA account for 98% of peat production in the British Isles.

In order to establish the exact extent, location and nature of their operations throughout the British Isles the PPA commissioned a postal survey of their members in June 1990. Twenty-one members, representing over 99% of the total area of land held by the PPA, provided information, and the findings of this survey are summarised in this book, together with discussion, based on a literature survey, of the areas of peatland used for other purposes in the British Isles, the ecology of mires, and possible alternatives to peat.

Professor J S Marsh
Director
Centre for Agricultural Strategy

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In addition, we would like to thank the Irish Peatland Conservation Council for allowing us to use the photograph of All Saints Bog, the upper of the two appearing on the back cover of this publication.

Finally, we would like to thank Dr J C Tayler, of the Centre for Agricultural Strategy, for his encouragement throughout the last year.

Abbreviations

ASI	Area of Scientific Interest
BANC	British Association of Nature Conservationists
CAS	Centre for Agricultural Strategy
DIY	Do-it-Yourself
ha	hectare(s) (1 ha = 2.471 acres)
IPCC	Irish Peatland Conservation Council
LSHTNC	Lincs and South Humberside Trust for Nature Conservation
m ³	cubic metre(s)
mm	millimetre(s)
NCC	Nature Conservancy Council
NNR	National Nature Reserve
NRA	National Rivers Authority
PFA	Pulverised fuel ash
PPA	Peat Producers' Association
RSNC	Royal Society for Nature Conservation
RSPB	Royal Society for the Protection of Birds
SCC	Somerset County Council
sp.	species (singular)
spp.	species (plural)
SSSI	Site of Special Scientific Interest
STNC	Somerset Trust for Nature Conservation
UK	United Kingdom (England, Scotland, Wales and Northern Ireland)
USSR	Union of Soviet Socialist Republics

Glossary

ACIDOPHILOUS	Growing well in an acidic environment
BRITISH ISLES	England, Scotland, Wales, Northern Ireland and the Republic of Ireland
CARR	Fen woodland dominated by plants such as alder (<i>A/nus</i> spp.) and willows (<i>Salix</i> spp.)
CATION	Positively-charged ion
COIR	Waste from coconut husk fibre extraction
CUT-AWAY	Mires (cut for fuel) where 30 cm or less of peat remains. (In practice, many cut-away mires still have areas where the depth of peat is greater than 30 cm)
FLOW COUNTRY	Generally, a Scottish term for a flat, moist, tract of land; specifically, the low-lying plains of Caithness and Sutherland which contain the largest continuous expanse of blanket mire in Great Britain
GREAT BRITAIN	England, Scotland and Wales
INTACT MIRE	A mire which is not hydrologically damaged
INSECTIVOROUS	Insect-eating. Insectivorous plants have become adapted to attract, trap and digest insects where the supply of nitrates is limited
IRELAND	Republic of Ireland or Eire
LAGG	Stream course adjacent to a raised mire
MINEROTROPHIC	Peatlands with water percolating through them bringing in nutrients from outside sources
MIRES	All peat-forming habitats
MOSS	Term for bog or mire mainly confined to Scotland and Northern England, eg Flanders Moss
OCEANIC	Influenced by a maritime climate
OMBROTROPHIC	Peatlands dependent on precipitation for water and nutrients
RAND	Steeply-sloping margin of a raised mire
REFUGIA	Areas which have escaped great changes undergone by the region as a whole and so often provide conditions in which relic colonies of plants and animals can survive.

Summary

- Current estimates indicate there to be nearly 500 million ha of peatland in the world, of which about 1.58 million ha are in the UK and a further 1.17 million ha in Ireland. Raised mires cover at least 116 000 ha in the UK and 311 000 ha in Ireland.
- All peatland types are considered important because they support rare and specialised flora, are refugia for numerous species of mammals, amphibians and invertebrates and act as a genetic resource and archival store. They provide peat for fuel and horticulture as well as land for trees and crops. Recently, concern has centred on raised mires, considered to be more at risk.
- The area of relatively intact raised mire remaining in Great Britain is unknown, but there is no published evidence to support the view that it is now less than 10 000 ha. Current estimates indicate that over 20 000 ha of raised mire in Great Britain have conservation value, of which more than 13 000 ha already have SSSI status. In addition, there are 3800 ha of relatively intact raised mire in Northern Ireland, and 22 952 ha of raised mire of conservation value in Ireland.
- The Peat Producers' Association (PPA) represents 28 peat producers in the British Isles who account for 98% of the peat production in the UK and Ireland. PPA members hold 7318 ha of peatland (5212 ha of raised mire) in the UK, and 88 472 ha of peatland in Ireland. Only 6972 ha of the latter (all raised mire) are used for horticultural peat production, the remainder providing fuel. Forestry covers at least 220 000 ha of peatland in the UK and 180 000 ha in Ireland. The total area of peatland devoted to agriculture in the UK is unknown, but must exceed that held

by the extraction industry. Not all peatland now devoted to extraction was intact beforehand: only 771 ha of the raised mire held by PPA members in the UK were intact.

- PPA members hold 987 ha of raised mire in the UK that have not yet been worked or drained. Only 153 ha of this are described as completely intact, and 141 ha of this will never be worked. A further 333 ha of raised mire with a virgin component or damaged in some way will also remain unworked. Responsibility for the conservation of intact raised mires, therefore, cannot rest solely with the PPA.
- Since 1970, peat extraction has started on 347 ha of peatland in the UK, not all of which were intact at the time. Peatland losses to forestry over the same period were 95 000 ha in Great Britain. The peat extraction industry is thus not the major agency responsible for the loss of large areas of intact peatland over recent years.
- Where after-use plans have been finalised, the majority of raised mires currently worked in the UK will be reclaimed for some form of conserved wetland habitat.
- PPA members have sold, leased or set aside more than 4000 ha of peatland for conservation in the British Isles. The PPA is sponsoring research into regeneration, and would welcome support in this area.
- The UK peat extraction industry produces 1.76 million m³ of horticultural peat annually. Three quarters of this is used as a major ingredient of growing media. The Irish peat industry produces a further 1.6 million m³ for horticulture. Total horticultural peat consumption in the UK is 2.5 – 3.0 million m³ each year.
- The peat extraction industry employs about 1300 full-time and 275 part-time workers throughout the British Isles, mainly in rural areas where employment alternatives are limited. In addition, the UK peat industry supplies 10 000 growers and many garden centres and DIY multiples.
- Alternatives to peat are being investigated and there are suitable replacements for some purposes, but as yet no one alternative is the perfect substitute.
- To ensure minimal damage to peatlands, peat extraction and after-use should be planned from the outset. With this in mind, the PPA produced its Code of Practice and is working with the NCC to produce a jointly agreed peatland strategy. Pending an agreed strategy, the PPA has pledged not to seek planning permission on sites with SSSI status or candidate SSSIs without prior agreement with the NCC.

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1 Peat and peatland – the facts

WHAT IS PEAT?

Peat consists of the dead remains of plant material that has accumulated over thousands of years. It forms where the natural cycle of plant production and decomposition is disrupted under waterlogged conditions. Here, the soil micro-organisms are unable to bring about the complete breakdown of plant material because of lack of oxygen and often highly acidic conditions. Rate of plant production therefore exceeds that of decomposition and peat builds up.

The most important peat-forming plants are *Sphagnum* spp., the fast-growing bog mosses, which produce loose-textured moss peat where the rainfall is high. *Sphagnum* has a unique cell structure which enables it to act like a sponge, holding over twenty times its own weight of water. It also extracts cations (especially calcium and magnesium) from the environment, exchanging them for hydrogen ions, and thus making the immediate surroundings even more acid¹.

Rate of peat accumulation varies with eg water regime and temperature, but on average it is very slow at about 2 mm a year. Thus although peat is a growing resource it cannot realistically be termed renewable on a given area of land.

Peat laid down in the British Isles, contains five main types of plant remains: *Sphagnum* spp. (the bog mosses), *Hypnum* spp. (true mosses), sedges and grasses, woody plants and humified material. It can be classified in various ways depending on the properties most relevant to the particular use to which it is to be put. However, the International Peat Society has developed and is promoting a general classification based on botanical composition and degree of decomposition, both of which can be readily determined in the field².

WHAT ARE THE VARIOUS TYPES OF PEATLAND?

Peatlands can be classified according to their physical (especially hydrological) characteristics, or their current vegetation or a combination of both, or by using other criteria such as chemistry and stratigraphy, and thus terminology can be confusing.

When peat begins to accumulate on waterlogged ground or in a lake basin the nutrients of the peat-forming vegetation are derived from groundwater as well as from decomposition and the mire is said to be **minerotrophic**. Gradually, the surface of the peat deposit rises above the water surface, plant growth continues and the influence of groundwater on the nutrition of the system becomes modified by rainwater and the mire is **intermediate** in type. The final, or **ombrotrophic** stage is reached when all nutrients supplied to the mire come from precipitation.

Minerotrophic mires are commonly described by the general term **fens** and ombrotrophic mires are represented by **raised mires** and **blanket mires**.

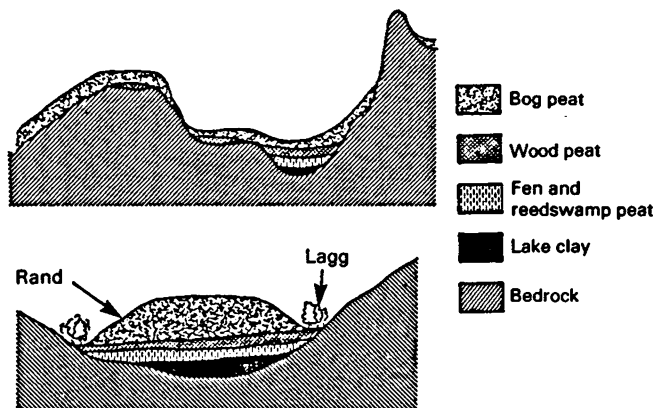
Raised mires

Classical raised mires are characteristically convex in profile, usually bounded by a drier, steeply-sloping margin (**rand**) and adjacent stream course (**lagg**) which has water with a higher nutrient content and thus limits the lateral spread of the acidophilous vegetation (see Figure 1.1).

Distribution of raised mires is very localised. Coastal raised mires below 15 m OD occur around estuaries in Cardigan and Morecambe Bay, the Vale

Figure 1.1

Sections of a blanket mire (top) and raised mire (below)³



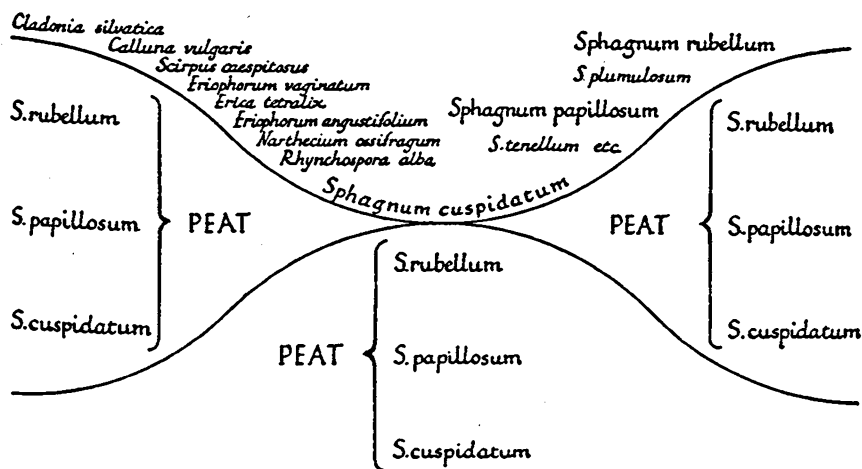
of Trent, Solway and the Upper Forth Valley. Inland, they are rarer and vary in altitude with some of the largest occurring in Wales and on the Welsh Borders, while smaller examples occur at higher altitudes. The raised mires of western Scotland are more oceanic in character and the mire surface is characterised by a pronounced pattern of pools and ridges⁴. Irish raised mires, particularly Midland ones, are less domed and less tree-covered than continental ones.

Raised mire vegetation

A typical lowland raised mire includes a hummock-hollow mosaic dominated by *Sphagnum* spp. (Figure 1.2). It is very attractive to the eye with the colours of the *Sphagnum* species themselves ranging from yellow and green through to red, orange and brown and the addition of the white common cotton-grass (*Eriophorum angustifolium*) and beak sedge (*Rhynchospora alba*), the red and green of the sundews (*Drosera anglica* and *D. rotundifolia*) and the yellow of bog asphodel (*Narthecium ossifragum*), while the pink bog rosemary (*Andromeda polifolia*) and crowberry (*Vaccinium oxycoccus*) are abundant. As hummocks grow higher, harestail cotton-grass (*E. vaginatum*), deer grass (*Trichophorum caespitosum*), heather (*Calluna vulgaris*) and cross-leaved heath (*Erica tetralix*) increase in

Figure 1.2

Diagram of the succession of species forming the peat in a typical 'hollow-hummock' cycle (Regeneration complex)⁵



frequency and the drier margins are often covered with bog myrtle (*Myrica gale*) and purple moor-grass (*Molinia caerulea*)^{4,6}.

Blanket mire

Blanket mire is the extreme climatic type of mire and the most oceanic of the European series. It is not only the most extensive type of mire in the British Isles but is better represented here than in the rest of Europe. It is confined to wetter areas and is extensive in the Northwest Highlands and Islands and eastern Highlands of Scotland almost to sea level, and in moorland areas such as Dartmoor, some of the Welsh Mountains, the Pennines, Cheviots and Southern Uplands. In the south it occurs mainly above 300 m⁴. The most extensive region of blanket mire is the Flow Country of Caithness and Sutherland where it covers 250 000 ha down to sea level.

Blanket mires occur in the west of Ireland below 150 m (Atlantic sub-type) and on the hills throughout the rest of the country (Montane sub-type)⁷.

