

HEALEY DELL NATURE RESERVE: BRYOPHYTE SURVEY			
M.E. NEWTON			
DATES OF SURVEY 25 th , 29 th , 30 th , November; 2 nd , 3 rd , 6 th , December, 2004.			
PROCEDURE All parts of the reserve, at SD/8814, SD/8715, SD/8815, SD/8716, SD/8816 (Fig.1), were visited, and a complete list of species was recorded. The locations of notable species are indicated in Fig. 1. In the table which follows, nomenclature is that of Blockeel & Long (1998), except for the treatment of <i>Barbula sardoa</i>, which follows the recent treatment by Frahm & Ahmed (2004). Reference is also made to the treatment of <i>Schistidium</i> by Blom (1998). Vascular plant nomenclature is that of Stace (1991). In presenting the data, an estimate of the frequency of each species within the reserve is made on the basis of rare (R = seen in 3 or fewer places), occasional (O = seen in more than 3 but fewer than 10 places), and frequent (F = seen in 10 or more places). In addition, attention is drawn to species of special conservational importance, reference having been made to Church <i>et al.</i> (2001), Hodgetts (1992, 1999), and Guidelines for Site Selection of Biological Heritage Sites in Lancashire (1998). The habitat notes for each species include distributional comparisons with Britain as a whole, as known from published records (Hill <i>et al.</i>, 1991, 1992, 1994).			
Species	Status	Habitat	Conservational importance
<u>Mosses</u>			
<i>Amblystegium serpens</i>	F	(Sections 2, 4, 5, 6, 9, 10, 11, 15, 17, 18, 20, 21, 23, 24, 25, 26, 27.) A common British species of a wide range of water-retentive substrates.	
<i>Atrichum undulatum</i>	F	(Sections 1, 2, 3b, 4, 5, 7, 8, 9, 12, 13, 14, 15, 16, 18, 20, 21, 23, 24, 25, 26, 27.) Widespread and common on water-retentive, usually clay, soils throughout Britain.	
<i>Aulacomnium androgynum</i>	R	(Section 5.) This is a moss showing a tendency towards an eastern bias in its British distribution. It is, however, widespread in Lancashire, and is considered to be increasing in frequency in Britain as a whole, both as an epiphyte and on fallen timber.	

<i>Barbula convoluta</i>	O	(Sections 1, 5.) It is a common colonist of disturbed, somewhat base-rich ground, but is not a strict calcicole.	
<i>Barbula sardoa</i>	R	(Section 17.) This species, formerly known as <i>B. convoluta</i> var. <i>commutata</i> , has been inadequately recorded in Britain as a whole, but is probably common. It is a colonist of sheltered, base-rich substrates, and was found here on a shaded embankment wall.	Data deficient
<i>Barbula unguiculata</i>	R	(Section 10.) Occupying similar habitat to <i>B. convoluta</i> , the two are frequent associates.	
<i>Brachythecium albicans</i>	R	(Section 11.) A moss that is indicative of acidic, base-poor, substrates, generally in freely draining sites in which leaching occurs. It grows on the bank of the lake in this section.	
<i>Brachythecium plumosum</i>	F	(Sections 8, 10, 15, 17, 26.) This is chiefly a species of rivers and streams, where it grows on boulders and, less commonly, exposed tree roots.	
<i>Brachythecium populeum</i>	O	(Sections 21, 25, 26.) This is widespread throughout most of lowland Britain, growing both epiphytically and on stone.	
<i>Brachythecium rivulare</i>	F	(Sections 1, 3a, 4, 7, 8, 11, 12, 13, 15, 16, 17, 18, 23, 25, 26, 27.) A plant of wet, minerotrophic situations. It is frequent throughout lowland Britain, in and by streams, rivers and flushes.	
<i>Brachythecium rutabulum</i>	F	(Sections 1, 2, 3b, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27.) One of the commonest British species on a wide range of substrates, it grows in grassland as well as in shade.	
<i>Brachythecium velutinum</i>	R	(Section 26.) A widespread and common species of lowland Britain, occurring on a wide range of substrates.	

