

BOHEMIA BOG AND MUNSLEY BOG BASELINE BRYOPHYTE SURVEY

Natural Enterprises Ltd

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1.0 INTRODUCTION

This report describes a survey commissioned by Natural Enterprise Ltd to establish a baseline of information about the lower plant interest at two Sites of Interest for Nature Conservation (SINC) near Godshill, Isle of Wight.

Munsley Bog is a site with very high historic nature conservation value that has declined greatly in recent years because of a lack of management. Bohemia Bog, several kilometres, has long been known to support species found nowhere else on the Isle of Wight, despite its tiny size. It has suffered from scrub invasion in recent years. Natural Enterprise has recently implemented major habitat management work at both SINCS.

Names of mosses and liverworts referred to in this report follow Hill *et al* (2008) whilst the names of vascular plants follow Stace (2010).

2.0 METHODOLOGY

Both sites were visited on 14th March 2012 when weather conditions were dry and mild, but whilst the ground was damp, providing ideal survey conditions for most species of lower plant. The field-work was undertaken by Sharon Pilkington CEnv MIEEM, an experienced professional bryologist and botanist.

Munsley Bog was much the larger of the two sites, and comprised several different habitats, including a *Sphagnum*-rich flush dominated in open areas by Purple Moor-grass *Molinia caerulea* and Greater Tussock-sedge *Carex paniculata* (Plate 1). The northernmost end of the site comprised flushed secondary woodland dominated by birch *Betula* and willow *Salix*, with Greater Tussock-sedge prominent below. Clearance of some of the wet woodland had taken place very recently, leaving stumps, brash and moderately disturbed ground.

At the request of Natural Enterprise, the focus of the survey was on the ground-dwelling bryophytes, especially those species indicative of mire (flush) habitats. This included the open areas of flush as well as the wet woodland floor. Although not a primary interest, epiphytic bryophytes on woodland trees were also recorded where they were seen.



Plate 1: *Sphagnum*-rich open flushed ground at Munsley Bog

The survey concentrated on the habitats of most interest in the northern part of the SINC, west of the stream. Brief excursions were also made into the other parts (including the publicly accessible southern section) but no extra species were added to the overall site list in doing so.

A slow walkover of the survey area was undertaken, searching every different microhabitat in order to target the survey most effectively within the available time. All species of bryophyte (moss, liverwort or hornwort) that were found were identified where possible in the hand. Samples of certain very small or difficult species were collected and verified under a high-power microscope later.

Bohemia Bog was a much smaller site and had far less variation in habitat. Here, the survey concentrated on an active, *Sphagnum*-rich flush at the eastern side of the SINC (Plate 2). Scrub removal works had been undertaken elsewhere on the SINC and the ground-dwelling bryophytes were far less diverse in those areas.



Plate 2. *Sphagnum*-rich ground at the eastern end of Bohemia Bog

3.0 RESULTS

3.1 Munsley Bog

42 bryophytes (34 mosses and 8 liverworts) were recorded during the survey and more than a third of those (10 mosses and 6 liverworts) were only seen on trees, scrub or decaying wood. Therefore 26 species (24 mosses and 2 liverworts) were associated with the flushed habitats of most interest (Tables 1 and 2).

The northern part of Munsley Bog SINC is a series of flushes arising on gently sloping ground with an easterly aspect. Another term for flush is soligenous mire, where peat accumulates around water on sloping terrain, and this gradient-driven flow distinguishes acid flushes from the valley mires (also called topogenous mires) that are so characteristic of e.g. the New Forest and Purbeck heaths in Hampshire and Dorset. Greater Tussock-sedge dominated much of the open ground and wet birch woodland and this species is a good indicator of lateral water movement in the root zone.

The flush did not appear to be regularly grazed, and this lack of management has probably been a major driver for the development of large sedge and *Molinia* tussocks and invasion of birch and willows into open areas.

Several species of moss formed carpets between the tussocks. In open areas, *Calliergonella cuspidata*, *Kindbergia praelonga*, *Sphagnum palustre* and *Sphagnum fimbriatum* were widespread (Plates 3 and 4), whilst in wet ground under the trees *Brachythecium rivulare* (Plate 5) and *Kind*

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bergia praelonga were the most frequently encountered species. A few other species were more common in the shade than in the open, including *Calliergon cordifolium* (Plate 6), *Pellia epiphylla* and *Sphagnum squarrosum*.



