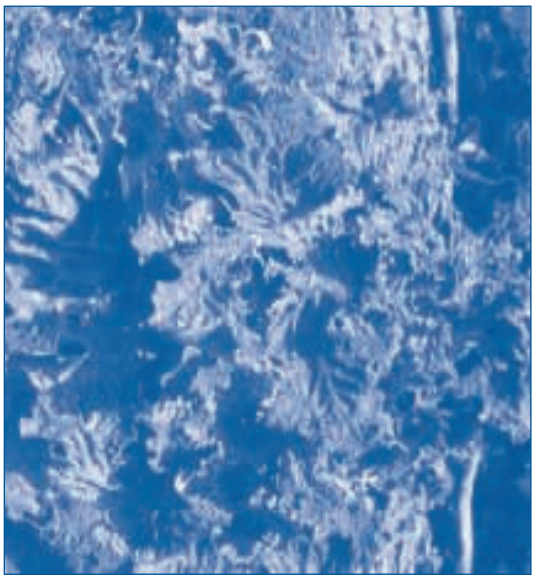
Dartmoor Species Action Plan for Mosses, Lichens, Ferns and Fungi

Dartmoor is nationally and internationally important for mosses, lichens and ferns. An altitude range from deep sheltered valleys to harsh upland rock, an Atlantic climate with relatively high humidity and mild winters, low levels of air pollution and extensive farming all combine to provide a unique combination of micro-climate and substrate. These 'lower plants' are found in every habitat, from ancient woodlands to wooden fence-posts and include upland mosses, lichens and ferns that are at the southern extremity of their range as well as more typically southern or oceanic species. Their luxuriant growth, particularly in hedgebanks and woodlands, is almost unique in Britain, if not in Europe, and adds significantly to Dartmoor's biodiversity.

The wooded valleys provide a particularly rich habitat. Some of the most diverse sites are in the Dart, Teign and Walkham Valleys and a unique community of mosses and lichens can be found in the four high altitude oakwoods (Wistman's Wood, Black Tor Copse, Piles Copse and Dendles Wood). Tors, clitter slopes, quarries and mine workings are home to some ferns and lichens that are uncommon in southern England e.g. forked spleenwort, and filmy ferns. The clean rivers host some nationally rare species such as the multi-fruited river moss. Some nationally scarce Dartmoor lichens are upland river specialists, inhabiting the splash zone or submerged below the water.

On Dartmoor, two 'Important Fungal Areas' (IFAs) have been recognised; Bellever Forest and Spitchwick Common. The key habitats for fungi on Dartmoor are; woodlands (including wet woodlands), wood pasture (parklands), veteran trees, old grasslands, and heath/grassland mosaics. One UK BAP species, *Armillaria ectypa*, a type of Honey Fungus, grows in *Sphagnum* bogs. Grasslands important for fungi are characterised by a short sward and often a high cover of mosses. They are usually northerly facing, sometimes on steep slopes, and have received little or no artificial fertilisers. Often referred to as 'Waxcap Grasslands', their typical species include waxcap fungi, earth tongues, fairy clubs and some members of the *Entoloma* genus e.g. big blue pinkgill. Old unimproved pastures, traditionally managed old lawns and churchyards can all be good sites for fungi, despite often being poor for vascular plants.



Tree lungwort at Buckland-in-the-Moor

Amongst the numerous rare moss, lichen and fern species recorded on Dartmoor, seven are included in the UK Biodiversity Action Plan: the lichens *Bryoria smithii* (protected under Schedule 8 of the *Wildlife and Countryside Act*), ***Graphina pauciloculata*** (a Dartmoor key species because it has it's stronghold here, with populations in the Walkham, Dart and Upper Plym valleys), *Schistmatomma graphidiodes*, the multi-fruited river moss *Cryphaea lamyana* and Killarney fern *Trichomanes speciosum* (these latter two are also protected under Schedule 8 of the *Wildlife and Countryside Act*). **String-of-sausages lichen** and ***Usnea florida*** are included as Dartmoor key species because they are attractive, easily recognisable, good indicators of clean air and, in the case of the latter, have undergone a contraction in range. Dartmoor also contains strongholds and/or the only site for a number of regional and Devon rarities. A description of selected rare lichens, mosses, ferns and fungi with a brief assessment of their status on Dartmoor is included at the end of this plan.