<i>Bryoerythrophyllum recurvirostrum</i>	F	(Sections 5, 9, 10, 11, 15, 17, 18, 24, 25.) This widespread and common moss is a strict calcicole, usually growing in soil-filled crevices of limestone rocks or in mortared walls. It is also not uncommon on well-drained soils in the open.	
<i>Bryum argenteum</i>	O	(Sections 1, 10.) One of the commonest British mosses on compacted soils, often on footpaths, in urban as well as rural situations.	
<i>Bryum bicolor</i>	O	(Sections 1, 10.) An early colonist of newly exposed soils, including those of tracks and river banks.	
<i>Bryum capillare</i>	F	(Sections 2, 5, 11, 15, 17, 20, 21, 22, 24, 25.) A common moss of a wide range of habitats, occurring in the shade as well as in the open. It is frequent on walls and on the ground, but also grows as an epiphyte on a range of tree species in favourable situations.	
<i>Bryum</i> sp.		(Sections 9, 10, 12, 15, 25, 26.)	
<i>Calliergon cordifolium</i>	R	(Sections 10, 13.) A plant of swampy ground associated with accumulations of organic debris. It is frequent and widespread in Britain.	
<i>Calliergon stramineum</i>	O	(Sections 10, 11, 27.) Common in many parts of Britain, with the exception of central and eastern England, growing amongst taller vegetation in marshy areas and in wet grassland.	
<i>Calliergonella cuspidata</i>	F	(Sections 1, 2, 4, 5, 6, 9, 10, 12, 13, 17, 18, 21, 24, 25, 27.) Widespread and common throughout Britain, in wet minerotrophic habitat.	
<i>Campylopus flexuosus</i>	F	(Sections 14, 22, 26, 27.) A pronounced calcifuge of organic substrates, occurring on peat as well as rotten timber.	Sub-Atlantic

<i>Campylopus introflexus</i>	F	(Sections 1, 4, 6, 9, 10, 14, 25, 26.) This is a characteristic colonist of dry organic substrates. Despite its relatively recent introduction to Britain, it is now widespread and common.	
<i>Campylopus pyriformis</i>	F	(Sections 3a, 3b.) Typical of exposed peat and peaty soil, and frequent throughout much of Britain.	
<i>Ceratodon purpureus</i>	F	(Sections 1, 3a, 3b, 9, 10, 11, 22, 24, 26, 27.) A calcifuge that is a frequent and often abundant colonist of waste ground, although it is also commonly found on living trees as well as on fallen timber. It occurs, too, in heath and acid grassland.	
<i>Cratoneuron filicinum</i>	F	(Sections 1, 7, 9, 10, 11, 17, 18, 24, 26, 27.) A mild calcicole, frequently found at the edges of metalled tracks, but also occurring in calcareous flushes and streams, and on wet rocks.	
<i>Cryphaea heteromalla</i>	R	(Section 10.) An epiphytic colonist of the bark of many tree-species, it shows a tendency to be commoner towards the south and west of Britain. It occurs at Healey Dell on <i>Acer pseudoplatanus</i> .	BHS (Br4)
<i>Ctenidium molluscum</i>	R	(Section 5.) A good indicator of calcareous conditions, and frequent throughout the altitudinal range in Britain.	
<i>Dichodontium pellucidum</i>	F	(Sections 1, 5, 6, 7, 9, 15, 18, 21, 26, 27.) Frequent, particularly in the west and north of Britain, where it is a characteristic species of gravel and sand beside watercourses in the hills.	
<i>Dicranella heteromalla</i>	F	(Sections 1, 3a, 3b, 4, 7, 8, 10, 15, 17, 21, 22, 23, 25, 26, 27.) A common feature of acid woodland throughout Britain and, less frequently, of exposed soils in the open.	
<i>Dicranella rufescens</i>	R	(Section 26.) This is an early	

		colonist of exposed wet soils.	
<i>Dicranella schreberiana</i>	R	(Section 26.) This is an early colonist of exposed wet soils and, particularly, clay.	
<i>Dicranella varia</i>	O	(Sections 1, 27.) This is an early colonist of exposed, somewhat basic, wet soil.	
<i>Dicranoweisia cirrata</i>	F	(Sections 1, 3b, 5, 6, 9, 10, 13, 14, 20, 21, 22, 23, 25, 26, 27.) Although it does occur on acidic rocks and dry-stone walls, this species is also known as the most widespread epiphytic moss in Britain in view of its apparent tolerance of atmospheric pollution.	
<i>Dicranum scoparium</i>	F	(Sections 5, 6, 10, 11, 12, 13, 14, 22, 23, 25, 26.) Common throughout Britain in a vast range of habitat, but occurring chiefly as an epiphyte and on fallen timber in this site.	
<i>Dicranum tauricum</i>	R	(Section 13.) A colonist of fallen timber as well as the bark of living trees, it is evidently able to tolerate considerable acidification. It was seen on <i>Salix</i> sp. in this site.	
<i>Didymodon insulanus</i>	F	(Sections 4, 5, 9, 11, 15, 17, 18, 21, 23, 24, 25, 26.) A species of damp, and often shaded, situations on base-rich substrates. It is typically found on damp rocks, masonry and stones.	
<i>Didymodon luridus</i>	R	(Section 10.) A characteristic calcicole of hard, stony substrates.	
<i>Didymodon rigidulus</i>	F	(Sections 5, 10, 11, 15, 17, 21, 24.) Frequent, on man-made as well as natural calcareous substrates.	
<i>Didymodon tophaceus</i>	O	(Sections 5, 18.) Widespread and common throughout lowland Britain. It is a pronounced calcicole of wet ground and irrigated limestone, and is often associated with tufa formation.	
<i>Didymodon vinealis</i>	F	(Sections 9, 10, 11, 17, 18, 23, 26, 27.) Typically found in	