Blanket mire vegetation

There are two major types of blanket mire vegetation which provide a varied and attractive colouration to the landscape. The first occurs in western situations generally below 460 m and is dominated by deer grass, purple moor-grass and cotton-grasses together with pool vegetation and *Sphagnum*-dominated hollows. The second is an Upland type which occurs mainly above 300 m and is dominated by heather and haretail cotton-grass⁴.

In Ireland, the Atlantic sub-type is dominated by purple moor-grass, bog-rush (*Schoenus nigricans*) and the liverwort *Pleurozia purpurea*, whereas the Montane sub-type is dominated by bilberry (*Vaccinium myrtillus*), crowberry and the moss *Diplophyllum albicans*⁷.

Intermediate mires

Types intermediate between raised and blanket mire occur in northern England (north Cumbria and Northumberland) and in the south and Central Lowlands of Scotland.

Fens

Fens are of two main types, open-water transition mires and flood-plain mires. The first type develops as the edges of lakes or rivers are colonised by emergent aquatic vegetation to form swamp communities and the second develops on lowland alluvial plains crossed by sluggish rivers. Both types are frequently the precursors of raised mires. Nutrient status of fen waters varies widely, giving rise to a richer and more varied flora than other types of mire⁴.

Fens, for example in East Anglia, have been more extensively destroyed by man than any other class of mire. It is interesting to note, however, that the best remaining example, the Norfolk Broads, owes its present existence to

lyrica large-scale peat cutting in the Middle Ages which gave rise to extensive hollows which show all stages of development from open water through rich fen to carr.

WHY ARE PEATLANDS CONSIDERED IMPORTANT?

- **Wildlife** Peatlands are an integral part of the biosphere. They support rare and specialized flora, eg insectivorous plants like sundews (*Drosera* spp.) and the North American pitcher plant (*Sarracenia purpurea*) and are refugia for numerous species of mammals, amphibians and invertebrates, especially birds and insects. New species, of insect for example, are still being discovered on mires⁸ – if mires were to disappear, such species could disappear without ever having been recognised.
- **Genetic resource** The preservation of gene pools in the wild is of increasing importance. The specialized organisms that have adapted to the extreme conditions of peatlands have potentially useful characteristics such as the ability to fix nitrogen or digest protein.
- **Archival store** Through their pollen record, peatlands contain a complete vegetational and climatic history over thousands of years. They are also rich sources of archaeological material, eg Lindow Man (or Pete Marsh)⁹ and the Somerset Trackways¹⁰.
- **Hydrological significance** It is now considered that drained peatlands have a significant role in the regulation of river flows because of wide fluctuations in the watertable. Intact mires are not so important in this role but are important in supplying groundwater sources or for maintaining the watertable in surrounding agricultural land. Run-off water is generally of constant composition and pollutants are absent. They also supply moist air by evaporation and thus affect local climate¹¹.
- **Carbon sinks** Peat is moderately rich in carbon and mires act as 'sinks' for carbon dioxide which is gradually released when peat is drained and used. (For further discussion see Chapter 4).
- **International importance** The United Kingdom holds 'type' locations for Atlantic raised mires and between 10 and 14% of the world's total of blanket mire¹². The Flow Country of Caithness and Sutherland is arguably the largest body of blanket mire in northern Europe.
- **Education and amenity value** Mires are of interest for the layman and scholar alike but their extreme fragility means they must be used with care.
- **Emotional appeal** This results from their great age and the fact that they remain one of the few wilderness areas in the country.

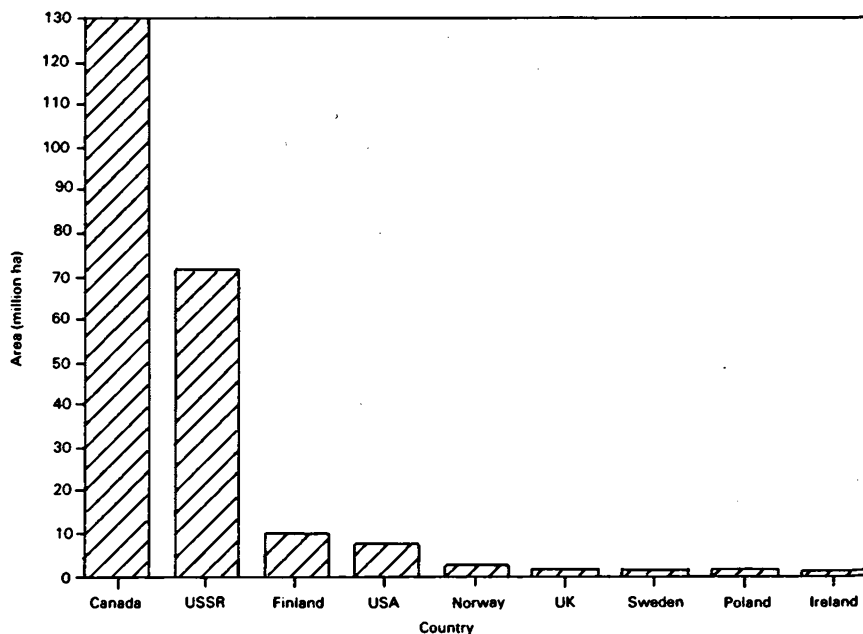
- **Resource for man** Mires have been used by man from the earliest times for fuel and more recently for agriculture, horticulture and forestry. These uses are discussed in more detail later.

HOW MUCH PEATLAND IS THERE IN THE WORLD AND WHERE IS IT?

The total area of peatland throughout the world was estimated in 1974¹³ to be 230 million hectares. It is now thought that the total is nearer to 500 million hectares, when peatlands in all the Third World countries are included¹⁴. Assuming the latter figure to be correct, peatland covers just under 1% of the total surface of the Earth and 3.4% of the total land surface.

By far the largest area of peatland is found in Canada, where there are nearly 130 million hectares. The USSR has more than 71.5 million hectares of peatland, and Finland 10 million hectares. As can be seen from Figure 1.3, the UK and Ireland lie 6th and 9th, respectively, in this league.

Figure 1.3
The world's peat resources¹³

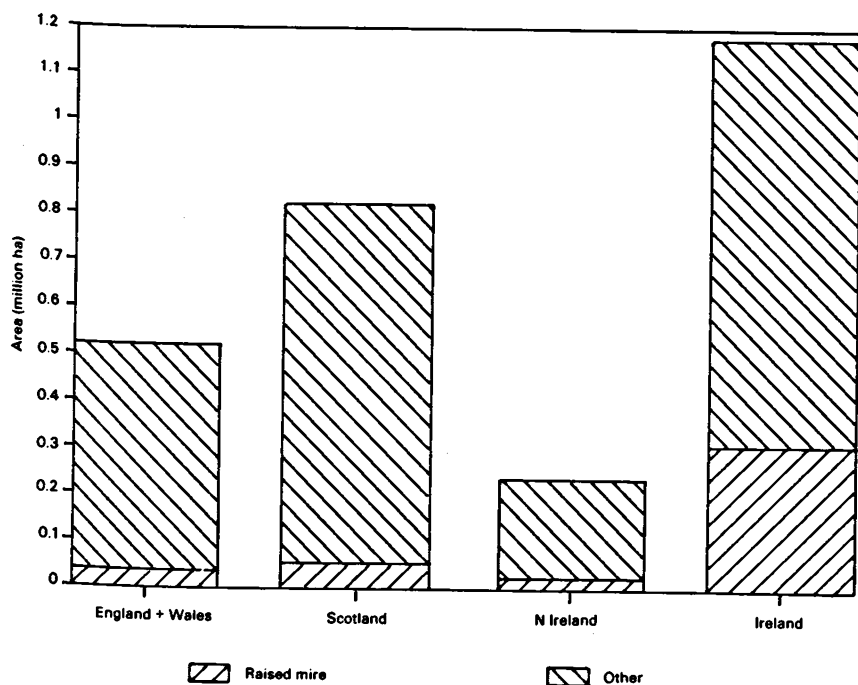


HOW MUCH PEATLAND IS THERE IN THE BRITISH ISLES?

There are about 1.58 million hectares of peatland in the UK¹⁵, covering 6.8% of the land surface, and a further 1.17 million hectares in Ireland, covering 17.2% of the land surface (see Figure 1.4).

Figure 1.4

Areas of peatland in the British Isles^{2,7,14,15}



There is a particularly large concentration of peatlands in Ireland, due to the wet climate and poor drainage conditions, the latter associated with the underlying geology of carboniferous limestone, precarboniferous rocks and glacial drift. The resulting water-logged ground, along with low temperatures, is ideal for mire formation.

Peatlands also occur in Scotland, the north of England, Wales and the Borders, East Anglia and the south west of England. The type of mire found

varies from region to region, with fen peat predominating in Somerset, East Anglia and parts of Ireland, blanket mires in the hill and coastal areas, particularly in Scotland and Ireland, and raised mires occurring throughout all five countries.

Recently, public attention has been centred on raised mires, which are felt to be most at risk as they tend to be more desirable for horticultural purposes, more accessible and easier to develop. Estimates of the area of raised mire in each of the countries are shown in Figure 1.4, but it should be noted that not all of these mires are still intact, and estimates of the area remaining intact vary.

HOW MUCH PEAT IS USED AND WHAT IS IT USED FOR?

Peat is perhaps best known in the UK for its contribution to horticulture: as a soil conditioner, as a mulch and as a valuable ingredient of growing media. Peat can either be bought in its pure form or as a component of growing media.

In Ireland, peat is a source of energy, and as well as its use as a domestic fuel it is also used to fire power stations, providing some 16% of the national primary energy requirements. Total peat production in Ireland is currently estimated by the PPA as 6.6 million tonnes per annum, of which approximately 5% is for horticultural use¹⁶.

Peat is used as a fuel on a lesser scale in the UK and also has less well-known uses including the production of whisky, animal bedding, insulation, effluent treatment and as a source of carbohydrates to be used as a medium for growing yeast for animal fodder¹³. Peat has medicinal uses harnessed in balneotherapy, and its healing and antiseptic properties were made use of when it was used in dressings in the First World War. However, this book concentrates on the use of peat for horticultural purposes, although it should be remembered that in Ireland, particularly, the fuel and horticultural peat industry are interlinked.

The current use of horticultural peat in the UK is, according to the PPA, between 2.5 and 3.0 million m³ each year, of which 250 000 m³ are used in the production of mushrooms. Although the UK does export peat, it is, in fact, a net importer and in 1988 imported 900 000 m³, a large proportion of which came from Ireland¹⁶.

HOW MUCH INTACT PEATLAND IS THERE LEFT IN THE BRITISH ISLES?

Over the years peatlands have proved useful to man, not only as a source of fuel, and more recently for horticultural use, but also in providing land for crops, grazing animals and forestry. Less well-known uses of peatland include honey production, game, berry picking (eg cranberries (*Vaccinium*

oxycoccus) and the growth of medicinal herbs (eg bogbean (*Menyanthes trifoliata*) and sundew). Man's activity has led to a modification of the mires and their ecology, as it has usually involved drainage and, in the case of agriculture and forestry, can involve the addition of fertilizers and cultivation.

There is much discussion as to how much peatland remains intact and thus still retains the ecology of a virgin mire. Attention has tended to centre on raised mires in Great Britain, considered by some to be most at risk, but there is increasing concern about the loss of blanket mire to forestry in Scotland, and the decline in intact raised mires in both Northern Ireland and Ireland.

In agricultural terms a fen peatland is the most valuable mire type. Most of the fen peatland in the British Isles was reclaimed for agriculture many years ago and very little remains in the unmodified state.

Intact raised mires in Great Britain

It has been implied in the RSNC Peat Report¹⁷ that only 4% of the original raised mires (totalling at least 85 000 ha) remain intact. That the area of intact raised mire in Great Britain could be as low as 3400 ha has caused particular concern among environmentalists, because the Nature Conservancy Council (NCC) state, in their guidelines, that if less than 10 000 ha of a particular ecosystem remain in Great Britain, it should be preserved in its entirety¹⁸.

A survey of two raised mire areas in Scotland and three in the north-west of England¹⁹, was reported as showing that although virtually all of the peatland surveyed was intact in 1850, only 13% (1803 ha) remained intact in 1978. This sample survey is unlikely to be representative of Great Britain as a whole, and so cannot be used to draw conclusions regarding the current state of raised mires throughout Great Britain. In addition, although it was stated at a BANC conference²⁰ that most of these 1803 ha were no longer intact, as a result of fire damage and drying out, there is no published evidence to support this, let alone extrapolate the results to all raised mires in Great Britain.

This survey did show that on the five areas concerned, between 1850 and 1978, 36% of the original peatland (5173 ha) had gone to agriculture and 30% (4368 ha) to forestry and woodland, but only 13% (1877 ha) had been cut for peat, the remainder being drained or used for urban development. Over the period 1970 to 1978, 209 ha of peatland went to agriculture and 927 ha to forestry and woodland, but the area devoted to peat cutting fell by 151 ha.

There appears to be no other information available on the total areas of peatland in Great Britain devoted to agriculture, let alone the extent to which this has increased over recent years. However, Forestry Commission data show that 125 000 ha of peatland in Great Britain were planted with trees before 1971, and a further 95 000 ha since 1971²¹.

A second survey² was used to identify 30 469 ha of raised mires (or mires with a raised component) on 82 of 345 peatland sites in England and Wales. Two of these were classed as having some form of natural vegetation (ie Nature Reserve, Site of Special Scientific Interest (SSSI), mire or semi-natural vegetation) as their only land use, totalling 910 ha. A further 19 sites (6219 ha) had natural vegetation as the dominant land use, and another 11 sites (8612 ha) had some natural vegetation, but not as the dominant land use. Thus 32 raised mire sites, totalling 15 741 ha in England and Wales, had a natural vegetation component. These are listed in Tables 1.1 and 1.2.

Scotland is believed to have at least 5000 ha of raised mire of conservation value¹⁴. However, this total area for Great Britain of 20 741 ha is certainly not all intact mire, and an accurate assessment of the area of intact raised mire cannot be made without a field survey of these mires.