This action plan addresses the conservation issues and management requirements of mosses, lichens, ferns and fungi on Dartmoor. There are cross-references to this plan in the Action Plans for Moorland, Woodland, Boundaries, Rocks and Freshwater.

For further information on management for lower plants contact NE, DNPA or DWT who can put you in touch with specialists, if necessary.

Current status

Little is known about the status of many moss, fern and fungi species on Dartmoor, though we do know more about lichens as a result of some detailed survey and monitoring on some SSSIs. It appears that some epiphytic lichens and mosses have declined in the high altitude woods since the 1960s. The decline of *Bryoria smithii* and *B. fuscescens* at Black Tor Copse and apparent recent extinction at Wistman's Wood may be due to changes in the structure of these woods from historic times. Climate change, linked perhaps to increased nutrients from atmospheric deposition carried in rain may be the cause, but this will be difficult to confirm without a great deal of experimental evidence. Elsewhere, leafy lichens such as those belonging to the *Sticta* genus have declined, and there has been a general retreat of sensitive lichens from the top to the bottom of valleys, where the humidity is higher. Specific information on the status of selected species is given later in this plan.

A new Red List for Fungi is being prepared by the British Mycological Society (BMS), working with the Joint Nature Conservation Committee (JNCC). Although work is required before it becomes an official Red List, a summary of the preliminary assessment together with threat categories and brief accompanying notes is now available on the BMS website at www.britmycolsoc.org.uk.

Dartmoor distribution map

Given the number of different species covered by this plan, distribution maps are not presented here.

Current factors affecting species on Dartmoor

Air pollution from both diffuse (e.g. agriculture, motor vehicles) and point sources (e.g. power stations) is likely to be a cause of the observed declines mentioned above.

Water quality is particularly important to river mosses, lichens and liverworts and any pollution, including increased siltation, caused by upstream works or land management practices can have an adverse effect.

Farming on Dartmoor has generally favoured lower plants by retaining more undisturbed habitat than elsewhere in England. Indeed, high grazing levels (or mowing) and lack of artificial fertilisers favours fungal fruiting in 'waxcap grasslands'. Decreases in grazing levels on important sites may therefore be a concern with recent reductions in stock numbers and longer growing seasons. However, where livestock concentrate or where dung or fertilisers are being spread, local nutrient enrichment can occur. This raises concentrations of ammonia in the air and results in the decline of rarer lichens which thrive in nutrient-poor conditions, whilst green algae and the commoner nutrient-loving lichens increase. Mosses and lichens on parkland trees are particularly at risk, and occasionally those on and around tors and clitter slopes.

Burning on bogs can destroy the surface layer of mosses, particularly *Sphagnum* species, which form the peat. In areas of mature heather, clubmosses and *Cladonia* lichens may be destroyed by swaling.

Excess shade from surrounding trees and scrub can adversely affect mosses and lichens growing on isolated trees or boulders. Heavy growth of ivy can also shade out mosses and lichens growing on individual trees.

Woodland management can drastically affect lower plants by changing the micro-climate as well as destroying host trees. Dartmoor is particularly important for oceanic species which require high humidity. Felling in stream valleys needs to take this into account and should be preceded by survey work in potentially rich areas.

Lack of information on the location and status of mosses, lichens, ferns and particularly fungi on Dartmoor.

Recreational use causes local damage e.g. climbing on the faces of tors or gullies which support good communities of lichens and ferns. Trampling and over-turning clitter can be a threat to lichens and ferns, especially where letterboxes are located.

Climate change i.e. warmer winters may be contributing to the decline of upland lichens.

Current action on Dartmoor

Information on the location of lower plant species from local naturalists and professionals is being collated by DNPA and NE. The 'Lichen Flora of Devon' has been published by Barbara Benfield (2001) and fern records have been included in an updated Atlas of Devon Flora. Lichen surveys have been undertaken on some DNPA and NT land, and in SSSIs. The Devon Fungus Group continues to collect data during their site visits.