		rather exposed situations on base-rich rocks, masonry and soil.	
<i>Eurhynchium hians</i>	F	(Sections 5, 11, 13, 15, 18, 25, 27.) A widespread and common species of rather basic soil, including that which is calcareous in limestone woodland, grassland, and quarries, etc..	
<i>Eurhynchium praelongum</i>	F	(Sections 1, 2, 3a, 3b, 4, 5, 6, 7, 8, 9, 11, 12, 13, 14, 15, 16, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27.) This is an extremely common plant of a wide variety of woodland and grassland situations, where it is usually a plant of soil and boulders, but it also ascends for some distance up tree trunks.	
<i>Eurhynchium striatum</i>	F	(Sections 5, 20, 23, 24, 25.) A widespread and frequent species throughout Britain, it reaches its greatest abundance in limestone and chalk woodland.	
<i>Fissidens adianthoides</i>	F	(Sections 5, 18.) This is chiefly a plant of wet rock-crevices, but it also grows in streams, flushes and, occasionally, as an epiphyte.	
<i>Fissidens bryoides</i>	F	(Sections 1, 2, 4, 7, 9, 11, 13, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27.) This is a common plant of clay or soil banks in woodland.	
<i>Fissidens curnovii</i>	R	(Section 15.) With a distinctly western distribution in Britain, this is characteristically a plant of wet rocks and clay banks beside streams and upland rivers.	
<i>Fissidens pusillus</i>	R	(Section 11.) Typically a plant of wet rock, and not infrequently under water in fast-flowing rivers and streams. It has only recently been added to the known flora of South Lancashire.	
<i>Fissidens taxifolius</i>	F	(Sections 12, 13, 15, 18, 21, 22, 23, 24, 25, 27.) Common,	

		on clay.	
<i>Fontinalis antipyretica</i>	R	(Section 8.) An aquatic species occurring in mesotrophic and eutrophic rivers, streams and ditches, as well as lakes, but one that is surprisingly rare at Healey Dell L.N.R..	
<i>Grimmia pulvinata</i>	O	(Sections 5, 10, 11, 20, 27.) This is a calcicole of limestone rocks and mortared walls.	
<i>Heterocladium heteropterum</i> var. <i>heteropterum</i>	F	(Sections 8, 15, 26.) A characteristic species of damp boulders and cliffs of many types of rock, but commonly sandstones and gritstones.	Sub-Atlantic
<i>Homalothecium sericeum</i>	O	(Sections 24, 25.) The species is one of solid substrata, including trees, as well as rocks and walls.	
<i>Hygrohypnum luridum</i>	O	(Sections 15, 18.) The presence of this species on rocks and tree roots in and by streams and rivers is indicative of somewhat basic or calcareous influence.	
<i>Hygrohypnum ochraceum</i>	F	(Sections 7, 10, 11, 15.) This is an aquatic calcifuge of streams and rivers, attached to rock and submerged tree roots.	
<i>Hylocomium splendens</i>	R	(Section 13.) With calcifuge tendencies, this is widespread throughout much of Britain in heath as well as acid grassland and woodland. In Healey Dell L.N.R., it is extremely rare, having been seen only as an epiphyte on <i>Salix</i> sp..	
<i>Hylocomium armoricum</i>	O	(Sections 15, 26.) Usually a plant of the riparian zones of upland rivers and streams, but it also occurs on the ground in wet woodland. In this reserve, it occurs close to the River Spodden.	Sub-Atlantic
<i>Hypnum andoi</i>	F	(Sections 2, 4, 5, 6, 12, 13, 14, 21, 22, 23, 24, 25, 26, 27.) An epiphyte, as well as a moss of damp rock outcrops,	

<i>Hypnum cupressiforme</i>	F	(Sections 1, 2, 3a, 3b, 5, 7, 9, 10, 11, 13, 14, 15, 16, 18, 19, 21, 22, 23, 25, 26, 27.) Common, in grassland and woodland.	
<i>Hypnum jutlandicum</i>	F	(Sections 3b, 4, 10, 11, 13, 14, 16, 22, 23, 26, 27.) A frequent and widespread calcifuge of heath and woodland habitats.	
<i>Hypnum lacunosum</i> var. <i>lacunosum</i>	O	(Sections 5, 13, 26.) A colonist of freely draining nutrient-poor soils and sand, as well as of rock exposures and fallen timber.	
<i>Hypnum lacunosum</i> var. <i>tectorum</i>	R	(Section 5.) A colonist of freely draining nutrient-poor soils and sand.	
<i>Hypnum resupinatum</i>	F	(Sections 11, 13, 15, 26, 27.) A moss of walls and trees.	Sub-Atlantic
<i>Leptodictyum riparium</i>	O	(Sections 10, 11.) Typically a plant of wet wood and stone in or by somewhat eutrophic water.	
<i>Mnium hornum</i>	F	(Sections 2, 3b, 4, 5, 6, 7, 8, 9, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 25, 26, 27.) A calcifuge of organic substrates, usually in woodland.	
<i>Orthodontium lineare</i>	F	(Sections 5, 12, 13, 14, 22.) An introduced species, which now occurs throughout Britain. It is a plant of tree boles and dead timber, as well as sandstone rock.	
<i>Orthotrichum affine</i>	F	(Sections 1, 2, 4, 5, 6, 7, 9, 11, 20, 21, 22, 24, 25, 26, 27.) An epiphytic species that is sensitive to atmospheric pollution.	
<i>Orthotrichum anomalum</i>	O	(Sections 10, 11.) A calcicole of limestone as well as concrete.	
<i>Orthotrichum diaphanum</i>	F	(Sections 4, 7, 9, 10, 16, 21, 22, 25, 26, 27.) This is the commonest British member of the genus, growing epiphytically and on a wide range of man-made substrates.	
<i>Orthotrichum lyellii</i>	R	(Section 27.) An epiphyte that is highly susceptible to the harmful effects of atmospheric	BHS (Br4)