As the above are the only two known published surveys of raised mires in Great Britain, there is no evidence to support the view that the area of intact raised mires is only 4% (ie 3400 ha) of the area in 1850. We do not know whether the area has fallen below the critical 10 000 ha level; there is certainly no published evidence to support the view that it has.

Northern Ireland

It has been suggested²² that only 13% (3800 ha) of the original 27 800 ha of raised mires remain intact and that 77% of the 130 920 ha of blanket mires remained unmodified in the late 1970's.

Ireland

In Ireland, 22 952 ha of raised mires (7% of the original 311 300 ha) have been classified as worthy of conservation by the National Parks and Wildlife Service, the Government conservation agency, with just under 50% of these classified as being of good, or very good, quality²². In the late 1970's, 73% of the blanket mires remained unmodified⁷.

HOW ARE PEATLANDS OF CONSERVATION VALUE PROTECTED?

As peat is defined as a mineral in the UK (for planning purposes), commercial extraction is governed by planning law. Planning controls came into effect in 1949 in Great Britain, but not until 1972 in Northern Ireland. The planning system is one way in which peatlands are protected from unnecessary damage through extraction.

In addition there is a network of statutory designations in the UK designed to protect areas of conservation value, including National Nature Reserves (NNRs) and SSSIs. The NCC is responsible for selecting and establishing NNRs and designating SSSIs. NNRs are considered to offer more protection to sites of conservation value, as the NCC or local authority may make bye-laws for the purpose of the protection of the site from disturbance of

Table 1.1

Lowland raised mires in England and Wales whose dominant land use is conserved land, mire or semi-natural vegetation²

	Prestwick Carr	274	ha
*	Bolton Fell	284	
*	Walton, Breaks and Little Mosses	371	
*	Bowness Common	1040	
*	Glasson Moss	233	
*	Drumburgh Moss	145	
*	Salta Moss	125	
*	Shaw Moss	95	
*	Black, Heathwaite, White and Herd House Mosses	460	
	Ireland, Roudsea, Stribers and Ellerside Mosses	534	
	Meathop and Nichols Mosses	165	
	Silverdale Moss	38	
	White, Hale and Burton Mosses	400	
*	Red Moss	110	
†	Risley Moss	110	
*	Fenns and Whixall Moss	775	
	Wem and Cadney Mosses	59	
	Whattal Moss and Sweat Mere	28	
	Shomere Pool	16	
	Cors Fochno (Borth Bog)	1067	
†	Cors-Goch Glan Teifi (Tregaron Bog)	800	

Table 1.2

Additional lowland raised mires in England and Wales whose land uses include some conserved land, mire or semi-natural vegetation²

*	Scaleby Moss	20	ha
*	Wedholme Flow	615	
*	Rusland, Hulleter and Hay Bridge Mosses	66	
*	Thorne and Crowle Wastes	1910	
*	Hatfield Moors	1460	
*	Over Wyre	2700	
	Carrington Moss	300	
	Danes Moss	210	
	Loynton, Big and Little Mosses	21	
	Arthog Bog	160	
	Holme and Yaxley Fens	1150	

Note: Areas given are total areas of the mires and not the areas of conserved or natural/semi-natural vegetation.

* Part of these sites also extracted for peat currently or in the recent past.

† Conserved or natural/semi-natural vegetation *sole* land use.

living creatures, or taking, or interference with, the vegetation or soil.

The NCC now has a duty to designate as SSSIs sites considered by the NCC to be of special interest by reason of their flora, fauna or geological or physiographical features. Originally, there was no obligation on the NCC to notify owners or occupiers that the site had been designated an SSSI, and many owners/occupiers were unaware of the special significance of their land. However, both owners/occupiers and the local authority now have to be notified, and the NCC can list any operations that they think might cause damage.

However, the instrument of control is still primarily a management agreement. Since 1977, local authorities have had a duty to consult with the NCC over SSSIs prior to considering planning applications for extraction. There is no compulsion to take the advice of the NCC, and local authorities have often to balance many conflicting demands, including conservation and local employment issues, when reaching a decision.

Peat producers operating on SSSIs are not breaking the law if they have planning permission. However, the PPA have agreed in their joint press release with the NCC²³ that

'pending an agreed Peatland Strategy, members will not make any planning applications to work existing or candidate peatland Sites of Special Scientific Interest without the prior agreement of the NCC'.

Details of peatland sites with NNR and/or SSSI status do not appear to be available, but it has been estimated that nearly 8000 ha of raised mires in England and Wales, and nearly 5500 ha of mainly raised and intermediate mires in Scotland have SSSI status (see Map 1). At least 5600 ha of peatland in Great Britain are NNRs¹⁴, although these do not necessarily have SSSI status. In addition, there are tens of thousands of hectares of blanket mires in Scotland either designated as SSSIs or candidate SSSIs¹⁴. In Somerset, 3110 ha of fen peat either have SSSI status or are proposed SSSIs²⁴.

In Northern Ireland, peatland sites are conserved as Country Parks, NNRs and Forest Nature Reserves. In 1987, 173 ha of raised mire and 790 ha of blanket mire were conserved as Forest Nature Reserves²⁵.

In Ireland, the National Parks and Wildlife Service identifies peatlands with potential Nature Reserve status, but inclusion on this list does not in itself protect the mires¹⁶.

Conserved mires on the Wildlife Service list in Ireland total 10 325 ha, of which 6872 ha are blanket mire Nature Reserves and 1036 ha are raised mire Nature Reserves¹⁶.

Irish Areas of Scientific Interest (ASIs) are shown in Map 3.

2 The peat extraction industry in the British Isles – the facts

WHAT IS THE PPA?

The Peat Producers' Association (PPA), formed 35 years ago, represents the interests of 28 peat producers, based in the UK and Ireland. Between them PPA members account for 98% of the peat production in the British Isles.

In 1990 a survey was carried out in order to establish the extent, nature and location of the peat extraction activities of the members in the British Isles. Twenty-one members, representing over 99% of the total area of land held by the PPA, provided information, and the major findings of the survey are presented below.

HOW MUCH PEAT DO PPA MEMBERS PRODUCE?

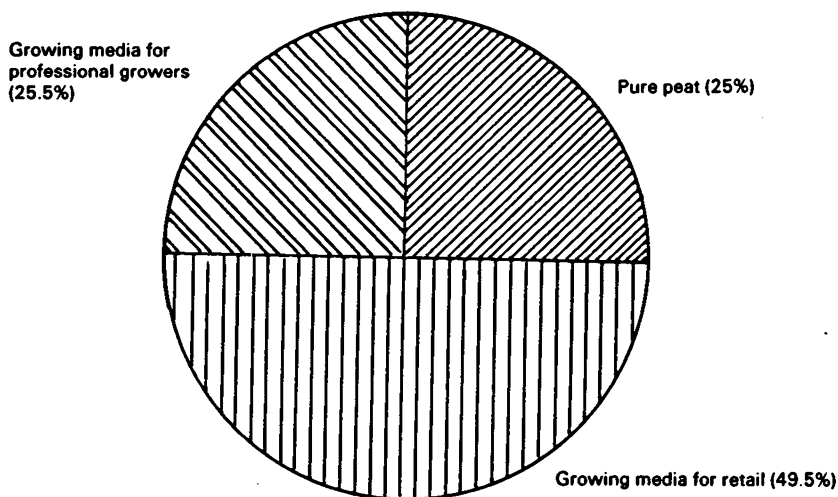
The members of the PPA produce at least 3.4 million m³ of horticultural peat each year. About 1.8 million m³ are produced from peatlands in the UK, and a further 1.6 million m³ from peatlands in Ireland.

The current market in the UK for peat and peat products is estimated to be worth about £70 m each year, in terms of manufacturers' prices.

At least three-quarters of the peat produced in the UK is sold as growing media (Figure 2.1), as opposed to pure peat, whereas the majority of the horticultural peat produced in Ireland is sold as pure peat. It is believed that a substantial proportion of this is eventually used in growing media.

About two-thirds of the growing media produced in the UK is sold to the retail trade, and about one-third to professional growers.

Figure 2.1
Annual peat production in the UK



HOW MANY PEOPLE DO PPA MEMBERS EMPLOY?

The UK peat industry employs 810 full-time workers and a further 145 workers on a part-time or seasonal basis. The horticultural sector of the peat industry in Ireland employs 486 workers on a full-time basis and 130 on a part-time basis.

It should be remembered that although these figures represent only a small proportion of the national work force in both the UK and Ireland, the peat industry is often located in rural areas, where there are limited employment opportunities. In addition, the contribution to employment in the ancillary industries, including garden centres and horticulture in general, should not be forgotten.

There are, in the UK, 10 000 growers, 2000 garden centres and 850 DIY multiple outlets¹⁶. The growers are currently dependent on peat-based growing media, and the garden centres and DIY outlets depend on a regular supply of plants from the growers, as well as on sales of growing media.

HOW MUCH OF THE UK AND IRISH PEATLANDS DO PPA MEMBERS HOLD?

Extent and distribution of PPA sites

The members of the PPA hold 7318 ha of peatland in the UK, and a further 88 472 ha in Ireland (see Maps 2 and 4). However, only 6972 ha of the latter are used at present for the production of horticultural peat. The majority of the land held by the PPA in Ireland is owned by the various producers, but 28% of that held by the PPA in the UK is leased.

Thus, PPA members hold only 0.5% of UK peatlands, and 7.6% of Irish peatlands, with only 0.6% of Irish peatlands held for horticultural peat production.

As can be seen in Figure 2.2, in England, PPA sites are concentrated in Somerset, the North-West and the North-East. Members of the PPA hold a total of 5051 ha of peatland in England, 1389 ha in Scotland and 878 ha in Northern Ireland, but no longer hold or operate on any sites in Wales.

The total area of 7318 ha of UK peatland held by the PPA is much less than the area of 11 158 ha stated in the RSNC Peat Report¹⁷ to have planning permission for extraction. The latter area was estimated from local authority records. The main discrepancy is in Scotland, where 4462 ha are reported to have planning permission, whereas PPA members hold only 1389 ha. It is believed that much of this additional area with permission in Scotland is a result of applications made for the extraction of fuel peat in the 1970's, in response to the fuel crisis. Most of these applications were never taken up, and may even have lapsed by now. However, further investigations are needed to ascertain why these areas differ.

The total area of peatland in Great Britain held by the PPA, 6440 ha, is also much less than the area of peatland currently covered by forestry, estimated to be at least 220 000 ha. Forestry covers 180 000 ha in Ireland²⁶. Although the area of peatland devoted to agriculture is unknown, it is almost certainly greater than the 6440 ha devoted to extraction in Great Britain. Indeed, the survey of the five areas in England and Scotland¹⁹ showed a total of 5173 ha of raised mire devoted to agriculture on these areas alone, whereas the PPA hold no more than 4779 ha of raised mire in the whole of Great Britain.

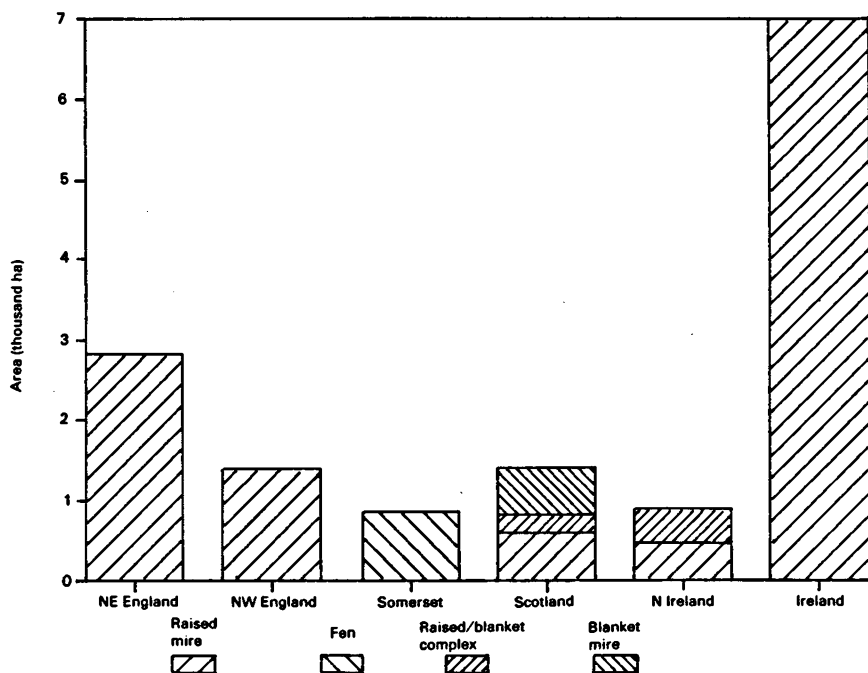
Types of mires held by members of the PPA

The majority of the peatlands held by PPA members are raised mire, particularly in Ireland, where 90% of the peatlands held are raised mires. Overall, PPA members hold 5212 ha of raised mire in the UK, equivalent to 5% of UK raised mires, and 6972 ha of raised mire for horticultural peat production in Ireland, equivalent to 2.2% of Irish raised mires. Most of the UK raised mires held by the PPA are in the north of England, as can be seen in Figure 2.2.

PPA members operate on blanket and raised mires in Scotland, Northern Ireland and Ireland, on intermediate mires in Scotland, and on fen peat in Somerset and a small area in north-east England.

Figure 2.2

Areas of peatland held for horticultural peat production by members of the PPA in the British Isles



Areas of peatland currently worked by the PPA

Not all the peatlands held by members of the PPA are being actively worked at present: in the UK the proportion is 57% and in Ireland, 59%.

In the UK, a further 11% is worked out, 15% is drained in preparation for work and 9.5% has not yet been drained. Some of the latter will never be worked for various reasons, including their high conservation value as shown in Figure 2.3. There is a similar picture on raised mires as shown in Figure 2.4.