Fire Plans and moorland management plans have been drawn up by the Dartmoor Commoners' Council and local Commoners' Associations, providing the opportunity to identify vulnerable areas and define guidelines for management of blanket bog.

Monitoring systems have been set up by Natural England at Wistman's Wood (for mosses & lichens), Black Tor Copse, Dendles Wood and the Walkham Valley (for lichens). In addition, 'common standards' for monitoring lower plants have been defined by the JNCC and are being implemented by NE on SSSIs.

Research has been stimulated by the newly formed Dartmoor Biodiversity Research Group.

Natural England's Species Recovery Programme includes the Dartmoor species golden hair lichen and *Schismatomma graphidioides*. Natural England's Countdown 2010 Biodiversity Action Fund supports projects carried out by voluntary organisations which deliver the Biodiversity Action Plan targets in England.

Air quality is currently being reviewed and assessed by local authorities, including District Councils which cover Dartmoor. Sources of air pollution are being identified and assessed in relation to objectives set in the national Air Quality Strategy, including those for the protection of vegetation and ecosystems.

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Hart's tongue fern in the Bovey valley

EA Review of Consents: A report produced for the EA [*Ashmore, M R & Headley, A D (2004) Dartmoor cSAC: Consented Discharges and Air Quality Impacts on cSAC Qualifying Habitats*] concluded that the concentrations of sulphur dioxide, oxides of nitrogen and ammonia did not exceed the critical levels for any of the priority habitats within the Dartmoor SAC. Ozone concentrations did exceed the critical levels for blanket and raised bogs, wet and dry heaths. The modelled rates of acid and total nitrogen deposition exceed the estimated critical loads for all the priority habitats within the Dartmoor SAC. Measured levels of ammonia at Yarner Wood are relatively low but total nitrogen deposition is high, which supports the modelling data in the EA report.

Catchment Management Plans produced by the Environment Agency include actions to prevent water pollution and to explore the impact of air pollution on biodiversity.

Grants are available through the Dartmoor ESA and Environmental Stewardship, and DNPA, to plant new trees alongside existing lichen-rich trees, to encourage new colonies to form on the 'replacement' tree. In addition, under the England Woodland Grant Scheme, the FC can support the retention of important trees.

***Action for Wildlife*, the Dartmoor Biodiversity Project**, set up in 1998, focuses on practical work for key species and habitats including the String-of-Sausages and *Graphina pauciloculata* lichens.

Mosses, Lichens, Ferns and Fungi Key Conservation Objectives and Targets

Mosses, Lichens, Ferns and Fungi Objectives

Objective 1

Maintain and enhance populations of key Dartmoor mosses, lichens, ferns & fungi.

Dartmoor targets

- A Identify important locations for rare ferns, lichens, mosses & fungi, or good aggregations of these species, by 2005.*
- B Maintain populations of rare or endemic species at known locations, and distribution of characteristic species.
- C Prevent damage to these sites through adverse recreational or agricultural activities, particularly on tors and clitter slopes.
- D Ensure that woodland management on Dartmoor takes account of vulnerable moss, lichen, fungi and fern species.
- E Survey potentially good fungi sites by 2011 and identify as 'Important Fungi Areas' (IFAs).
- F Secure appropriate management on IFAs through agri-environment agreements by 2011.

Objective 2

Maintain and where possible improve air and water quality across Dartmoor.

Dartmoor targets

- A Ensure that the objectives for the protection of vegetation and ecosystems set out in the national Air Quality Strategy are achieved on Dartmoor by the end of 2001.*
- B Ensure that all Dartmoor rivers achieve the highest classification of water quality (River Ecosystem Class 1) by 2002.*

Objective 3

Identify isolated trees and groups of trees of particular importance for lichens and mosses and promote their longevity.

Dartmoor targets

- A Compile a database identifying important isolated trees and groups of trees ('hot spots') by 2005.*
- B Maximise longevity of these trees and secure replacements by 2016.