		pollution and which is, therefore, absent or uncommon in industrial areas.	
<i>Orthotrichum pulchellum</i>	O	(Sections 21, 25, 27.) An epiphytic species, which is now returning to many urban areas in which it became extinct as a consequence of atmospheric pollution.	Sub-Atlantic
<i>Palustriella commutata</i> var. <i>commutata</i>	R	(Section 5.) This is a pronounced calcicole, particularly of wet limestone and of calcareous flushes, but also of wet calcareous shales. It is often involved in tufa formation.	
<i>Philonotis fontana</i>	R	(Section 27.) Characteristic of minerotrophic springs and flushes, including those that are calcareous.	
<i>Plagiomnium rostratum</i>	F	(Sections 5, 10, 15, 18, 25, 26, 27.) Widespread and common throughout Britain, growing on basic, and often calcareous, soils and boulders in woodland, as well as in grassland and on wet ground by rivers and streams.	
<i>Plagiomnium undulatum</i>	F	(Sections 5, 10, 12, 13, 15, 21, 27.) A common species of mesotrophic habitats, attaining its greatest size and abundance in shaded situations. It is often associated with nettles.	
<i>Plagiothecium denticulatum</i>	O	(Sections 1, 17.) A calcifuge of damp soil, rotten timber and rock in shaded situations.	
<i>Plagiothecium succulentum</i>	F	(Sections 2, 7, 8, 9, 11, 17, 18, 21, 22, 25, 26.) A calcifuge of damp soil, rotten timber and rock in shaded situations.	
<i>Plagiothecium undulatum</i>	F	(Sections 1, 3b, 4, 7, 10, 12, 13, 14, 22, 23, 25, 26, 27.) A pronounced calcifuge, which tolerates dense shade, but also occurs in open heathland and acid upland grassland.	
<i>Pogonatum aloides</i>	F	(Sections 11, 15, 23, 26, 27.) This is adapted to growth on unstable banks liable to erosion. It is common on acid soils by upland streams, as	

		well as in woodland.	
<i>Pohlia annotina</i>	R	(Section 26.) An early colonist of exposed soils, often beside streams and ditches, but also on tracks and spoil heaps.	
<i>Pohlia melanodon</i>	O	(Section 26.) A widespread and common species of water-retentive soils and clay banks, as well as tracks and river banks throughout lowland Britain.	
<i>Pohlia nutans</i>	O	(Sections 3a, 3b.) Characteristic of organic substrates, including dry peat, rotten timber and organic soils, and common throughout Britain.	
<i>Pohlia</i> sp.		(Section 11.)	
<i>Pohlia wahlenbergii</i>	F	(Sections 5, 10, 25, 26, 27.) Generally a plant of nutrient-poor springs and wet rock outcrops, as well as wet shale or clay banks.	
<i>Polytrichum commune</i>	F	(Sections 1, 2, 4, 5, 8, 10, 11, 13, 14, 21, 26, 27.) A calcifuge of wet peat and acid soils in open situations as well as in woodland.	
<i>Polytrichum formosum</i>	F	(Sections 1, 4, 6, 10, 14, 18, 20, 21, 23, 24, 25, 26, 27.) Chiefly a plant of rather drier ground than that favoured by <i>P. commune</i> , but showing considerable overlap with that species.	
<i>Polytrichum juniperinum</i>	R	(Section 9.) A calcifuge of thin, nutrient-poor soils and, to a lesser extent, of dry peat and dead timber.	
<i>Polytrichum longisetum</i>	R	(Section 26.) A typical colonist of disturbed peat and peaty soil, logs, and gravelly soil.	BHS (Br4)
<i>Polytrichum piliferum</i>	R	(Section 3b.) Characteristic of similar habitat to that of <i>P. juniperinum</i> , and a frequent associate.	
<i>Pseudotaxiphyllum elegans</i>	F	(Sections 3a, 3b, 4, 5, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 23, 25, 26, 27.) Common, as a pronounced calcifuge on the ground in	