Figure 2.3
Current use of land held by members of the PPA in the UK:
all peatland

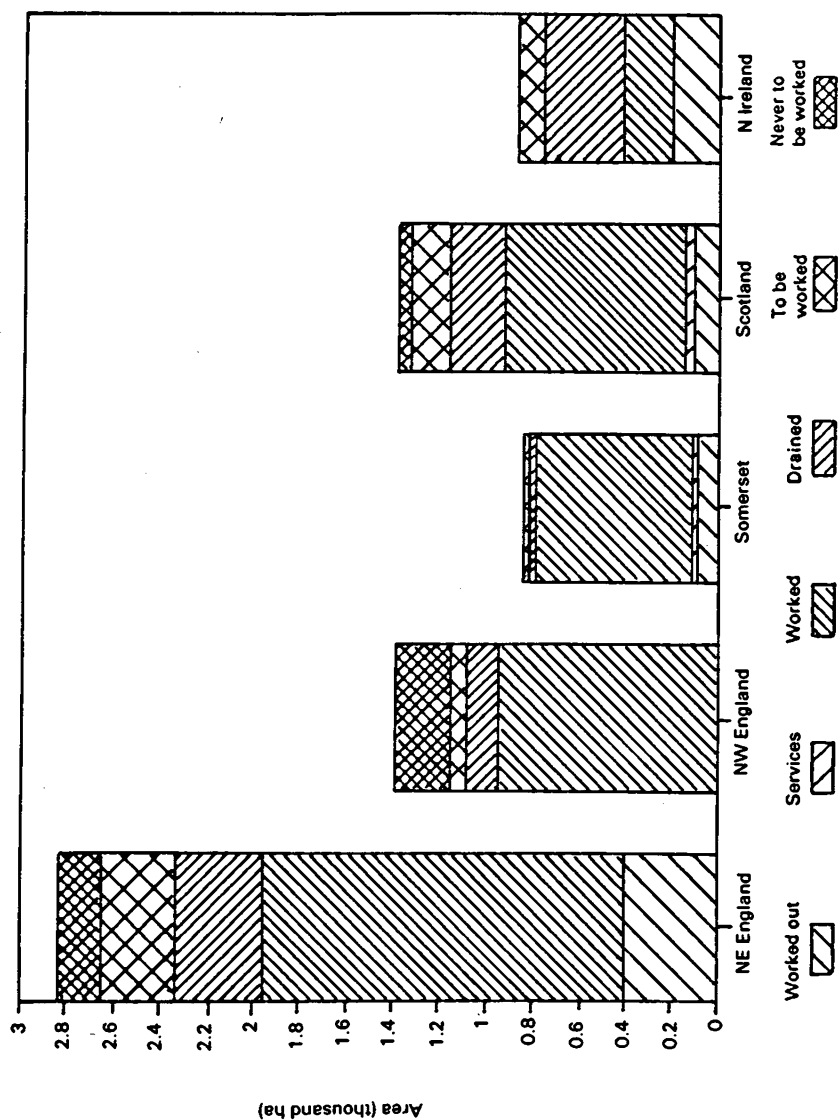
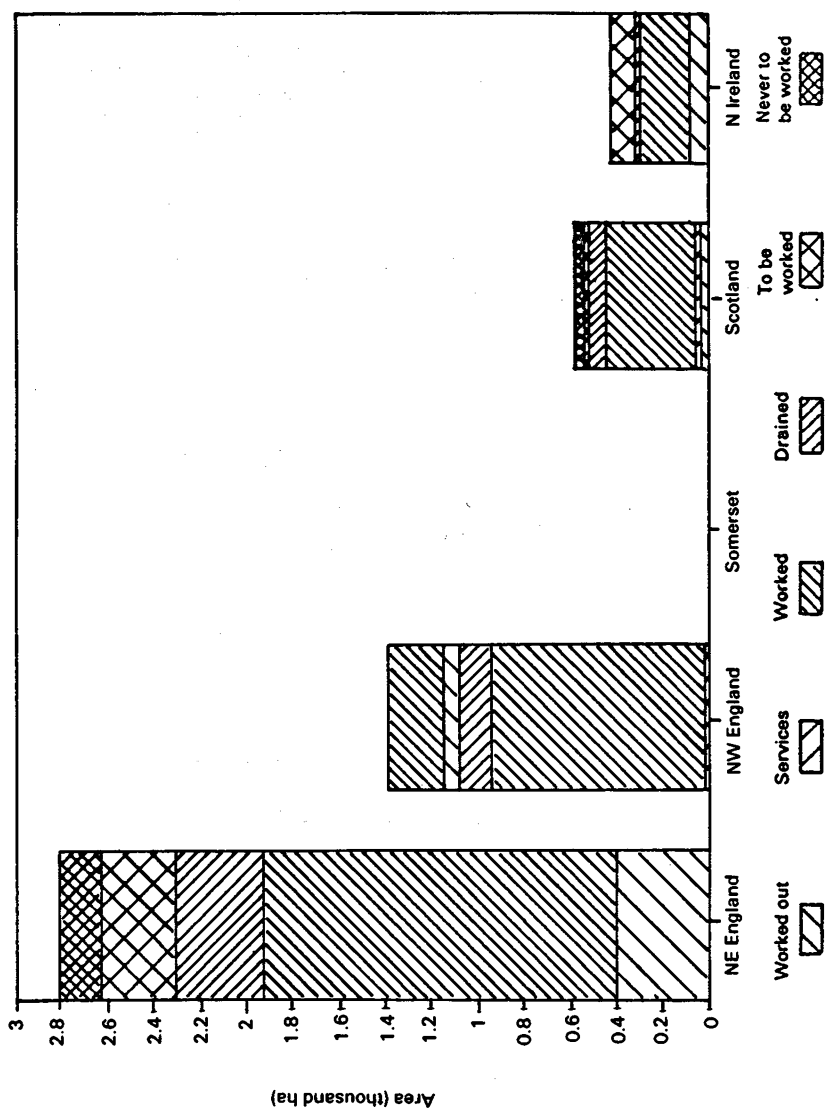


Figure 2.4
Current use of land held by members of the PPA in the UK:
raised mires only



In Ireland, 12% of the land held by the PPA is worked out, 6% is drained ready for work and 8% has not yet been worked. The remaining 15% includes services and waste land.

The members of the PPA hold a total of 987 ha of raised mire in the UK which have not yet been worked or drained. For various reasons, including lack of planning permission and NNR status, 474 ha of this will never be worked. Of this raised mire held by the PPA but never to be worked, 141 ha are described as virgin mire, 292 ha as having a virgin component and 41 ha as damaged mire. Of the 513 ha that will be worked eventually, only 12 ha are described as virgin mire, but 495 ha have a virgin component. Thus PPA members currently hold only a small area of intact mire in the UK.

HOW IS PEAT EXTRACTED?

The way in which peat is extracted has changed radically in recent years. Traditionally turves were dug and laid on the adjacent mire surface to dry until light enough to carry, wet weather delaying the process.

The various methods used for extraction today include:

- **sod/block/trench cutting** – a specially-designed cutting machine slices peat from trenches and stacks the sods alongside the trench to dry;
- **rotavation or milling** – vegetation is stripped from the mire surface which is then rotavated or milled to a depth of 15–50 mm and harrowed to promote drying. Shallow milling may result in 6 to 8 harvests each season;
- **extrusion** – Difco and similar machines extract the peat from narrow trenches and extrude it in long 'sausages' over the mire surface, where it is left to dry. These machines make it economical to work shallow peat and small mires in the uplands as well as the lowlands. This method is used mainly for the extraction of fuel peat.
- **open cast** – a hydraulic excavator with a bucket digs out peat and spreads it to dry.

Surface milling, or rotavating, is used on 64% of UK extraction sites and on 80% of horticultural peatland sites in Ireland but on 90% of sites world-wide. A further 27% of the UK sites and 20% of the Irish sites are sod/block cut. The rest of the UK sites are harvested either by a mixture of the above methods or by extrusion or open-cast excavation (see Figure 2.5).

HOW MUCH INTACT PEATLAND HAS BEEN BROUGHT INTO PRODUCTION SINCE 1960?

The areas of UK peatland held by members of the PPA on which extraction has started in the last 30 years are shown in Figure 2.6. Some of this land is

Figure 2.5
Extraction methods used on land held by members of the PPA in the UK:
all mire types