Plate 3. *Calliergonella cuspidata*



Plate 4. *Sphagnum fimbriatum*



Plate 5. *Brachythecium rivulare*



Plate 6. *Calliergon cordifolium*

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Table 1. Mosses

Species	Status	Abundance (DAFOR)
<i>Aulacomnium palustre</i>	Common and widespread	F
<i>Brachythecium rivulare</i>	Common and widespread	F
<i>Brachythecium rutabulum</i>	Common and widespread	O
<i>Calliergon cordifolium</i>	Infrequent	O
<i>Calliergonella cuspidata</i>	Common and widespread	A
<i>Ceratodon purpureus</i>	Common and widespread	R
<i>Dicranoweisia cirrata</i> *	Common and widespread	R
<i>Funaria hygrometrica</i>	Common and widespread	R
<i>Hypnum cupressiforme</i> *	Common and widespread	R
<i>Hypnum cupressiforme</i> var. <i>resupinatum</i> *	Common and widespread	F
<i>Hypnum jutlandicum</i>	Common and widespread	O
<i>Isoetecium alopecuroides</i> *	Common and widespread	R
<i>Isoetecium myosuroides</i> *	Common and widespread	R
<i>Kindbergia praelonga</i>	Common and widespread	A
<i>Mnium hornum</i>	Common and widespread	O
<i>Orthotrichum affine</i> *	Common and widespread	O
<i>Orthotrichum diaphanum</i> *	Common and widespread	R
<i>Orthotrichum lyellii</i> *	Common and widespread	R
<i>Plagiomnium undulatum</i>	Common and widespread	R
<i>Polytrichum commune</i>	Common and widespread	O
<i>Pseudoscleropodium purum</i>	Common and widespread	A
<i>Rhytidiadelphus squarrosus</i>	Common and widespread	R
<i>Sphagnum cuspidatum</i>	Common and widespread	R
<i>Sphagnum denticulatum</i>	Common and widespread	O
<i>Sphagnum fallax</i>	Common and widespread	O
<i>Sphagnum fimbriatum</i>	Common and widespread	A
<i>Sphagnum flexuosum</i>	Probably not recorded previously on IOW. Infrequent and under-recorded on the mainland.	R

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<i>Sphagnum inundatum</i>	Common and widespread	R
<i>Sphagnum palustre</i>	Common and widespread	F
<i>Sphagnum squarrosum</i>	Common and widespread	O
<i>Sphagnum subnitens</i>	Common and widespread	O
<i>Ulota bruchii</i> *	Common and widespread	O
<i>Ulota phyllantha</i> *	Common and widespread	F

Species marked with an asterisk (*) were present either as epiphytes i.e. growing on trees or scrub, or on decaying wood on the ground.

Estimate of abundance in relation to the site: **D**ominant; **A**bundant; **F**requent; **O**ccasional; **R**are. **L** is used to indicate a patchy (local) distribution.

Table 2. Liverworts

Species	Status	Abundance (DAFOR)
<i>Calypogeia fissa</i>	Common and widespread	O
<i>Cololejeunea minutissima</i> *	Common and widespread	O
<i>Frullania dilatata</i> *	Common and widespread	F
<i>Metzgeria consanguinea</i> *	Common and widespread	R
<i>Metzgeria furcata</i> *	Common and widespread	O
<i>Microlejeunea ulicina</i> *	Common and widespread	R
<i>Pellia epiphylla</i>	Common and widespread	O
<i>Radula complanata</i> *	Common and widespread	R

Overall, the flush system at the northern end of the SINC supported an impressive nine species of *Sphagnum*, including what may be the first recorded population of *Sphagnum flexuosum* on the island (Plate 7). The majority of species recorded were typical of this kind of habitat in lowland England.

Known environmental requirements of many of the ground-dwelling bryophytes (Hill *et al* 2007) strongly suggest that at least some the groundwater moving through this part of the site is nutrient-rich and of a near-neutral pH (indicators are e.g. *Calliargonella cuspidata*, *Calliargon cordifolium* and *Brachythecium rivulare*) whilst other parts of the flush are more infertile and acid, as indicated by such species as *Sphagnum fimbriatum* and *S. denticulatum* (Plate 8)).

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Munsley Bog also supported a good range of typical epiphytic mosses and liverworts characteristic of damp lowland woods with good air quality in southern England, but no notable species were found.