		woodland as well as in the open.	
<i>Racomitrium aciculare</i>	F	(Sections 10, 15, 17, 18, 24, 26.) A calcifuge of boulders and, less commonly, exposed tree roots in the riparian zones of rivers and streams. Within the L.N.R., it is rather uncommon in the River Spodden itself.	
<i>Racomitrium lanuginosum</i>	R	(Section 24.) A calcifuge of exposed rocks, scree and walls in the open.	
<i>Rhizomnium punctatum</i>	F	(Sections 2, 5, 7, 9, 10, 11, 13, 15, 16, 17, 18, 20, 21, 25, 26, 27.) Chiefly a colonist of damp or wet stones and boulders by streams and in wet woodland, but also found in flushes in the open.	
<i>Rhynchostegium confertum</i>	F	(Sections 1, 2, 3a, 4, 5, 8, 9, 10, 13, 15, 21, 22, 24, 25, 26, 27.) Common throughout lowland Britain, on a wide variety of substrates, both in the shade and in the open.	
<i>Rhynchostegium murale</i>	F	(Sections 5, 10, 11, 15, 17, 18, 24, 25.) Characteristically a moss of limestone rock, mortared walls and concrete.	
<i>Rhynchostegium riparioides</i>	F	(Sections 3a, 4, 5, 6, 7, 8, 10, 12, 15, 16, 18, 21, 25, 26.) An aquatic species, subject to more or less permanent inundation, and generally of fast-flowing streams and rivers.	
<i>Rhytidiadelphus loreus</i>	O	(Sections 8, 9, 13, 23, 26.) A characteristic calcifuge of acid woodland, upland grassland and heath, but one that is considered to be susceptible to the harmful effects of atmospheric pollution.	
<i>Rhytidiadelphus squarrosus</i>	F	(Sections 1, 2, 3b, 5, 9, 10, 11, 12, 13, 14, 18, 22, 23, 27.) Widespread and common throughout Britain, occurring in grassland as well as in woodland.	
<i>Schistidium apocarpum</i> (s.s.)	O	(Sections 5, 26.) <i>S. apocarpum</i> (sensu lato) has	

		undergone recent taxonomic revision. The revised species (<i>sensu stricto</i>) occurs within the reserve on artefacts in section 5, and on a riparian boulder in section 26.	
<i>Schistidium crassipilum</i>	F	(Sections 10, 11, 25, 27.) This calcicole is part of the taxonomic revision that has affected our knowledge of the distribution of <i>S. apocarpum</i> .	Data deficient
<i>Schistidium rivulare</i>	R	(Section 10.) A colonist of riparian rocks and tree roots, where it is subject to frequent inundation. It is generally indicative of rather basic situations, either as a consequence of rock type or of water quality.	
<i>Sphagnum denticulatum</i>	R	(Sections 13, 27.) It occurs in a range of minerotrophic situations, directly on wet acid rock ledges or in flushes.	
<i>Sphagnum fallax</i>	R	(Sections 12, 27.) Characteristic of valley mires, the edges of nutrient-poor pools, <i>Juncus effusus</i> flushes, etc..	
<i>Sphagnum fimbriatum</i>	F	(Sections 1, 4, 10, 14, 26, 27.) Generally indicative of the influence of minerotrophic groundwater, it occurs amongst <i>Molinia caerulea</i> , on wet shale cliffs, in wet woodland, and in ditches, etc..	
<i>Sphagnum inundatum</i>	R	(Section 13.) Characteristic of a narrower range of habitat than <i>S. denticulatum</i> , with which it is sometimes associated.	
<i>Sphagnum palustre</i>	O	(Sections 12, 27.) A common and widespread species of minerotrophic situations, in wet woodland as well as in the open.	
<i>Sphagnum squarrosum</i>	O	(Sections 13, 26.) Common, but usually in fairly small quantity, in <i>Juncus</i> flushes, in ditches and in wet woodland.	
<i>Syntrichia ruralis</i>	R	(Section 10.) A frequent calcicole of limestone and man-made calcium-rich	