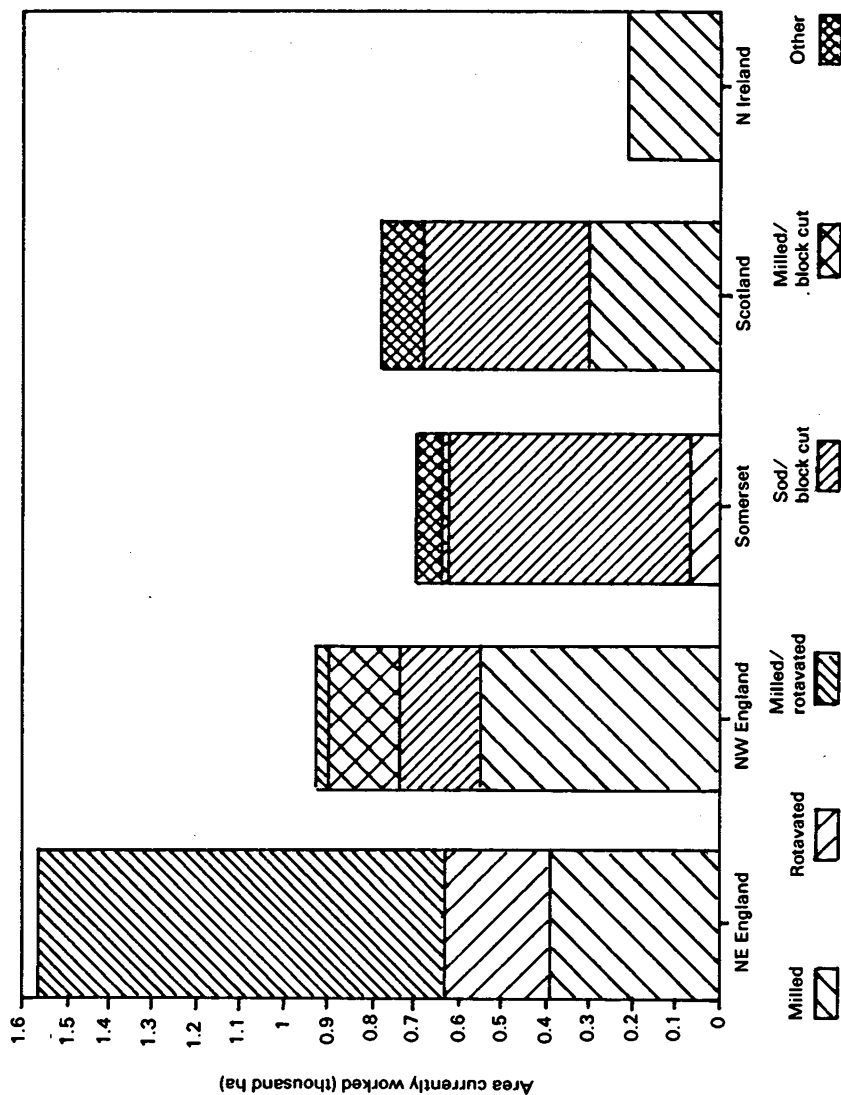


Figure 2.6
Areas of UK peatland brought into production:
type of mire

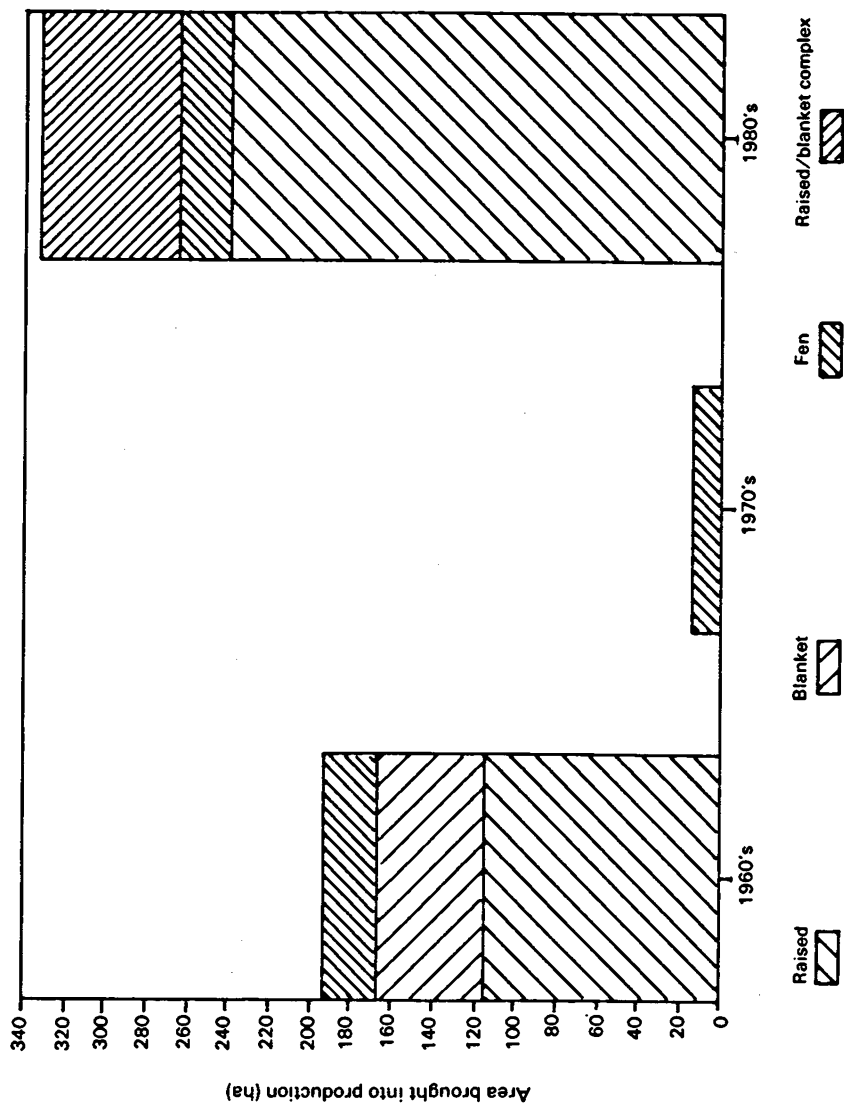
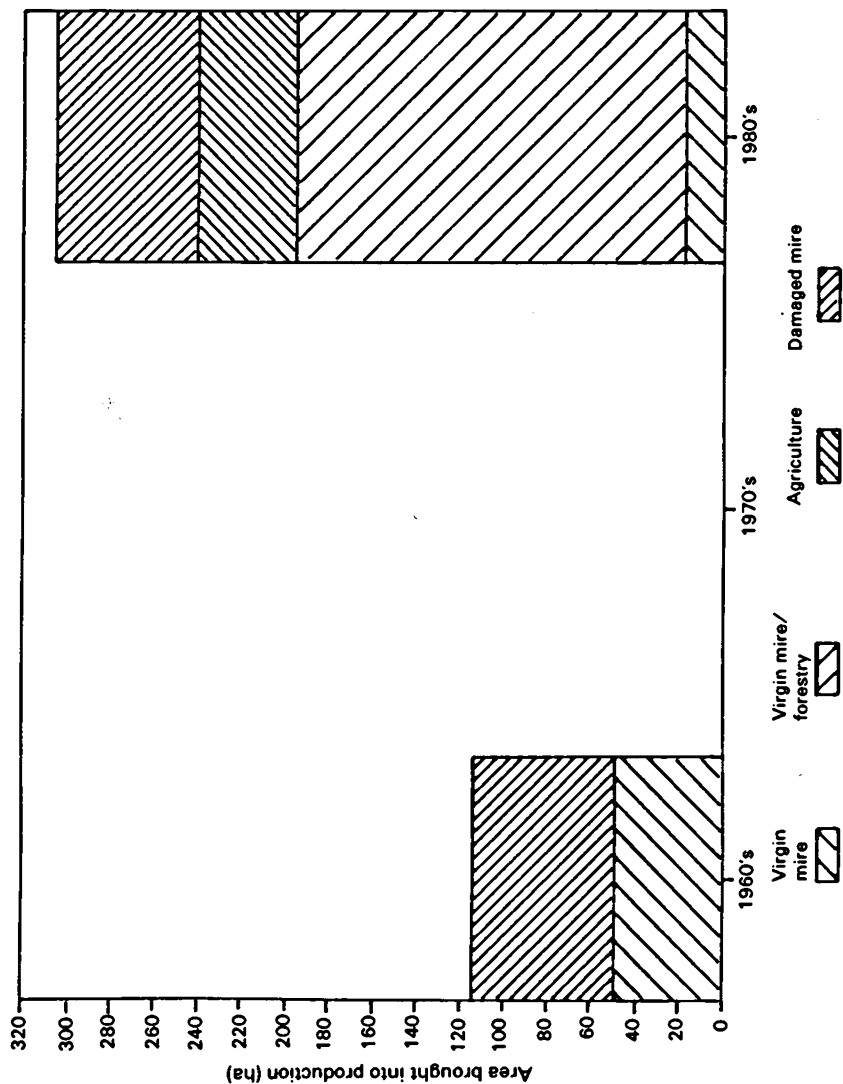


Figure 2.7

Areas of UK raised mires brought into production:
previous condition



now classed as worked out. Areas of peatland that have been drained, but not yet worked, are not included in these totals.

In all, 541 ha of UK peatland have been brought into production since 1960: 333 ha were brought into production in the last 10 years. An area of 354 ha of raised mire has been brought into use since 1960, of which 240 ha was in the last 10 years (see Figure 2.7).

Not all the peatland brought into extraction was intact before work started. Indeed, only 18 ha of intact raised mire have been brought into use in the last 10 years, although a further 178 ha of raised mire on which extraction has started since 1980 were classed as a mixture of virgin mire and forestry originally.

Although the 53 ha of blanket mire brought into use in the 1960's were intact before extraction started, the 69 ha of raised/blanket complex were already damaged. In Somerset, none of the fen peat on which work started was classed as intact, the majority having already been drained for grazing or other agricultural purposes beforehand. The UK peat producers, therefore, cannot be considered responsible for the loss of large areas of virgin peatland over recent years.

Areas brought into peat production can be compared with the areas of peatland planted with trees or absorbed by agriculture. In the 1970's and 1980's, 95 000 ha of peatland in Great Britain were planted with trees²¹, whereas extraction started on only 347 ha of peatland in the UK. Less is known of the reclaiming of additional peatland for agriculture, although on the five areas surveyed in the north of England and Scotland, 209 ha of raised mire were reclaimed for agriculture between 1970 and 1978, whereas the total area of raised mire brought into peat production in the whole of the UK during the 1970's and 1980's was 240 ha, and some of this had already been reclaimed for agriculture¹⁹.

In Ireland, 9245 ha of peatland have been brought into production over the last 10 years, but only 1156 of these are for horticultural production. Extraction for horticultural peat started on 1317 ha in the 1960's and 960 ha in the 1970's.

It is more difficult to give an accurate picture of the areas brought into production prior to 1960. In addition, it should not be forgotten that many of these mires had experienced hand cutting for centuries before machine extraction started.

In the UK as a whole, only 18% of all peatlands held by members of the PPA (15% of raised mires) were virgin mires prior to extraction. A further 49% of all peatlands (68% of raised mires) had a virgin mire component and 12% of all peatlands had previously been used for agriculture (see Figure 2.8).

In Ireland, 90% of the raised mires held by the PPA were classed as virgin mires prior to extraction. The remaining 10% had been subject to hand cutting. All the blanket mires in Ireland were intact before extraction started.

Figure 2.8
 Previous condition and uses of UK peatlands held by
 members of the PPA: all mire types

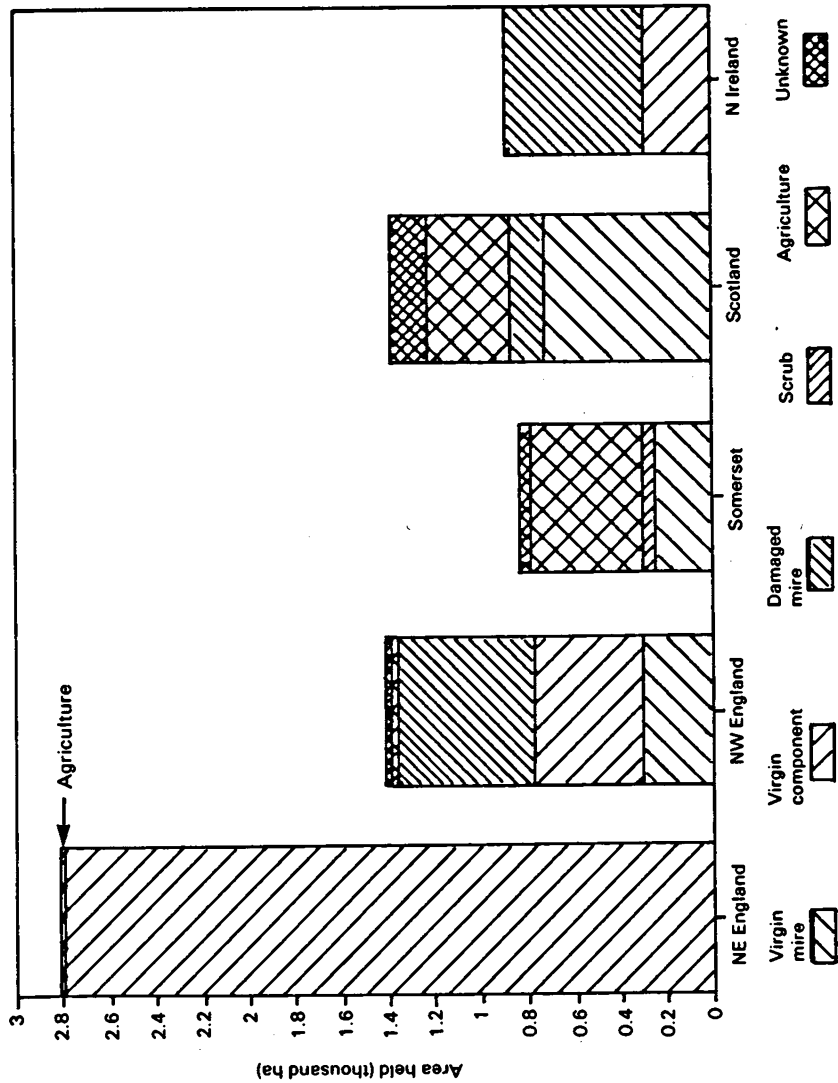
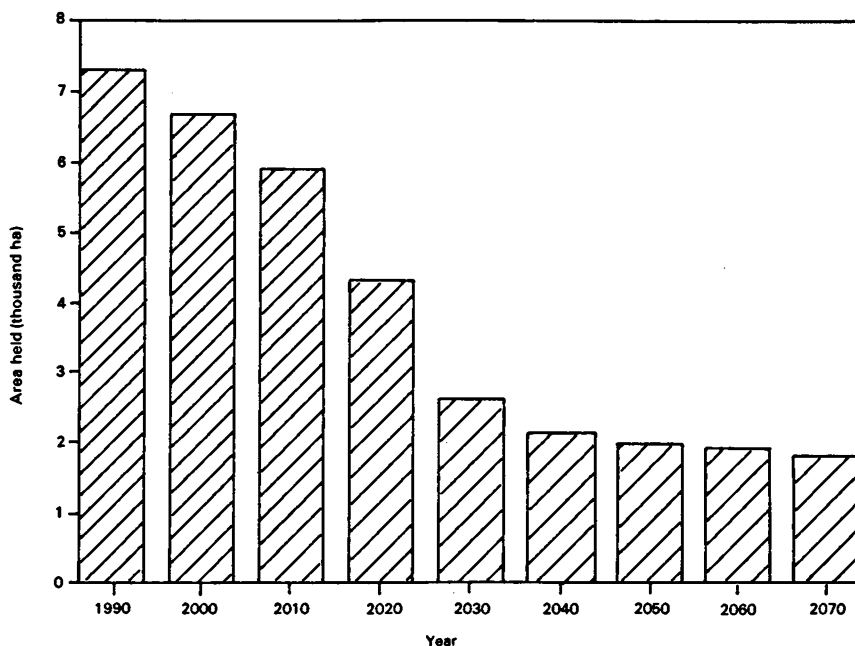


Figure 2.9

Land, held by members of the PPA, remaining in production in the UK



HOW LONG WILL THE PEAT RESERVES IN THE UK AND IRELAND LAST?

Assuming that current extraction rates continue, nearly 1800 ha of the UK peatlands currently worked, or allocated for extraction, will still be yielding peat by the year 2070 (see Figure 2.9).

In Ireland, horticultural peat reserves should last until the middle of the next century at least, given current extraction rates and production practice.

WHAT WILL HAPPEN TO PEATLANDS AFTER EXTRACTION HAS FINISHED?

The various after-uses proposed by members of the PPA for peatland sites, once extraction has finished, are shown in Figures 2.10 and 2.11. The most commonly named after-use proposed for raised mire, where members of the PPA have control over after-use, is some form of conserved wetland. It should be stressed that the resulting ecology may be substantially different from that of the peatland before extraction started, but, where the previous use was low-grade agricultural land, this will be a positive contribution to nature conservation. However, forestry and agriculture are currently the dominant proposed after-uses on blanket mires and raised/blanket mire complexes.

Three other important points arise from the findings illustrated in the diagrams:

- on a considerable proportion of the land held (usually leased) by members of the PPA, the member concerned has no control over after-use;
- much of the freehold land held by the PPA does not have after-use plans as yet but these are being actively developed in consultation with the NCC, other voluntary conservation bodies, and local planners;
- regeneration is mentioned in respect of some peatland, and this is discussed in more detail later.

