Mire bryophyte survey of the northern part of Mynydd Hiraethog SSSI

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Report for Natural Resources Wales

Evidence Report No 641

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1. Crynodeb Gweithredol

Cafodd bryoffytau cynefin cors ar chwe safle eu harolygu o fewn rhan ogleddol SoDdGA Mynydd Hiraethog yn ystod pum niwrnod o waith maes ym mis Gorffennaf 2022. Roedd y corsydd yn cynnwys eangerau mawr o gynefin prin ei rywogaethau yn bennaf, yn arbennig M6c a M23, ond roedd rhai safleoedd yn cynnwys enghreifftiau mwy lleoledig o gasgliadau mwy diddorol, gan gynnwys M10, M18 a 'thrylifiad niwtral'. Canfuwyd dwy rywogaeth o frÿoffyt oedd o Bryder Cadwraethol, sef *Hamatocaulis vernicosus* a *Tomentypnum nitens.* Cafwyd hyd i'r gyntaf mewn dau drylifiad yn Foelasfechan (5 achos cyfwerth ag unigolyn [o fewn celloedd grid 1 m]) ac mewn dau drylifiad arall ger Llyn y Foel Frech (14 achos cyfwerth ag unigolyn), a'r ddau safle yn rhai newydd i'r rhywogaeth hon. Ni ail-ganfuwyd y rhywogaeth hon yng Nghors Maen Llwyd, lle cafodd ei chofnodi yn 1972, ac mae'n ymddangos ei fod wedi'i cholli o ganlyniad i danbori a chystadleuaeth gysylltiedig am le gan blanhigion mwy. Cafwyd hyd i boblogaeth fawr o *Tomentypnum nitens*, a oedd yn cynnwys 140 achos cyfwerth ag unigolyn, mewn tri trylifiad cyfagos ar ochr ogleddol Gors Dopiog, sef lleoliad tebygol y rhywogaeth pan gafodd ei chofnodi yn 1972 yn 'Bryn Euryn'.

2. Executive Summary

Bryophytes of mire habitat at six sites within the northern part of Mynydd Hiraethog SSSI were surveyed during five days of fieldwork in July 2022. The mires mainly comprised large expanses of species-poor habitat, especially of M6c and M23, but some sites included localised occurrences of more interesting assemblages, including M10, M18 and 'neutral flush'. Two bryophyte species of conservation concern were found, *Hamatocaulis vernicosus* and *Tomentypnum nitens.* The former was found in two flushes at Foelasfechan (5 individual-equivalents [occupied 1 m grid cells]) and in

two other flushes near Llyn y Foel Frech (14 individual-equivalents), both new sites for this species. This species was not refound at Gors Maen Llwyd, where it was recorded in 1972, and it appears to have been lost due to under-grazing and associated competitive exclusion by bigger plants. A large population of *Tomentypnum nitens*, comprising 140 individual-equivalents, was found in three adjacent flushes on the northern flank of Gors Dopiog, which is the likely location of a 1972 record of the species from ‘Bryn Euryn’.

3. Background

Mynydd Hiraethog SSSI is a large area (6379 ha) of rolling moorland located at the northern end of the Cambrian Mountains, traditionally managed as a grouse moor and shooting estate. The bedrock comprises shales of the Wenlock Group, which outcrop in areas but are generally masked by deep peat deposits in the shallow valleys. The author was commissioned by NRW to undertake a survey of mire bryophytes within six sites in the northern part of the SSSI (Figure 1), following previous similar surveys in the southern part of the SSSI (Averis 2001; Callaghan 2011).

4. Methods

Five days of fieldwork were carried out during July 2022. Mire habitat of the six sites was visited and an inventory of the species present was compiled, with a focus on locating species of conservation concern. When such a species was found, a temporary marker flag was positioned at the colony, ignoring further locations if <1 m from an existing flag. Each flagged location was considered a separately occupied 1 m grid cell and following Bergamini et al. (2019), each occupied 1 m grid cell is considered an 'individual-equivalent'. Coordinates of locations occupied by species of conservation concern, plus a selection of other species that often indicate the more interesting mire habitat, were recorded with a hand-held GPS (Garmin GPSMAP 64s, Garmin Ltd, Olathe, USA), as was the survey route, generally with a positional accuracy of ≤5 m. Taxonomy follows Blockeel et al. (2021).