Objective 4

Increase awareness of the unique value of Dartmoor's moss, fern, fungi and lichen flora amongst land managers and the public.

Dartmoor targets

- A Publicise best practice management guidelines for enhancing habitats for lower plants.
- B Promote increased knowledge and enjoyment of lichens, mosses, fungi and ferns amongst land managers and the public.

* Target from original (2001) version of the BAP that has already been achieved and therefore not taken forward in the revised Action Plan.

Dartmoor moss, lichen, fern & fungi species of particular conservation importance with notes on their current Dartmoor status. Species included in the UK Biodiversity Action Plan are marked with an asterisk ⁕.

Lichens

⁕ *Bryoria smithii*

Critically endangered in Britain and classed as threatened on the preliminary European Red List for lichens. A dark-brown 'beard' lichen of upland areas, where it grows on the acidic bark of old oak trees and on acidic mossy boulders in sheltered but relatively well-lit situations. Probably now extinct in North Wales and Scotland. Recorded from Wistman's Wood and Black Tor Copse.

⁕ Orange-fruited elm-lichen *(Caloplaca luteoalba)*

Vulnerable in Britain and protected under Schedule 8 of the *Wildlife & Countryside Act*. It prefers trees (predominantly elm) in well-lit, dry situations. Found on an ash at Ponsworthy. Declining throughout Europe and eastern England because of loss of elms, other wayside trees, changes in land management, and air pollution. Dartmoor is not a typical location for this species and indeed the identification of the species at Ponsworthy has been disputed.

⁕ *Graphina pauciloculata*

Vulnerable in Britain and probably endemic to the British Isles. This lichen grows on the smooth bark of trees such as hazel, old holly and young oak, in ancient, damp, oceanic woodlands or willow carr. Now only found in Devon and Cornwall (two sites on Bodmin Moor). Recorded from the Walkham, Dart and Upper Plym valleys.

⁕ *Schismatomma graphidioides*

Vulnerable in Britain. A European endemic, considered to be rare and declining. The world populations are centred in eastern Scotland, with outliers in south-west England. Recorded at ten sites in eastern Scotland and south-west England, and in Europe. Previously recorded at Whiddon Deer Park SSSI, and found on 10 January 2007 just outside the DNP boundary near Dunsford .

String-of-sausages lichen *(Usnea articulata)*

A popular species which is declining nationally. A good indicator of clean air. Relatively common on Dartmoor in wooded valleys and on isolated moorland trees, especially hawthorn.

Golden Hair Lichen *(Teloschistes flavicans)*

Vulnerable in Britain and protected under Schedule 8 of the *Wildlife & Countryside Act*. This species requires clean air and a well-lit, breezy location. There has been a massive decline on Dartmoor since 1872 when it was recorded as 'growing on every tree on Dartmoor'. It has recently disappeared from its two known Dartmoor locations and is now probably extinct on Dartmoor.

Collema fragrans

Vulnerable in Britain. It grows on nutrient-enriched bark of parkland or wayside trees (especially elm), often in rain- or wound-tracks. Widely reported from southern England and Wales and with scattered localities extending northwards, this species has nevertheless declined by 20% in the last 10 years because of air pollution and loss of elms. Recently recorded at Whiddon Deer Park.

Pannaria sampaiana

Threatened within Europe but not a UK Red Data Book species because it is known from many localities in western Scotland. It now occurs at only one site in England, in the Dart valley, having vanished from its other Dart valley sites in 1990.

Pertusaria melanochlora
Endangered in Britain. Until recently, when new sites were discovered in Wales and Bodmin Moor, the shattered dolerite boulders at Cox Tor and White Tor were the only known British locations of this lichen.

Porocyphus kenmorensis
A rare aquatic lichen known from Dartmoor, Snowdonia, the Lake District and a few scattered sites in Scotland. A sizeable colony on the River Dart, growing across gently shelving bedrock, is considered to be the finest in Britain.

MOSSES AND LIVERWORTS

❇ **Multi-fruited river moss *(Cryphaea lamyana)***
Vulnerable in Britain and protected under Schedule 8 of the *Wildlife & Countryside Act*. Found in Devon, Cornwall, south-west Wales (its principal British stronghold), Europe and Africa. This moss was recorded recently on the River Bovey and has been recorded in the past on the Rivers Taw and Dart.