Figure 2.10
**Planned after-use of UK mires held by members of the PPA:
all mire types**

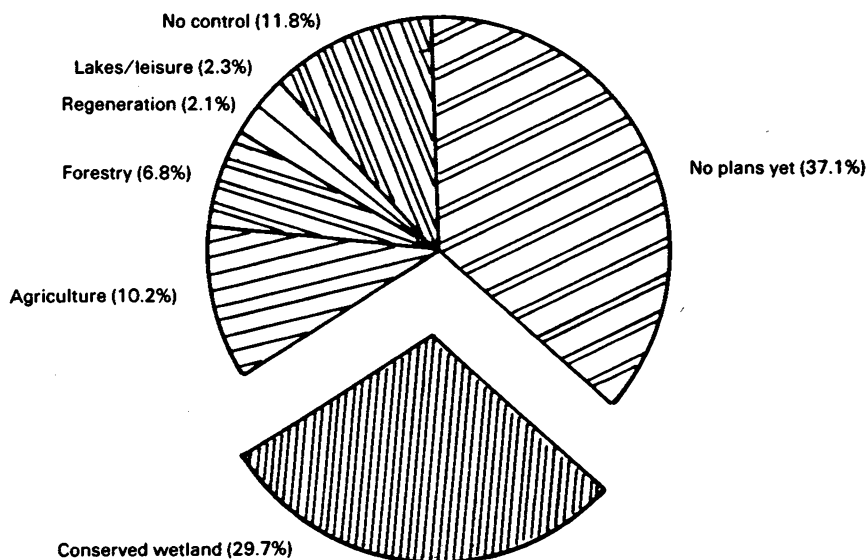
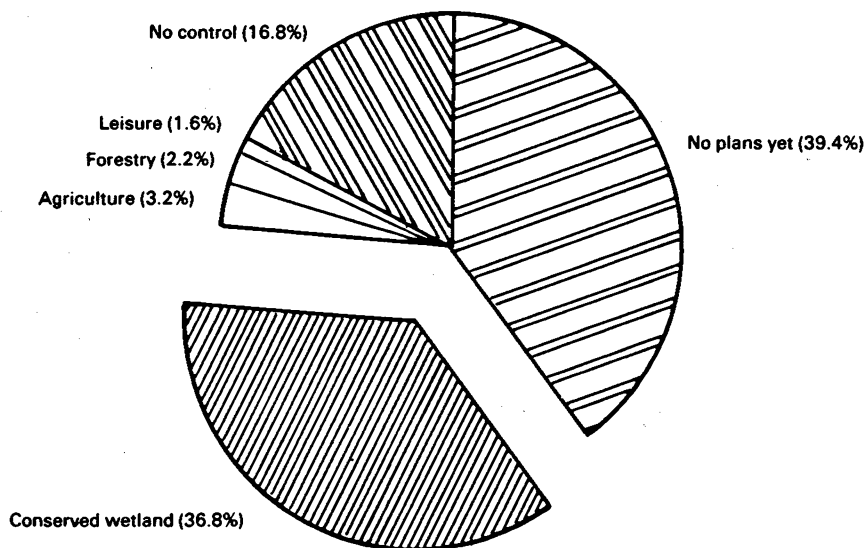


Figure 2.11
Planned after-use of UK mires held by members of the PPA:
raised mires



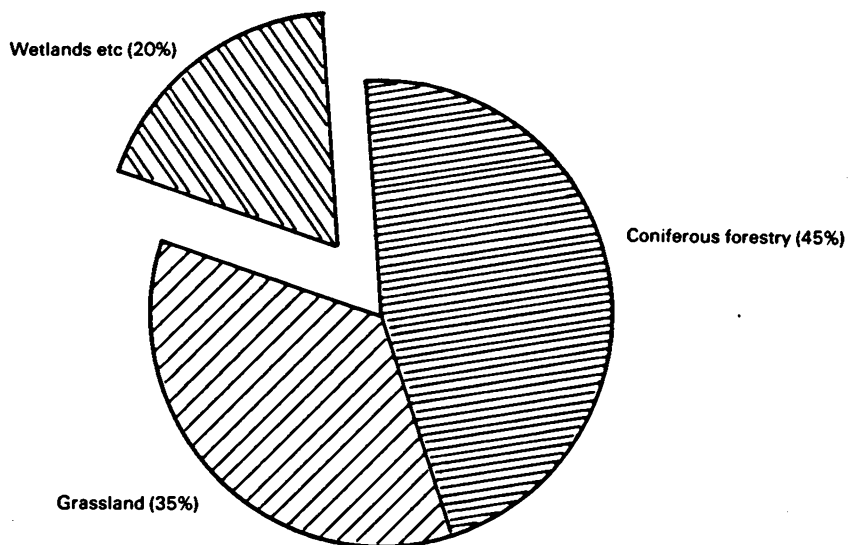
The reason for much of the PPA peatlands in the UK having no agreed after-use, as yet, is that in the early years of the 1947 Town and Country Planning Act there were few conditions attached to planning permissions. Peat is classed as a mineral, and thus extraction cannot start without first being granted planning permission, but permission was obtained on many sites in the 1940's and 1950's.

The 1981 Minerals Act gives local authorities the power to tighten up on after-use, by ensuring that conditions of reclamation, after-use and after-care are attached to new planning permissions for mineral extraction. In addition the terms of old permissions can be reviewed and restoration and after-care conditions imposed, with compensation payable in some cases. The PPA itself pledges in its Code of Practice, to make every effort, where after-use is not specified, to consult local authorities and conservation bodies about environmental schemes and recreational uses.

In Ireland, the choice of after-use depends on the nature of the cut-away area left after extraction has finished. There are much larger areas of cut-away to be planned for than in the UK, and there are many other factors to be taken to account, including the need to maintain rural employment levels and the future of the fuel peat industry.

Figure 2.12

**Proposed after-use of Irish mires held by members of the PPA:
all mire types (including mires cut for fuel)**



Agricultural practice in Ireland is less intensive than in the UK and there is consequently a greater abundance of wildlife habitats. None the less, the creation of additional wetland and other habitats is considered an essential element when planning after-use.

Physical factors, such as soil type, influence the choice of after-use, as does ownership, and an assessment of these on PPA sites in Ireland suggests the possible breakdown of after-use shown in Figure 2.12. Twenty percent of the area is destined for wetlands/nature reserves and amenity. However, some hardwood trees will be grown for amenity and shelter purposes on the areas of grassland, coniferous forest and wetland.

HOW ARE PPA MEMBERS CONTRIBUTING TO THE CONSERVATION OF PEATLANDS?

Ten of the 17 UK PPA members replying to the questionnaire reported active discussions with several bodies on conservation, management and after-use of PPA sites. The main extractor in Ireland has worked actively for many years with environmental and conservation bodies.

Conservation of sites

PPA members can contribute sites for conservation either by selling, leasing with a management agreement, or donating them to conservation bodies or by managing them themselves. Conservation activities by PPA members include:

- Fenns and Whixall Moss (Shropshire/Clwyd borders) – the 385-ha area of raised mire has been sold to the NCC for conservation;
- Flanders Moss (Scotland) – 122 ha of virgin mire have already been given to the NCC and a further 40-ha area is being leased with a management agreement to the local conservation trust;
- Hatfield Moor (NE England) – 120 ha of nightjar (*Caprimulgus europaeus*) habitat are being developed, to be managed by a PPA member;
- Thorne Waste and Crowle Moor (NE England) – 79 ha have been sold to the NCC, 43 ha sold to the Lincs and South Humberside Trust for Nature Conservation (LSHTNC) and a further 75 ha are managed by the LSHTNC. In addition, 134 ha have been identified for conservation and will not be worked. A total of 20% of the total area has been sold, leased or set aside for conservation.
- In Somerset, two PPA members have handed over a total of 33 ha of peatland to the NCC and the Somerset Trust for Nature Conservation (STNC);
- Peatland with archaeological value has been set aside in Somerset in order to protect the 'Sweet Track', a 6000-year-old road, discovered in 1970 during peat harvesting. The original PPA land is now owned by the NCC and therefore permanently protected, and the PPA member providing the land received the Times Archaeological Research Award in 1971, for the discovery and preservation of the oldest trackway in Europe, and again in 1977 for continuing co-operation with the Somerset Levels Project.
- The PPA has also contributed to the 'North-West Wetlands Survey', an archaeological survey funded by English Heritage;
- The main extractor in Ireland has conserved 3120 ha of peatland in Ireland, of which 1890 are raised mires, and proposes to conserve a further 1510 ha. In addition, 5247 ha of privately-owned raised mires have been excluded from future development plans because of their conservation/scientific value. A number of Irish peatland sites have also been set aside for archaeological reasons.

Although they do not necessarily have formal arrangements for visitors, many members of the PPA allow access to their sites on request, and some are developing hides for bird watchers.

Minimising damage during extraction

In addition to the areas conserved by PPA members, mentioned above, members have had discussions on the management and conservation of sites with the NCC and other organisations. Sites included in the discussions are Glasson Moss, Wedholme Flow and Fannyside Muir.

- The Somerset Peat Producers' Association has had contact with conservation bodies, such as the NCC.
- The Peat Local Plan produced by Somerset County Council (SCC) aims to encourage peat producers to minimise archaeological and environmental damage during extraction by encouraging phased working of sites and landscaping (including tree planting) from the beginning of the operation.
- An invertebrate study is being carried out on Thorne Waste and Hatfield Moor, in the north-east of England, by the LSHTNC. The aim is to identify the location of the invertebrate population so that this information can be taken into account by the owner, when planning their future operations. An area of 20% of Thorne Waste has already been set aside to act as permanent refugia.
- The PPA itself pledges, in its Code of Practice, to minimise damage during extraction by co-operating with the movement of valuable plant communities to safe sites, leaving areas of greatest interest undisturbed, and avoiding drainage and land clearance too far ahead.

Reclamation and after-use of worked peatlands

A summary of PPA plans for after-use is presented above, but a number of specific activities need particular mention:

- in their Code of Practice, the PPA pledges to 'leave a layer of peat behind when harvesting ceases' where appropriate;
- it is more difficult to develop an effective after-use plan for sites where there are a number of producers, such as the Somerset Levels, and so SCC has established the Peatlands Reclamation Advisory Board, consisting of representatives of the main interested bodies, including the PPA, NCC, Royal Society for the Protection of Birds (RSPB), National Rivers Authority (NRA) and the STNC, its purpose being to co-ordinate, promote and fund after-use proposals;
- the NCC has carried out a topographical survey of Thorne Waste to produce an accurate profile of peat depths to assist in after-use planning;
- one PPA member is involved in a number of projects on regeneration, aimed at:

- developing a technique for the most rapid establishment of wetland plants which could lead to mire regeneration;
 - identifying the location, and thus best source, of plants necessary for regeneration;
 - developing methods of protecting the hydrology of mires (including a 'double-ditch' system);
- another PPA member is undertaking a regeneration project on a site in Scotland, in conjunction with a leading environmental agency;
 - in Ireland, 20 000 ha of cut-away mire have been surveyed, and the main extractor is involved in research on the floral and faunal communities on naturally revegetated cut-away areas.

3 Alternatives to peat – the facts

USES OF PEAT IN HORTICULTURE

Between 2.5 and 3.0 million m³ of horticultural peat are used in the UK each year in three main ways:

- (i) as a soil conditioner;
- (ii) as a mulch;
- (iii) as an ingredient of growing media, including mushroom casings.

However, as shown in Chapter 2, the majority (75%) of the peat produced in the UK is used in growing media.

It is peat's blend of qualities, including being both moisture retentive and well-aerated, that make it ideal for most uses²⁷. However, in recent years alternatives to peat have been investigated, partly in response to general concern over the environmental aspects of peat extraction.

TYPES OF ALTERNATIVES

Alternatives to peat can be considered under the following headings²⁷:

- (i) **minerals** – loams, sands and gravels, river dredgings and expanded mineral aggregates (vermiculite, perlite, pumice, clay leca, pulverised fuel ash (PFA) and rockwool);
- (ii) **plant wastes and plant products** – forestry products (bark, wood), domestic and municipal wastes, leaf mould, straw, coir;
- (iii) **animal wastes and animal products** – sewage sludge, animal manures, spent mushroom compost, worm-worked waste;

- (iv) **plastics** – polystyrene, foams, geotextiles and sheets, cross-linked polymer gels;
- (v) **mixtures**

Table 3.1 presents a summary of the quality and characteristics of many of the alternative materials currently being investigated or promoted. The deficiencies and strengths of each will often require that, in practice, mixed formulations are preferred.

The requirements of the three main situations in which peat is used, and the scope for alternatives are considered below.

CRITERIA FOR USE OF PEAT OR ALTERNATIVES

Mulches

Deep mulches must allow free passage of rain and air to the soil below, insulate the soil, be heavy enough to remain in position and discourage the germination of wind-blown seed. Although peat is often used as a mulch, it is believed that bark and other similar materials are more suitable, although often more expensive²⁷.

Soil conditioners

Peat is used on landscape sites and in gardens to improve soil texture and structure, soil crumb formation, soil resource storage capacity, buffering capacity and fertility. Some alternatives are suitable for particular uses, eg sands and gravel for improving soil texture and manures for improving soil crumb formation. Soil conditioners are used in bulk, and so price is important, with many alternatives (including perlite and water-holding polymers) being too expensive²⁷.

Growing media

A successful growing medium must satisfy the following criteria²⁸:

- (i) reliability and availability of supply;
- (ii) consistency of materials;
- (iii) satisfactory reaction to moisture;
- (iv) freedom from disease which can affect operators or plants; safety in use by operators and acceptability to operators;
- (v) competitive cost.

These criteria, particularly reliability, are likely to be as important to amateur growers as to professional growers. However, some amateur growers may be prepared to purchase peat substitutes, and apply less exacting standards, in the belief that, in so doing, the rate of extraction of peat may be reduced²⁷.