		substrates, chiefly in lowland Britain.	
<i>Tetraphis pellucida</i>	F	(Sections 4, 5, 12, 13, 22, 26.) Frequent on rotten timber and, in humid sites, also on living tree bark.	
<i>Tetrodontium brownianum</i>	R	(Sections, 8, 15.) Scattered throughout northern and western parts of Britain, where it grows in deep shade on siliceous rocks in humid situations, usually on the undersides of overhanging rock.	Sub-Atlantic
<i>Thamnobryum alopecurum</i>	O	(Sections 15, 18, 25, 27.) A common British moss of wet woodland and of river banks.	
<i>Thuidium tamariscinum</i>	R	(Sections 13, 14.) A plant of many woodland and grassland communities, growing on soil, boulders and fallen timber.	
<i>Tortula muralis</i>	F	(Sections, 5, 9, 10, 11, 15, 17, 18, 20, 21, 22, 24.) A common calcicole of limestone and mortared walls.	
<i>Tortula truncata</i>	R	(Section 9.) A common ephemeral of fertile mineral substrates, occurring in shade as well as in the open.	
<i>Ulota bruchii</i>	F	(Sections 1, 2, 6, 9, 10, 11, 13, 14, 16, 18, 21, 22, 24, 25, 26, 27.) An epiphytic species, generally on the smaller and/or upper branches of various tree species, this is highly sensitive to atmospheric pollution.	
<i>Ulota crispa</i>	F	(Sections 4, 5, 6, 7, 11, 12, 13, 21, 22, 25, 27.) Occupying the same ecological niche as <i>U. bruchii</i> .	
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<u>Liverworts</u>			
<i>Barbilophozia atlantica</i>	R	(Sections 3a, 5.) A liverwort of acid rocks and soil-filled crevices in the N.W. of Britain. In Healey Dell L.N.R., it occurs on peaty soil and on rotten timber.	Nationally scarce
<i>Blasia pusilla</i>	R	(Sections 1, 26, 27.) Scattered throughout Britain, but common only in Scotland. It is a colonist of wet clay beside	BHS (Br4)

		tracks and rivers, but also occurs on dripping shale banks.	
<i>Calypogeia arguta</i>	F	(Sections 8, 14, 15, 23, 26, 27.) A calcifuge of sandy or clay soils, generally in sheltered positions, and commonly also at the foot of sandstone cliffs.	Sub-Atlantic
<i>Calypogeia fissa</i>	R	(Section 23.) A common species of a vast range of habitat, including mires, woodland banks, grassland, etc..	
<i>Calypogeia muelleriana</i>	F	(Sections 3a, 3b, 7, 14, 17, 26.) In many of the habitats favoured by <i>C. fissa</i> .	
<i>Cephalozia bicuspidata</i>	F	(Sections 2, 3a, 3b, 7, 8, 14, 15, 17, 18, 23, 25, 26, 27.) A common species of rotten timber, damp sandstone and humus-rich soils.	
<i>Cephaloziella divaricata/stellulifera</i>	O	(Section 3a.) These two species are indistinguishable in the absence of fertile shoots. Both are plants of damp, acid soils, but the former is scattered throughout Britain and is common, whereas the latter is more restricted geographically.	
<i>Cephaloziella rubella</i>	O	(Section 3a.) A colonist of acid soils and, less commonly, of organic substrates. It is widely scattered throughout Britain.	
<i>Chiloscyphus polyanthos</i>	F	(Sections 1, 8, 10, 11, 12, 15, 16, 17, 18, 20, 21, 25, 26, 27.) Common, as an aquatic species on stones which are subject to periodic or permanent inundation.	
<i>Colura calyptrifolia</i>	R	(Sections 5, 13, 16.) This is one of the most infrequent oceanic species in Britain. Being dependent on sustained high humidity, its chief concentrations are in the extreme west of Scotland and Ireland, as well as in Wales and the Lake District. In Britain as a whole, it is found on rock surfaces as well as epiphytically, but in Healey	Nationally scarce

		Dell L.N.R. it was seen only as an epiphyte. Detailed records of position and dimensions were made in order to facilitate future identification of the precise trees on which the species grows, as well as the position of <i>C. calyptrifolia</i> on those trees.	
<i>Conocephalum conicum</i>	O	(Sections 3a, 3b, 7, 11, 15, 18, 26.) Common, on wet soil, tree roots and boulders beside streams and rivers.	
<i>Diplophyllum albicans</i>	F	(Sections 1, 7, 8, 14, 15, 18, 23, 24, 25, 26.) A common calcifuge of acid soils and rock outcrops.	
<i>Frullania dilatata</i>	O	(Sections 9, 20, 25.) An epiphytic liverwort on a range of tree species but, until recently, known in south Lancashire only from historic records, as a consequence of atmospheric pollution.	
<i>Gymnocola inflata</i>	F	(Sections 3a, 3b, 15, 23, 26.) A calcifuge, commonly found on acid soils, both on the ground and in soil- or humus-filled crevices.	
<i>Jungermannia sphaerocarpa</i>	R	(Section 26.) Generally restricted to the north and west of Britain, where it occurs on rocks and among gravel beside streams and rivers.	
<i>Lepidozia reptans</i>	F	(Sections 13, 14, 17, 23, 26.) A pronounced calcifuge, occurring on organic substrates, including humus, rotten timber and, where humidity is high, also on living trees.	
<i>Lophocolea bidentata</i>	F	(Sections 1, 2, 3b, 4, 5, 7, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27.) Common and widespread on rotten timber, in marshy ground, wet grassland and on damp stone and brick.	
<i>Lophocolea heterophylla</i>	F	(Sections 2, 4, 5, 6, 7, 9, 11, 12, 13, 14, 15, 16, 19, 20, 21, 22, 24, 25, 26, 27.) A common epiphytic liverwort	