Antitrichia curtipendula
Once abundant in Wistman's Wood and Black Tor Copse. Extinct since 1980, possibly because of declining air quality.

Sphagnum imbricatum
This moss has been declining since the Middle Ages. In England there are now only a few scattered sites in the north, and three locations on the blanket bog of southern Dartmoor.

Fissidens serrulatus
A moss with a southerly distribution in Europe, this species is only found in four locations in Britain, two of them on Dartmoor.

❇ ***Cephalozulla nicholsonii***
This liverwort is a UK BAP priority species, and an example of a heavy metal spoil species. It has been recorded from two copper mines on Dartmoor.

CLUBMOSSES

❇ **Marsh clubmoss *(Lycopodiella inundata)***
Nationally scarce in Britain. Records exist for Fox Tor Mires (1979), Smallhanger Down (outside the National Park) and Cadover Bridge, either on tinners' or china-clay waste.

Fir clubmoss *(Huperzia selago)*
Scattered over upland Britain but now rare in the lowlands. On Dartmoor this species is found on tors, particularly on ledges with a northerly aspect and in a few well grazed mires.

Stag's horn clubmoss *(Lycopodium clavatum)*
Similarly rare in lowland Britain, but much commoner in upland northerly areas of Scotland and Wales. This is the best known Dartmoor clubmoss growing on moorland amongst heather and on old spoil heaps.

Quillwort *(Isoetes lacustris)*
A northern species, confined in England to the Lake District and a few sites on the south-western edge of Dartmoor where it is found in old settling ponds associated with clay workings.

Spring Quillwort *(Isoetes echinospora)*
Scattered across northern Britain with a few records in south-west England and the Isle of Purbeck, this species is abundant in Dartmoor reservoirs and also associated with old settling ponds.

FERNS

❇ **Killarney fern *(Trichomanes speciosum)***
Vulnerable in Britain and protected under Schedule 8 of the Wildlife & Countryside Act. Only the gametophyte stage has been found in small quantity at a number of sites across Dartmoor.

Tunbridge and Wilson's filmy ferns *(Hymenophllyum tunbrigense and H. wilsonii)*
Both of these tiny ferns have a restricted distribution in Europe and are sparsely scattered across western Britain (Tunbridge filmy fern is also found in Tunbridge Wells). On Dartmoor both species can be found on rocks in shady Dartmoor valley woods, particularly around the west and south of the moor or deep in crevices on tors. However, Tunbridge filmy fern is commoner in woodland whilst Wilson's filmy fern is commoner on tors.

Forked spleenwort *(Asplenium septentrionale)*
A scarce plant in Britain, where it is decreasing in natural situations, this fern has its only location in southern England on the eastern edge of Dartmoor where it has persisted since at least 1877.

Parsley fern *(Cryptogramma crispa)*
Although this arctic-alpine species is fairly common in the uplands of north west Britain, it is very rare in southern Britain, with only one record from Exmoor and one from Dartmoor (near Princetown).

Royal fern *(Osmunda regalis)*
A strikingly handsome large fern, not uncommon in south-west England and western Ireland but becoming increasingly rare elsewhere because of collection in the past and habitat destruction today. In sheltered Dartmoor valleys it can grow up to 2 metres tall and forms impressive stands in acidic bogs and along riverbanks particularly on the Dart.

FUNGI

Violet webcap *(Cortinarius violaceus)*
This violet or purple mushroom is found in deciduous woods, especially oak, birch and beech, but also occasionally with conifers, as it is at Bellever Forest. It is 'Near Threatened' i.e. found in 6-10 'hectads' (10km x 10km squares) in Great Britain since 1960. It is found in North America and Europe.

Straw club *(Clavaria straminea)*
This 'Near Threatened' mushroom was found in unimproved acidic grassland in a mosaic with scrub & deciduous woodland at Spitchwick Common in 1995.

Brown brain *(Tremella steidleri)*
This 'Near Threatened' mushroom was found at Spitchwick Common.