Plate 7. *Sphagnum flexuosum*

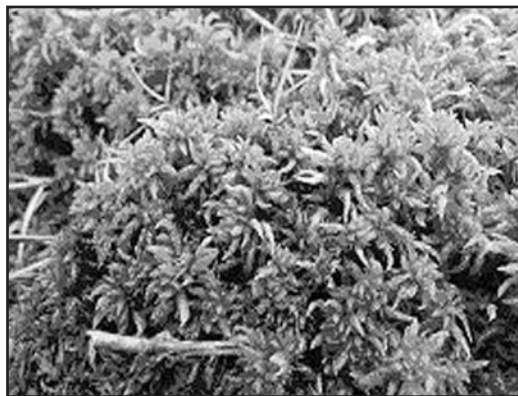


Plate 8. *Sphagnum denticulatum*

3.2 Bohemia Bog

Bohemia Bog SINC was a smaller flush, situated part of the way up a north-facing slope. In appearance it was very different to the open flush at Munsley Bog. Bohemia Bog lay within pony-grazed pasture and the animals had controlled access to the flushed ground. The grazing gave a much shorter sward in the flush, with moderate poaching and some areas of bare peat. The northern end of the flush was dotted with Gorse *Ulex europaeus* and this species had clearly been problematic elsewhere in the SINC. Recent scrub management activities had removed much of the Gorse but left disturbed ground which supported fewer bryophytes.

An interesting feature of the hydrology of Bohemia Bog was apparent from the distribution of species across the flush. The upper part of the flush was dominated by *Sphagnum* mosses, most commonly *S. palustre* and *S. subnitens* (Plates 9 and 10), which both indicate relatively acid and infertile water. About halfway down the flush however, the groundwater chemistry appeared to change, and the *Sphagnum* mosses were almost entirely replaced by carpets of *Calliergonella cuspidata*, indicating a movement toward eutrophic conditions and a circumneutral pH.

36 bryophytes (25 mosses and 11 liverworts) were recorded during the survey and of these, 32 species (21 mosses and all the liverworts) were primarily associated with the flush habitat (Tables 3 and 4). A few additional species were seen on the edge of piles of spoil in the area of recent major scrub clearance (marked with an asterisk).

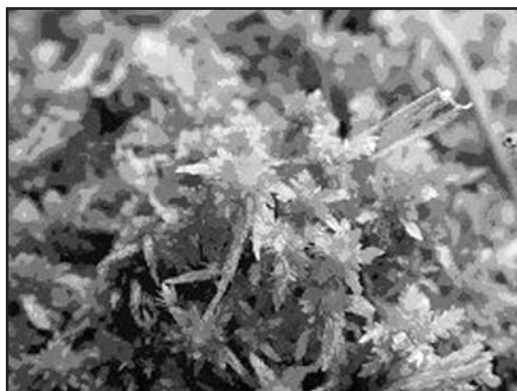
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Table 3. Mosses

Species	Status	Abundance (DAFOR)
<i>Aulacomnium palustre</i>	Common and widespread	F
<i>Brachythecium rivulare</i>	Common and widespread	F
<i>Brachythecium rutabulum</i>	Common and widespread	O
<i>Bryum dichotomum</i> *	Common and widespread	R
<i>Calliergonella cuspidata</i>	Common and widespread	LA
<i>Campylopus introflexus</i>	Common and widespread	R
<i>Campylopus pyriformis</i>	Common and widespread	O
<i>Dicranella heteromalla</i>	Common and widespread	R
<i>Dicranella staphylina</i> *	Common and widespread	R
<i>Funaria hygrometrica</i>	Common and widespread	R
<i>Hypnum jutlandicum</i>	Common and widespread	F
<i>Kindbergia praelonga</i>	Common and widespread	O
<i>Leucobryum glaucum</i>	Common and widespread	R
<i>Mnium hornum</i>	Common and widespread	R
<i>Oxyrrhynchium hians</i> *	Common and widespread	R
<i>Philonotis fontana</i>	Common and widespread	R
<i>Physcomitrium pyriforme</i>	Common and widespread	R
<i>Pleuridium acuminatum</i> *	Common and widespread	R
<i>Pohlia wahlenbergii</i>	Common and widespread	R
<i>Sphagnum capillifolium</i>	Common and widespread	O
<i>Sphagnum denticulatum</i>	Common and widespread	A
<i>Sphagnum fallax</i>	Common and widespread	O
<i>Sphagnum palustre</i>	Common and widespread	A
<i>Sphagnum subnitens</i>	Common and widespread	A
<i>Thuidium tamariscinum</i>	Common and widespread	R

Table 4. Liverworts

Species	Status	Abundance (DAFOR)
<i>Aneura pinguis</i>	Common and widespread	O
<i>Calypogeia arguta</i>	Common and widespread	O
<i>Calypogeia fissa</i>	Common and widespread	F
<i>Calypogeia muelleriana</i>	Common and widespread	O
<i>Cephalozia bicuspidata</i>	Common and widespread	R
<i>Cephalozia connivens</i>	Common and widespread	R
<i>Kurzia pauciflora</i>	Common and widespread	R
<i>Odontoschisma sphagni</i>	Common and widespread	R
<i>Pellia epiphylla</i>	Common and widespread	O
<i>Riccardia chamedryfolia</i>	Common and widespread	O
<i>Riccardia multifida</i>	Common and widespread	F