		that has shown itself to be tolerant of high levels of atmospheric pollution.	
<i>Lunularia cruciata</i>	F	(Sections 1, 2, 3a, 3b, 4, 5, 6, 7, 8, 9, 11, 15, 17, 18, 25, 26, 27.) Frequent on fertile soils, often beside rivers and streams, particularly in the vicinity of human habitation.	
<i>Metzgeria fruticulosa</i>	R	(Section 26.) A species that has been under-recorded as a consequence of confusion with <i>M. temperata</i> . It is epiphytic and known to be widely distributed throughout most of Britain.	BHS (Br4)
<i>Metzgeria furcata</i>	O	(Sections 5, 6, 13, 15, 16, 21, 25, 26, 27.) An epiphytic liverwort that is less frequent in urban areas than in rural areas as a consequence of the effects of atmospheric pollution. It also occurs on rock faces .	
<i>Metzgeria temperata</i>	F	(Sections 1, 2, 5, 6, 21, 25, 26.) Chiefly epiphytic, with hygrophilous tendencies and a western distribution in Britain.	Sub-Atlantic
<i>Nardia geoscyphus</i>	R	(Section 3b.) Characteristic of damp, often peaty soils, and of soil-filled rock crevices, the western side of the southern Pennines represents one of its concentrations of known localities in Britain. There are, however, no previously published records for it in the grid-square SD/81.	Nationally scarce
<i>Nardia scalaris</i>	R	(Section 3b.) Common, as a colonist of damp clay and compacted soil.	
<i>Nowellia curvifolia</i>	R	(Section 26.) A specialist of wet, rotten timber.	Western British
<i>Pellia endiviifolia</i>	F	(Sections 4, 5, 6, 7, 9, 10, 12, 13, 15, 16, 18, 21, 24, 25, 26, 27.) A calcicole of damp soil and wet rocks.	
<i>Pellia epiphylla</i>	F	(Sections 1, 2, 3b, 4, 5, 7, 8, 9, 10, 11, 14, 15, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, 27.) A calcicole of damp soil.	
<i>Pellia neesiana</i>	R	(Section 4.) A basiphilous	

		species, but not a calcicole, of wet ground, often among <i>Juncus effusus</i> .	
<i>Ptilidium pulcherrimum</i>	R	(Section 5.) Scattered throughout Britain, as an epiphyte, and possibly increasing in frequency. It grows on one trunk of a six-trunked <i>Acer pseudoplatanus</i> within the reserve.	
<i>Scapania nemorea</i>	R	(Section 3a.) A widespread and common British species of rotten timber, damp boulders and humus-covered rock exposures in sites of high humidity.	
<i>Scapania undulata</i>	F	(Sections 7, 8, 10, 11, 15, 16, 18, 26.) A common aquatic species of streams, rivers and flushes.	

LOCATION OF *COLURA CALYPTRIFOLIA*

Section 5. The species is located as follows, from a point on the disused railway track at about SD/87958-16527:

Fig. 2 - compass bearing of 200° from form, north of entrance from Station Road car-park, to show entrance at left of centre.

Fig. 3 - compass bearing of 229° from triple-trunked willow, seen at right of Fig. 2, to show two willow trees at water's edge on far side of pond. *C. calyptrifolia* occurs on both willow trees.

Fig. 4 - closer view on compass bearing of 238°, to show two trees at water's edge. On the forked trunk to the north (*i.e.* right as seen in the photograph), the aspect of *C. calyptrifolia* is 223°. On the straight trunk at the water's edge, the aspect of *C. calyptrifolia* varies between 300° and, as seen left to right on the trunk, 212°.

Section 13. The species is located as follows, from a point on the disused railway track between the northern end of the viaduct and the bridge carrying Station Road over the track:

Fig. 5 - compass bearing of 347°, along disused railway track, with bridge carrying Station Road in the distance.

Fig. 6 - same bearing from first alder tree by track, as seen in Fig. 5, to show first tall, straight willow on raised bank at right, with form beyond.

Fig. 7 - compass bearing of 15° to show closer view of willow identified in Fig. 6.

Fig. 8 - compass bearing of 79° from willow in previous photograph to willow leaning to right, at centre.

Fig. 9 - compass bearing of 93° to closer view of site across path. *C. calyptrifolia* occurs as five small patches scattered over an area of *c.* 21 x 15.5cm at a height of *c.* 1m above the ground. Its aspect is *c.* 214°. Associates are *Hypnum cupressiforme*, *Lophocolea bidentata* and lichens.

Section 16. The species is located as follows, at about SD/88247-16041:

Fig. 10 - compass bearing of 191° to forked tree, *Salix alba*, at centre.

Fig. 11 - closer view of same tree on compass bearing of 203°.