Red edge bonnet *(Mycena rubromarginata)*
Found at Bellever Forest.

SSSIs ON DARTMOOR IMPORTANT FOR THEIR LICHEN INTEREST

Black Tor Copse
SX590864
Black Tor Copse is nationally important based on the presence of a number of Rare lichens e.g. *Graphina pauciloculata* (RDB Vulnerable, Nationally Rare, British endemic), *Stenocybe bryophila* (extremely rare in south-west England), and Black Tor Copse being the only surviving extant site for *Bryoria smithii*. It also undoubtedly possesses the greatest populations of *Bryoria bicolor* in the British Isles (with in excess of 614 thalli present). Apart from *B. smithii*, all populations of rare species are considered to be viable. Black Tor Copse also possesses probably the best examples of the *Parmelietum laevigatae* community in south-west Britain.

Bovey Valley
SX766811
Older trees and the boulders especially those nearer to the two rivers are exceptionally rich in lichens including *Lobaria pulmonaria, L. amplissima, L. laetevirens, Catillaria pulverea, Nephroma parile, Lecanora piniperda & Thrombium epigaeum*.

Buckland in the Moor
SX720732
Notified for its lichen interest. Lobarion communities, *Nephroma laevigatum*. Over 65 species of lichen have been recorded.

Dendles Wood
SX615619
Supports a rich lichen and moss flora. *Parmelia laevigatum* community, *Usnea* species, *Graphina ruizania, Cetrelia cetrarioides*.

Grenofen Wood & West Down
SX488706
Supports a diverse lichen flora including *Parmelia horrescens, Cetrelia cetrarioides*. Other rare species *Dermatina quercus, Cladonia ochrochlora, Dimerella diluta, Byssaloma marginatum* and *Parmelinopsis minarum*.

Halstock Wood
SX607936
At least 79 species recorded especially the *Parmelia laevigata* community. *Graphinia ruiziana* present.

Hembury Woods
SX728687
Diverse lichen flora including *Phlyctis agelaea* & *Pannaria sampaiana*.

Holne Woodland
SX702711
Rich lichen flora Lobarion. Many species listed in the SSSI citation.

Piles Copse
SX646616
Trunks etc. support lichens of humid and rather exposed conditions e.g. *Parmelia laevigata* & *Ochrolechia inversa*.

Rushford Wood
SX703898
Over 130 lichens recorded both on trees & shrubs also on granite rocks. Among several rare species *Phlyctis agelaea, Buellia erubescens, Coniocybe furfuracea*. Old forest species *Catillaria atropurpurea*. Of particular note is *Leptogium palmatum* until recently thought extinct in Britain.

Sampford Spiney
SX544731
In the sheltered valleys the Lobarion community predominates, while higher up this grades into the *Parmelietum perlatae*, and finally to the *Parmelietum laevigatae* and western *Graphidion* communities which require a higher rainfall. Among the many rare lichen species present are *Heterodermia obscurata, Menegazzia terebrata, Lobaria scrobiculata, Pannaria mediterranea, Parmelia arnoldii, P. endochlora, Graphina pauciloculata* (the type locality of this endemic species on holly), *G.ruiziana* and *Cetrelia olivetorum*.

Shaugh Prior Woods
SX537638
Important for its ancient oak wood which supports a rich lichen & moss flora. Very rich lichen communities vary through the site according to the degree of exposure. Long list of species on the citation.

Whiddon Deer Park
SX725893
Pasture woodland with an exceptionally diverse lichen flora & rich invertebrates. List of species on the SSSI citation.

Wistman's Wood
SX613770
The epiphytic flora is luxuriant and lichens are well represented including *Alectoria smithii*. Wistman's Wood also possesses probably the best examples of the *Parmelietum laevigatae* community in south-west Britain.

Yarner Wood & Trendlebere Down
SX778788
The site supports a rich bryophyte flora & over 100 species of lichen have been recorded including *Lobaria pulmonaria* and a good population of *Parmelinopsis horrescens*.