Table 3.1
Characteristics of peat and peat alternatives²⁷

KEY					
WH	(WATER HOLDING CAPACITY)				
A	(AERATION)				
MI	(RESISTANCE TO MISHANDLING)				
SL	(STRUCTURAL STABILITY/LONGEVITY)				
B	(BUFFERING CAPACITY)	VG = Very good	G = Good	M = Moderate	P = Poor VP = Very poor
NR	(NUTRIENT RETENTION)				
NS	(NUTRIENT SOURCE)				
T	(TOXINS)				
P	(PATHOGENS)				
SA	(SALINITY)				
W	(WEEDS)				
O	(OFFENSIVE)				
pH	(A low pH can be corrected by liming. It is difficult to lower a high pH.)				
N	(NUTRIENT LOCKUP)				
D	(DENSITY which increases transport costs yet lends stability to containers)				
S	(SOIL IMPROVEMENT CHARACTERISTICS)				
MU	(MULCH)				
EC	(ECONOMICS/CONTINUITY OF SUPPLY)				
U	(UNIFORMITY/QUALITY ASSURANCE)				
RE	(RESEARCH/EXPERIENCE OF USE)				
ED	(POSSIBLE ENVIRONMENTAL DAMAGE)				

H = Human	P = Plant	N = None	S = Sometimes	C = Common problem
N = None	S = Sometimes	C = Common problem		
Y = Yes	N = Not when properly treated			
H = High	L = Low			
N = can immobilise nitrogen	O = can immobilise some nutrients	-- = Usually no problem		
H = High/heavy	L = Low/light			
S = Soil separator	O = Organic colloids which form soil crumbs			
T = Textural Modifier	R = Resource storage			
G = Good	S = Sometimes useful	P = Poor	E = Expensive	
G = Good	P = Poor	U = Unpredictable		
L = Low	H = High			
S = At source	D = At disposal	N = No major problem		

	WH	A	MI	SL	B	NR	NS	T	P	SA	W	O	pH	N	D	S	MU	EC	U	RE	ED
Peat	G	G	G	G	M	M	P	N	N	N	S	N	L	-	L	SR	S	G	G	H	S
Loam	G	P	P	M	VG	VG	G	S(P)	S(PH)	N	C	N	L/H	O	H	TR	P	P	P	H	S
Sand/gravel	VG	VG	VG	VG	VP	VP	VP	N	N	N	S	N	L/H	-	H	T	G	G	G	H	S
River dredgings	G/VP	G/P	G/P	P	G/P	G/P	M	C(PH)	N	C	N	N	L/H	O	H	TR	S	U	P	L	D
Expanded aggregate	P	VG	M	M	M/P	M/P	P	N	N	N	N	N	L/H	-	L	TR	E	G	G	H	SD
Bark	M	VG	G	G	G	M	P	S(P)	S(P)	N	N	N	L/H	N	L	TS	G	G	G	H	S?
Wood	M	M	G	M	G/M	M	P	N	S(P)	N	N	N	L/H	N	L	TS	G	G	G	L	S?
Refuse	G	M	M	M	M	M	M	S(PH)	?	S	S	N	L/H	N	L	RO	?	U	U	L	N
Leaf mould	M	M	M	M	M	M	M	S(P)	S(P)	S	S	N	H/L	N	L	SO	G	P	P	L	N
Straw	M	M	M	P	M	M	P	N	S(P)	N	S	N	L/H	N	L	SO	S	U	U	H	N
Coir	G	G	G	G	G	M	P	N	S(H)	S	N	N	L	N	L	SR	SE	U	G	L	N
Sewage sludge	G	M	M	P	M	M	VG	C(PH)	S(H)	C	S	N	L/H	-	L	O	P	U	P	L	D
Animal manures	G	M	M	P	M	M	VG	S(P)	?	C	S	N	L	-	L	O	P	U	U	L	N
Spent mushroom	G	M	G	M	M	M	P	S(P)	N	S	N	N	H	-	L	SRO	S	G	G	H	N
Worm-worked waste	M	G	M	G	G	M	P	?	?	N	S	N	L	-	L	?	?	P	G	L	N
Plastics	P/VG	G	G	G	P/M	P/M	VP	S	N	N	N	N	L	-	L	R	S	G	G	H/L	SD

NB Inevitably this table represents a summary which requires generalisations to be made.

Horticultural crops can be divided into two groups: those grown in controlled conditions to produce a harvest of fruit or flowers and those sold complete with pot and compost. Growers of some of the former have found satisfactory alternatives, eg the use of rockwool to replace peat in the growth of cucumbers and tomatoes (although there may be a rockwool disposal problem). However, in the case of the latter group, which includes pot plants, bedding plants and house plants, there are no alternatives yet developed to a point where they can replace peat. Trials do indicate that coir could replace peat for long-term pot plants, if water and nutrient regimes were adjusted^{27,28}. Peat is also very important for the propagation of vegetables.

SAFETY

Many alternatives have been suspected of carrying plant pathogens or even, in the case of sewage sludge and coir, human pathogens. These materials must be sterilised. Freedom from all viruses cannot be guaranteed in digested sewage sludge, and even if it could the product may still be unacceptable to the consumer^{27,28}.

CONCLUSIONS

Alternatives may have a role to play in the future but, as yet, no one alternative is the perfect substitute for peat, as shown in a report of work commissioned by the Horticultural Development Council²⁸. There is more immediate scope for the introduction of alternatives in certain outlets, including soil conditioners and mulches. However, in the case of growing media it may be some time before suitable alternatives are available. The needs of the professional growers for uniform output are particularly demanding, but alternatives may meet the needs of the amateur grower sooner. Most alternatives, as yet, cannot compete on price, quality or the range of species for which they are suitable.

More research is needed into the development and use of alternatives and in some cases particular attention must be paid to their potential to support plant or human pathogens.

4 Peat and the 'Greenhouse Effect'

The 'Greenhouse Effect' can be defined as the effect produced by the accumulation of eg carbon dioxide and water vapour in the upper atmosphere. This insulates the earth and thus raises the atmospheric temperature by preventing heat loss.

Peat, when extracted and drained, is a source of carbon dioxide as the organic material oxidises. It has been claimed that this is an additional reason for stopping the extraction of peat. In partial rebuttal of this criticism, it has been suggested that the drainage of peat inhibits the formation and release of methane (another and more potent 'Greenhouse' gas) and is therefore beneficial in off-setting this contribution to the 'Greenhouse Effect'. Although both these effects exist, the magnitude of production of these gases from peatland is small and essentially trivial in comparison with those from fossil fuel resources. The argument for the preservation of peat mires should not need to rest on the 'Greenhouse Effect'²⁹.

5 Conclusions

AREA OF INTACT PEATLANDS

There is no published evidence, at present, to support the view that the area of relatively intact raised mires has fallen below 10 000 ha or below 4% of the area of raised mires in the 19th century.

Although intact peatlands, especially raised mires, have declined in area there appears to be little information as to the extent and whereabouts of the remaining intact peatlands. The actual areas and location of intact peatland in the British Isles should be established as soon as possible.

AREAS OF PEATLAND HELD FOR EXTRACTION BY PPA MEMBERS

Members of the PPA hold only a small proportion (less than 1%) of the peatlands in the British Isles for horticultural peat production. The total area of 7318 ha of UK peatland held by the PPA is much less than the area of 11 158 ha stated in the RSNC Peat Report to have planning permission for extraction. The latter area was estimated from local authority records. However, many of these applications were made in the 1970's, when fuel shortage was feared, but have not been taken up and may have lapsed. The main discrepancy is in Scotland, where 4462 ha are reported to have planning permission, whereas PPA members hold only 1389 ha. Further investigation is needed to ascertain why these areas differ, and if the RSNC Peat Report figures are correct, who owns the additional land with planning permission. The area of intact raised mires held by the PPA is even smaller, totalling 153 ha, and 141 ha of these will never be worked. Thus the responsibility for conserving intact peatland cannot rest solely with the PPA.

LOSSES OF INTACT PEATLANDS

Losses of intact peatland to peat extraction over the past 30 years appear to be small when compared with the likely losses to agriculture and forestry. Actual losses to agriculture are unknown although it is known that on five areas of raised mire in Scotland and the North of England, losses to agriculture between 1970 and 1978 were just over 200 ha, whereas the area on which peat extraction took place declined by about 150 ha. It is known that 95 000 ha of peatland in Great Britain have been planted with trees since 1971, and that forestry now covers at least 180 000 ha of peatland in Ireland. By comparison, only 347 ha of UK peatland were lost to extraction between 1970 and 1990.

It should be ensured that the concentration upon the peat extraction industry does not distract attention from forestry and that future losses to forestry plantings of peatland sites are minimised.

CONSERVATION OF INTACT PEATLANDS

When considering the conservation of peatlands there are two key issues:

- the number of sites to be conserved;
- the effectiveness of the current protective measures (particularly SSSIs).

With regard to the former issue, the NCC proposes that if less than 10 000 ha of each mire type remain intact, the remainder should be conserved, with a representative site in each county or region if at all possible. The actual location and extent of peatland SSSIs in the UK should be published by the relevant bodies as soon as possible. The PPA has recommended that its members will not seek planning permission on SSSIs or candidate SSSIs without the prior agreement of the NCC, pending an agreed peatland strategy. Peatlands with SSSI status that do not currently have planning permission would therefore be protected from extraction.

In Ireland, the government is committed to the conservation of 10 000 ha of raised mire and 40 000 ha of blanket mire.

AREAS OF PEATLAND CONSERVED BY THE MEMBERS OF THE PPA

PPA members have sold, leased or set aside over 4000 ha of peatland for conservation in the UK and Ireland, and have contacted conservation bodies regarding management of peatlands with conservation value, minimising damage during extraction and after-use. PPA members are funding research into regeneration and would welcome government assistance and co-operation from conservation bodies in this area.

AFTER-USE OF PEATLANDS HELD BY MEMBERS OF THE PPA

The majority of peat producers with control over after-use of raised mire and fen peat sites propose to reclaim the land for some form of wetland habitat. Whilst the resulting ecology will not necessarily be the same as that of the mire prior to extraction, in some cases it will involve the conversion of low-grade agricultural land to land of conservation value. Worked-out sites can also be of value as parts of reservoirs, drainage schemes and water-based leisure schemes, and the overall requirements of a region, including local employment, should be taken into account when considering after-use.

EMPLOYMENT IN THE HORTICULTURAL PEAT INDUSTRY

The British peat industry supplies a substantial proportion of the UK's horticultural peat requirements, and provides full- and part-time employment in rural areas. Its important contribution to employment and the local economy in certain rural areas, and to horticulture and gardening in general, should not be ignored when considering the need for conservation.

PLANNING FOR PEAT EXTRACTION

To ensure minimal damage to the peatlands, peat extraction, after-use and after-care should be planned from the outset. The Code of Practice of the PPA was developed with this in mind. The 1981 Minerals Act enables local authorities to ensure that after-use and after-care are considered at the planning application stage and the PPA is working with the NCC to produce a jointly agreed Peatland Strategy.

POSSIBLE ALTERNATIVES TO PEAT

Peat alternatives may have a role to play in the future, but as yet no one alternative is the perfect substitute. There are alternative mulches and soil conditioners, but not so many alternative ingredients for growing media. The alternatives, as yet, cannot all compete on price, quality, or the range of plants for which they are suitable. Development of the use of alternatives for different purposes could help reduce the rate of extraction and pressure to expand extraction areas and thus help to protect ecologically desirable areas of peatland in the future.

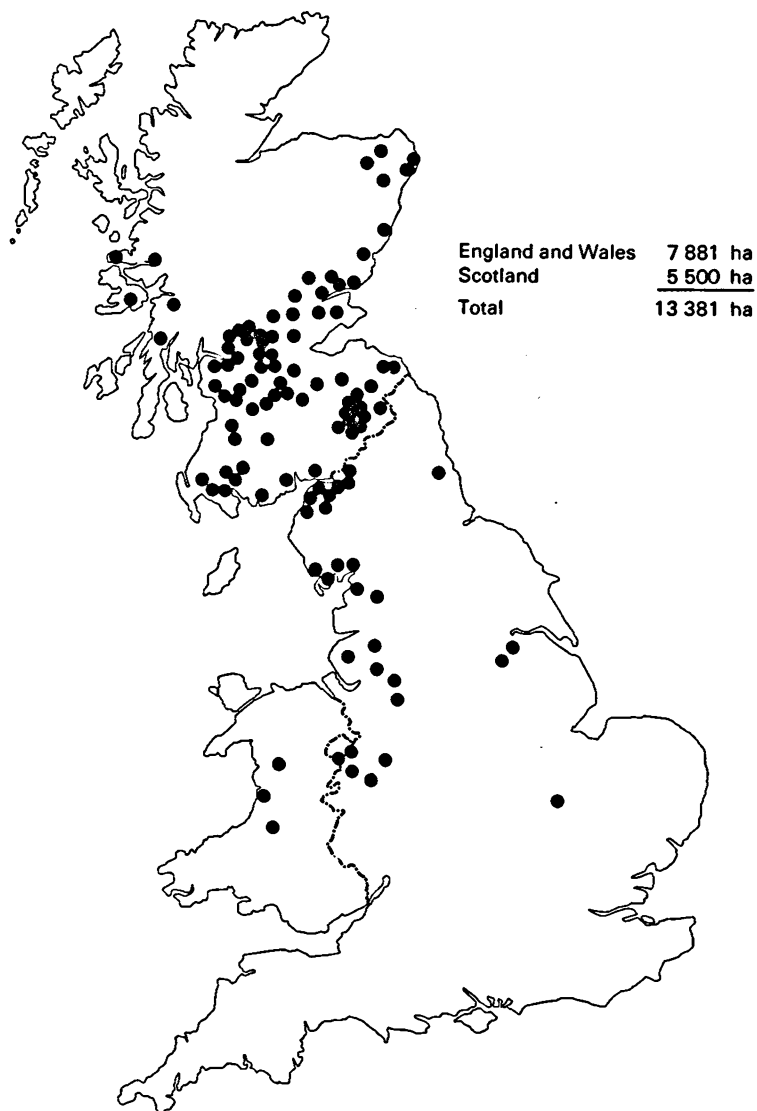
PEAT AND THE 'GREENHOUSE EFFECT'

The magnitude of the gases carbon dioxide and methane emanating from peatland is small and essentially trivial in comparison with fossil fuel resources. The argument for the preservation of peatland should not need to rest on the 'Greenhouse Effect.'