Fig. 12 - close view of site of *C. calyptrifolia* on tree in previous photographs, as seen on compass bearing of 219°.

Fig. 13 - closer view of site of *C. calyptrifolia* outlined by yellow-headed pins on left trunk of tree, as seen on compass bearing of 221°.

Fig. 14 - close view of lower end of marked site of *C. calyptrifolia* on trunk seen in Fig. 13.

Fig. 15 - overlapping view of marked site of *C. calyptrifolia* immediately above Fig. 14.

Fig. 16 - overlapping view of marked site of *C. calyptrifolia* immediately above Fig. 15. The population extends from *c.* 42cm above the ground, to at least 210 - 240cm above the ground, *i.e.* well beyond reach from the ground. It is about 20cm wide at its widest point.

SITE ASSESSMENT

Potential S.S.S.I. status. Healey Dell Nature Reserve is an area of considerable bryological interest. With reference to the recommendations of the Joint Nature Conservation Committee (J.N.C.C.) (Hodgetts, 1992, 1999) for the selection of Sites of Special Scientific Interest (S.S.S.I.), the only scheme currently available, it scores as follows:

<i>Barbilophozia atlantica</i> (Nationally scarce)	50
<i>Calypogeia arguta</i> (Sub-Atlantic)	5
<i>Colura calyptrifolia</i> (Nationally scarce)	50
<i>Campylopus flexuosus</i> (Sub-Atlantic)	5
<i>Metzgeria temperata</i> (Sub-Atlantic)	5
<i>Nowellia curvifolia</i> (Western British)	5
<i>Heterocladium heteropterum</i> (Sub-Atlantic)	5
<i>Hyocomium armoricum</i> (Sub-Atlantic)	5
<i>Nardia geoscyphus</i> (Nationally scarce)	50
<i>Hypnum resupinatum</i> (Sub-Atlantic)	5
<i>Orthotrichum pulchellum</i> (Sub-Atlantic)	5
<i>Tetrodontium brownianum</i> (Sub-Atlantic)	5

TOTAL: 195

In a part of Britain where a total score of 200 would qualify a site for consideration as an S.S.S.I. in terms of its bryophytes alone, Healey Dell is clearly a highly ranked site. The J.N.C.C. recommendations are, however, in need of updating in the light of continuing field work, which continually increases records for *C. calyptrifolia* (Newton, unpublished; Stern, in Long, 1999; Bosanquet, 2004). As a consequence, it is no longer possible to regard the species as nationally scarce, *i.e.* occurring in fewer than 100 10km grid squares in Great Britain. Since it would be inappropriate to modify the J.N.C.C. recommendations piecemeal, attention is drawn, here, merely to the fact that caution needs to be exercised in their application and interpretation.

J.N.C.C. recommendations are also in need of revision in the light of biogeographical work by Hill & Preston (1998), which largely supersedes that of Ratcliffe (1968), on which the recommendations are based. In addition to the three nationally scarce species, a further 19 species, instead of ten, would each score either 5 or 10 points. Direct comparisons of total scores based on the newer classification are not, however, possible because the meaning of overall totals in a geographical context have not yet been revised.

Nevertheless, there is a strong case to be made for the inclusion of *Metzgeria fruticulosa* in the list of scoring species for Healey Dell. The species had not been recognized as distinct from *M. temperata* at the time of Ratcliffe (1968). However, since both species are regarded as Suboceanic Temperate species by Hill & Preston (1998), it would be irrational to include the latter and not the former. I would therefore strongly recommend that *Metzgeria fruticulosa* should be added to the above score, as follows:

TOTAL BROUGHT FORWARD	195
<i>Metzgeria fruticulosa</i> (Sub-Atlantic)	5

TOTAL: 200

Additional evidence of oceanic micro-habitat. During the course of this survey, small accumulations of prothalli belonging to the filmy fern, *Trichomanes speciosum*, were seen in section 15. The sporophyte generation is extremely rare in Britain, but it has recently been discovered that the species survives as the gametophytic generation, the prothallus, in many parts of Britain. This appears to be the first record for the grid square SD/81 (van der Meijden & de Kort, 2004).

MANAGEMENT CONSIDERATIONS

Healey Dell Nature Reserve owes its bryophyte interest, not only to general diversity of habitat, but also to the presence of well represented areas of oceanic microhabitat. Topography plays a vital part in maintaining those features, but so too does tree canopy, some of which is not composed of native species. Inappropriate felling of selected species could have seriously deleterious consequences for, in particular, *Colura calyptrifolia*, which requires the maintenance of high humidity irrespective of the tree species which contribute to that effect.

C. calyptrifolia, for which this is the first record in Lancashire, is an exceedingly rare species in England as a whole. Other records are confined to only 13 10km grid-squares in England. Four are in the Lake District, five in Cornwall, and one each in Devon, Somerset, Monmouthshire, and Mid-west Yorkshire (Hill *et al.*, 1991; Holyoak, in Blackstock, 1999)

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