Actions for Mosses, Lichens, Ferns and Fungi on Dartmoor

Monitoring responsibility: Natural England

Action	Meets Objective/ Target	Deliverer		Complete by					Date achieved
		Lead	Partners	2007	2008	2011	2016	On-going	
Policy and Legislation									
Ensure that local reviews and assessments of air quality and any subsequent air quality action plans make reference to lower plant conservation and use critical levels of air pollutants on vegetation as a basis for setting goals	1B, 2A	LAs	DNPA, NE					●	
Ensure that planning policies are in place to achieve air quality objectives set out in the national Air Quality Strategy	1B, 2A	DNPA	EA, NE	●					
Ensure that, where known, air and water quality requirements for key species are taken account of in regulatory activities and Catchment Management Plans	1B, 2B	EA, NE	DNPA						
Seek to ensure that agri-environment and woodland grant schemes support favourable management for sites hosting key species	1B, 1C, 1D, 1F	Defra, FC	DNPA, NE			●			
Site Safeguard									
Safeguard key lower plant sites against direct threats through planning controls, forestry and other consultations	1, 3	DNPA, FC	NE					●	

(cont.)

Actions for Mosses, Lichens and Ferns on Dartmoor (cont.)

Action	Meets Objective/ Target	Deliverer		Complete by					Date achieved
		Lead	Partners	2007	2008	2011	2016	On-going	
Habitat Management									
Secure favourable management for all sites where rare or endemic species occur	1B, 1F, 3B	DNPA, NE	FC, Defra			●			
Define action required to ensure longevity and replacement of important, isolated host trees	3B	DNPA	NE, FC			●			
Assess condition of these trees every two years and take action to prevent shading of rare species by ivy or other vegetation	3B	DNPA, NE	BBS, BLS					●	
Use Tree Preservation Orders to protect important host trees where they are threatened	3B	DNPA, FC						●	
Undertake emergency translocations of rare species when host trees are blown down, record methods and evaluate success	3B	DNPA, NE	BBS, BLS					●	
Manage public access where damage to key species is a threat	1C	DNPA, NE						●	
Advisory									
Ensure land owners, land managers and statutory agencies are aware of the location and importance of key species and appropriate methods of habitat management for their conservation	4	DNPA, NE	Defra, FC					●	
Research & Monitoring									
Identify past and present locations of key species, including indicators of air quality and compile a database	1A, 3A	DNPA	NE, BLS, BBS	●					
Monitor sample populations of key species and air quality indicators every five years to assess changes in population size and habitat quality including air and water quality	1B, 2A	NE	DNPA, BLS, BBS, LAs	●		●	●		

(cont.)

Actions for Mosses, Lichens and Ferns on Dartmoor (cont.)

Action	Meets Objective/ Target	Deliverer		Complete by					Date achieved
		Lead	Partners	2007	2008	2011	2016	On-going	
Research & Monitoring									
Identify 'hot spots' with aggregations of important host trees. Tag trees where appropriate	3A	DNPA	NE, BBS, BLS		●				
Assess the success of experiments to translocate large-lobed lichens	1B	NE						●	
Include any necessary actions to protect *Cryphaea lamyana* in annual review of Catchment Management Plans	1B,1C	EA						●	
Survey potentially good fungi sites and identify as 'Important Fungi Areas' (IFAs)	1E	NE	DNPA, DFG			●			
Communication and Publicity									
Increase awareness amongst the general public of the importance of Dartmoor for lichens, mosses, ferns & fungi through publications and guided walks	4B	DNPA, NE	BBS, BLS					●	
Encourage naturalists to pass records to DNPA to improve databases	1A	DNPA	NE					●	
Run field workshops on lower plant identification for specialists	4B	BLS, BBS, DA, DFG	DNPA, NE					●	

Abbreviations used in this table:

BBS - British Bryological Society, BLS - British Lichen Society, DaCC - Dartmoor Commoners' Council, DFG – Devon Fungus Group, DNPA - Dartmoor National Park Authority, DoC - Duchy of Cornwall, EA - Environment Agency, FC - Forestry Commission, LAs - Local Authorities, Defra - Department for Environment, Food & Rural Affairs, NE - Natural England