**Plate 9.** *Sphagnum palustre***Plate 10.** *Sphagnum subnitens*

All of the species found at Bohemia Bog were common and widespread species of similar habitats in southern England. Previous surveys of Bohemia Bog (most notably by Dr Francis Rose in 1975 and 1977) found populations of several regionally notable bryophytes, including *Pohlia camptotrachela* and the characteristic New Forest liverworts *Cephalozia macrostachya* and *Riccardia latifrons*. However, despite a careful search of likely microhabitats, none of these species was re-found. A survey in 1980 also indicated that nine different species of *Sphagnum* were present then, compared to the five species found in the current survey. However, the area covered by that survey was not given and a search of adjacent wet scrub and woodland may have revealed additional

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shade-tolerant species such as *S. squarrosus* and *S. fimbriatum*. It is also possible that a small population of *C. macrostachya* may persist at Bohemia Bog as it is a tiny species and easy to overlook.

4.0 DISCUSSION

At present, Munsley Bog is the more bryologically diverse of the two SINCS. This is perhaps unsurprising given its much larger size and greater number of bryophyte habitats. In both sites, the peat-based vegetation has developed over flushed ground with apparently mixed groundwater chemistry, and they share many species. However, a recent history of regular grazing at Bohemia Bog has created short, hummocky vegetation with exposed peat which offers a superior habitat for small species, especially small liverworts indicative of good quality wet peat habitats. In this respect, Munsley Bog was particularly lacking, with nearly all of the small liverworts found confined to the wet woodland as epiphytes.

Munsley Bog does not appear to have been surveyed before by a bryologist, so it is not possible to draw any conclusions about the current bryological condition of the site in relation to past observations. It is however likely that suitable site management will be key to improving bryophyte diversity in the flush. The same management should also improve the habitat for vascular plants. It is suggested that future management efforts should have two main objectives:

- To maintain the existing area of unshaded flush vegetation through regular removal of tree saplings and young scrub (excluding the Bog Myrtle *Myrica gale*);
- To re-introduce grazing to the unshaded flush vegetation in order to decrease the overall sward height, reduce the dominance of coarse tussocky species such as Purple Moor-grass and Greater Tussock-sedge and create openings in the vegetation suitable for small bryophytes and vascular species such as Bog Pimpernel *Anagallis tenella*. Ideally grazing livestock should be light-footed and tough-mouthed and suitable breeds might include New Forest ponies or Belted Galloway and Herdwick cattle.

A more long-term aim would be to reduce the levels of nutrients in the groundwater percolating through the flush. Eutrophic water favours vigorous species such as *Calliergonella cuspidata*, which forms large masses and can out-compete other bryophytes, as well as tussocky grasses and sedges. Eutrophication of lowland habitats is an insidious but serious problem, often caused by regular applications of agricultural fertiliser to nearby intensively managed farmland. In some cases farmers can be encouraged to apply for environmental stewardship grants which can be tailored toward protection of groundwater resources and sensitive wetland sites, and it could be worth exploring this with local stakeholders.

Bohemia Bog, in contrast, has been quite well studied by bryologists in the past. It is of concern that a significant number of mire specialists that were recorded previously were not relocated in the current survey and it is likely that the habitat has changed in the past through decades, possibly by drying out, scrubbing over and/or nutrient enrichment. Concerns about groundwater eutrophication are similar to those at Munsley Bog, especially as the site is surrounded by farmland. If the owners and managers of the land adjacent to Bohemia Bog are, or have been, applying fertilisers to their crops or pasture, this will inevitably degrade the flush vegetation.

On the positive side, Bohemia Bog retains a very interesting short open area with many small liverworts and other species intolerant of tall vegetation. In this respect it is quite similar to some New Forest flushes. Recent removal of dense Gorse scrub should also help to keep the ground wet and restore some of the more degraded flush. Management suggestions for maintaining and improving the bryophyte interest of Bohemia Bog are as follows:

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- Maintain current grazing regime to keep flush vegetation short. Poaching of the peat within the richer part of the flush is very important in retaining micro-habitats for the smallest species but current levels are close to becoming excessive. Too much poaching can permanently damage fragile flush habitats;
- Undertake scrub control to ensure that only scattered bushes are present in wet ground;
- Encourage the landowner(s) to implement environmental stewardship programs with an emphasis on protecting groundwater resources through low-input agricultural systems.

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