Maps

MAP 1

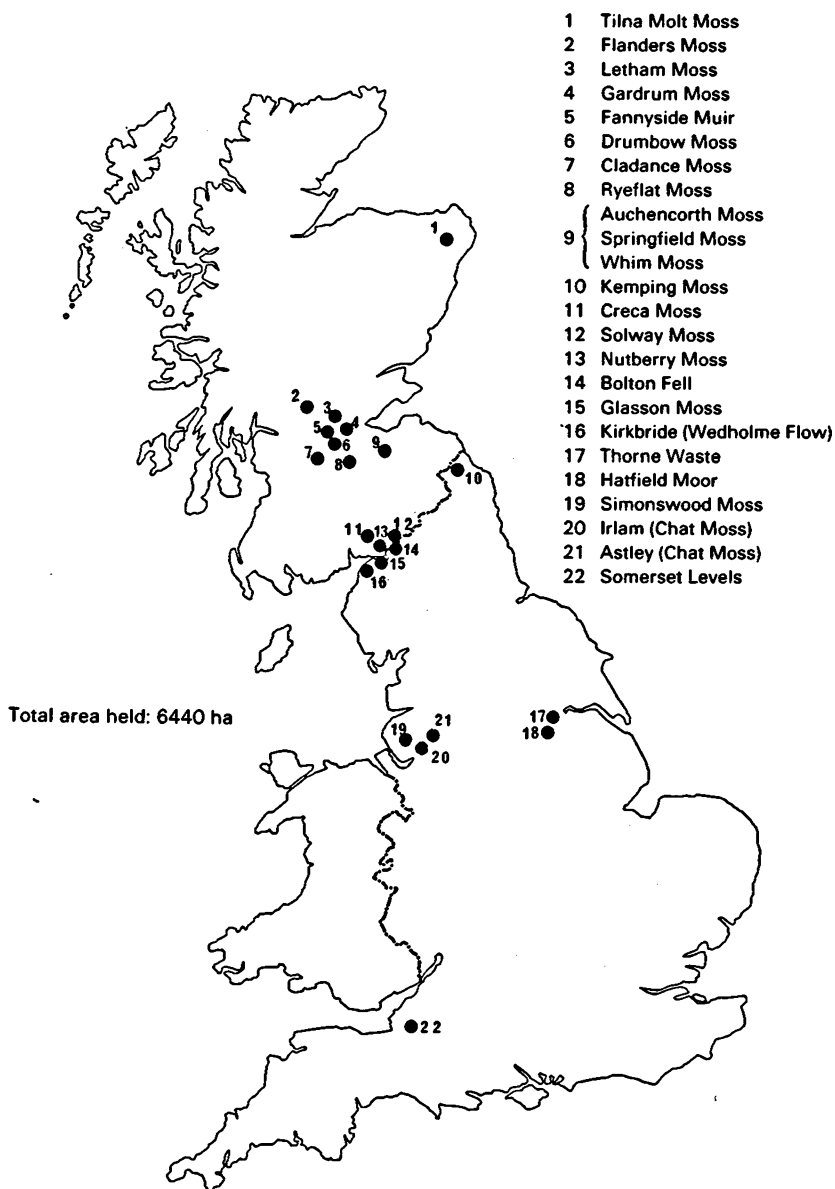
Raised and intermediate mire SSSIs in Great Britain^{2,14}



Note: This map was prepared specifically for this publication to show the approximate number, situation and total area of SSSIs with a raised mire component. Scottish sites may include a mixture of mire types.

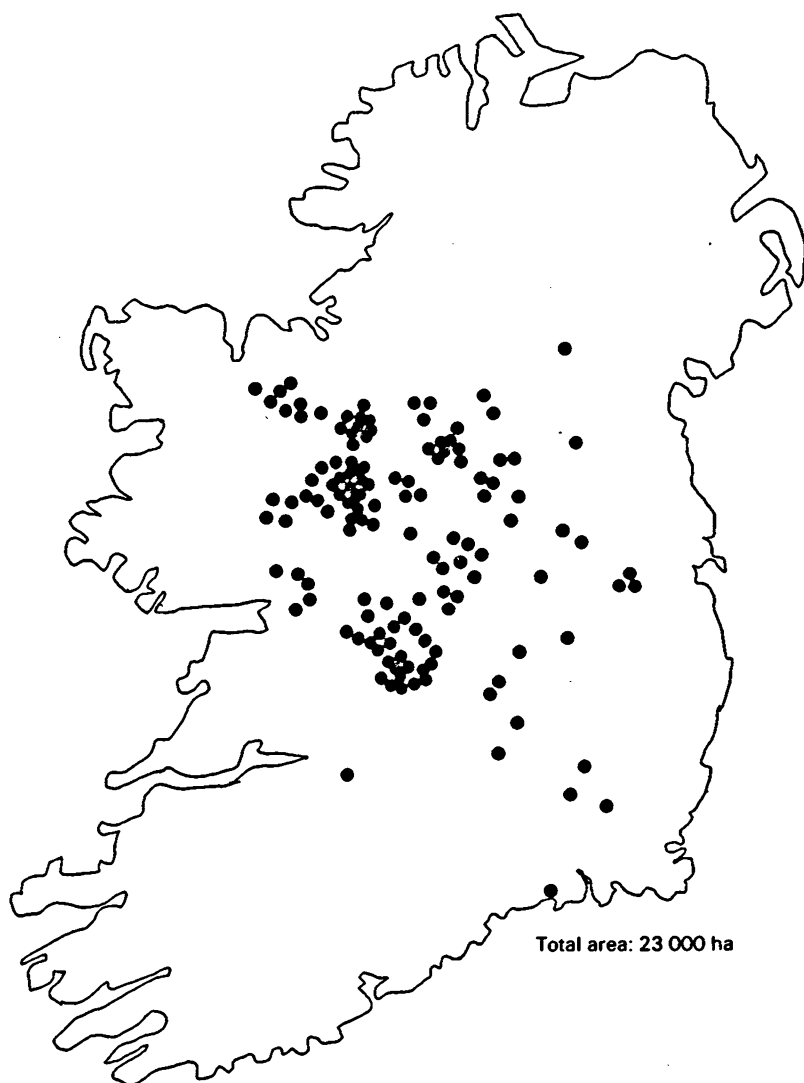
MAP 2

Horticultural peat production sites held by PPA members: Great Britain¹⁶



Note: The area given is the total area held by PPA members, not the area worked for peat.

MAP 3
Raised mire ASIs in Ireland¹⁶

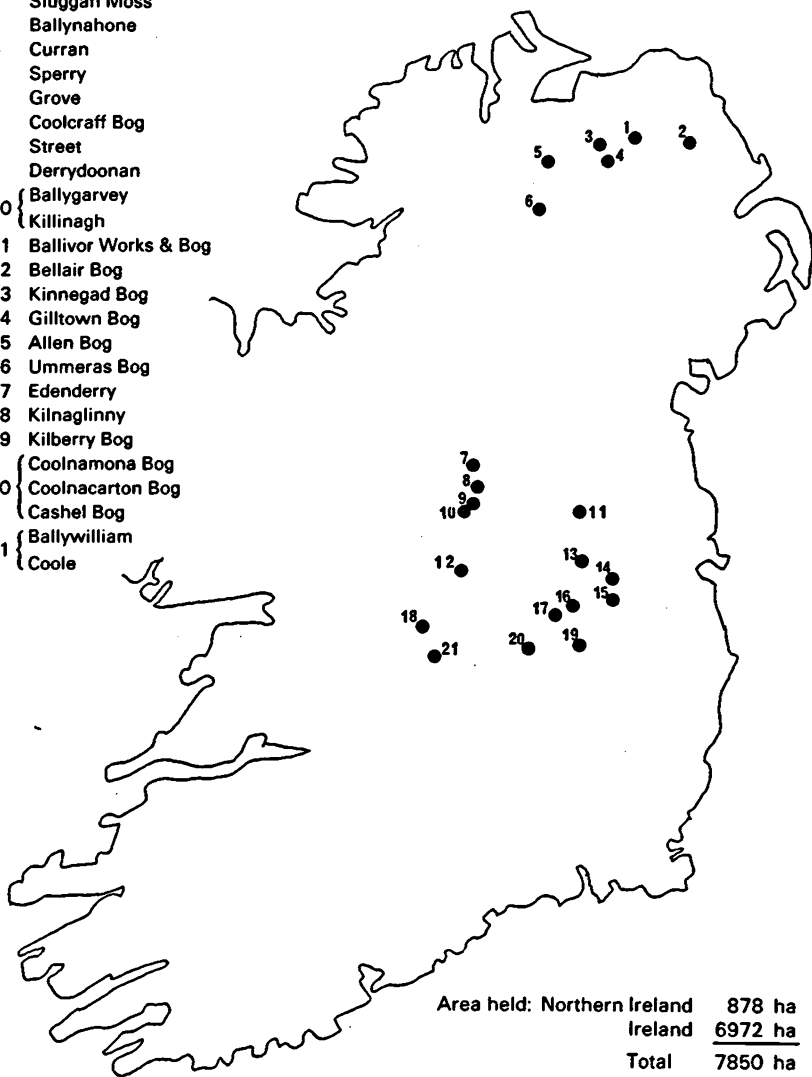


Note: This map was prepared specifically for this publication from current Wildlife Service listings to show the approximate number and situation of ASIs.

MAP 4

Horticultural peat production sites held by PPA members: Ireland and Northern Ireland¹⁶

- 1 New Ferry
- 2 Sluggan Moss
- 3 Ballynahone
- 4 Curran
- 5 Sperry
- 6 Grove
- 7 Coolcraff Bog
- 8 Street
- 9 Derrydoonan
- 10 { Ballygarvey
Killinagh
- 11 Ballivor Works & Bog
- 12 Bellair Bog
- 13 Kinnegad Bog
- 14 Giltown Bog
- 15 Allen Bog
- 16 Ummeras Bog
- 17 Edenderry
- 18 Kilnaglinny
- 19 Kilberry Bog
- 20 { Coolnamona Bog
Coolnacarton Bog
Cashel Bog
- 21 { Ballywilliam
Coole



Note: The area given is the total area held by PPA members for horticultural peat production, not the total area worked for peat.

PPA code of practice summary

Peat Producers must:

- do all in their power to reduce the impact of their operations and ensure a proper after-use situation which restores the land to the benefit of the community,
- use sites damaged hydrologically when seeking new sites and consult with NCC/relevant experts over 'environmental inventory' of rare fauna/flora,
- co-operate with the movement of valuable plant communities to safe sites,
- leave undisturbed areas of greatest interest so plants/animals can recolonise after harvesting and co-operate with recognised conservation bodies in the management of areas of environmental interest not required for peat production.
- liaise with county archaeologists and instruct staff where finds may be expected,
- prevent drainage/land clearance too far ahead of harvesting commencing and leave a layer of peat behind when harvesting ceases,
- determine when sites available for after-use and co-operate to ensure success of after-use project,
- make every effort, where after-use not specified, to:
 - consult planning authorities/NCC/conservation bodies about environmental schemes and recreational uses,
 - assist recognised conservation bodies; take opportunities to assist with visitor centres for reserves; help facilitate and control visitor movement; in any other way enhance public awareness/enjoyment of peatland areas.

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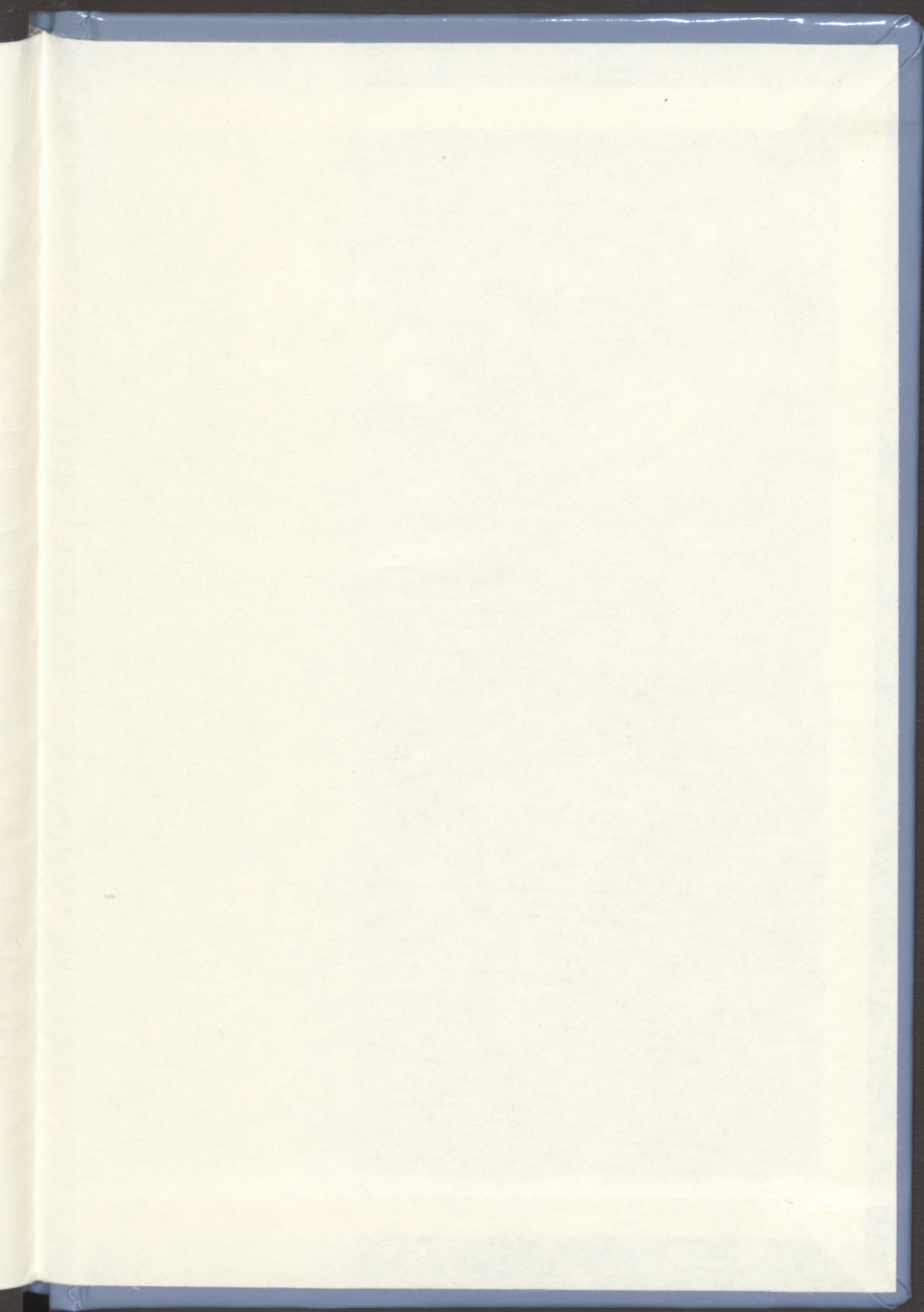
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