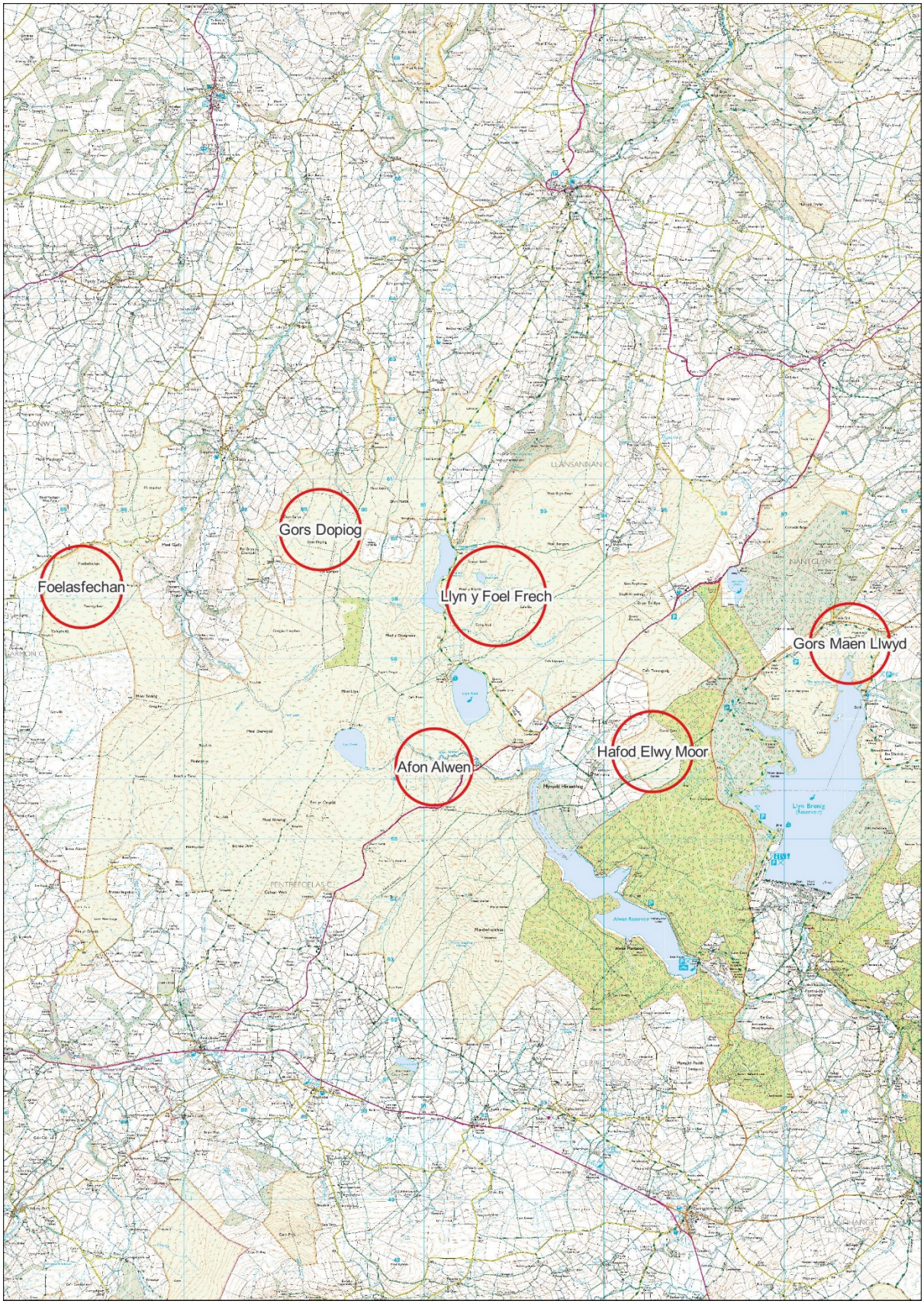

Figure 1. Location of survey sites.

5. Results and Discussion

Afon Alwen

The mires comprise large expanses of species-poor M6 and M23. A very small area of neutral flush was found, no more than a few square meters in extent, supporting *Sphagnum contortum* (Figure 2) and a few other bryophytes typical of this assemblage, but no species of conservation concern.

Table 1. Inventory of mire bryophytes and their frequency of occurrence at Afon Alwen.

Species	Frequency
Bryum pseudotriquetrum	Rare
Calliergonella cuspidata	Rare
Campylium stellatum	Rare
Dichodontium palustre	Rare
Pellia epiphylla	Occassional
Philonotis fontana	Rare
Polytrichum commune	Abundant
Polytrichum strictum	Frequent
Scapania undulata	Rare
Scorpidium cossonii	Rare
Scorpidium scorpioides	Rare
Sphagnum auriculatum	Frequent
Sphagnum contortum	Rare
Sphagnum fallax	Abundant
Sphagnum palustre var. palustre	Occassional
Sphagnum rubellum	Occassional
Sphagnum subnitens subsp. subnitens	Rare

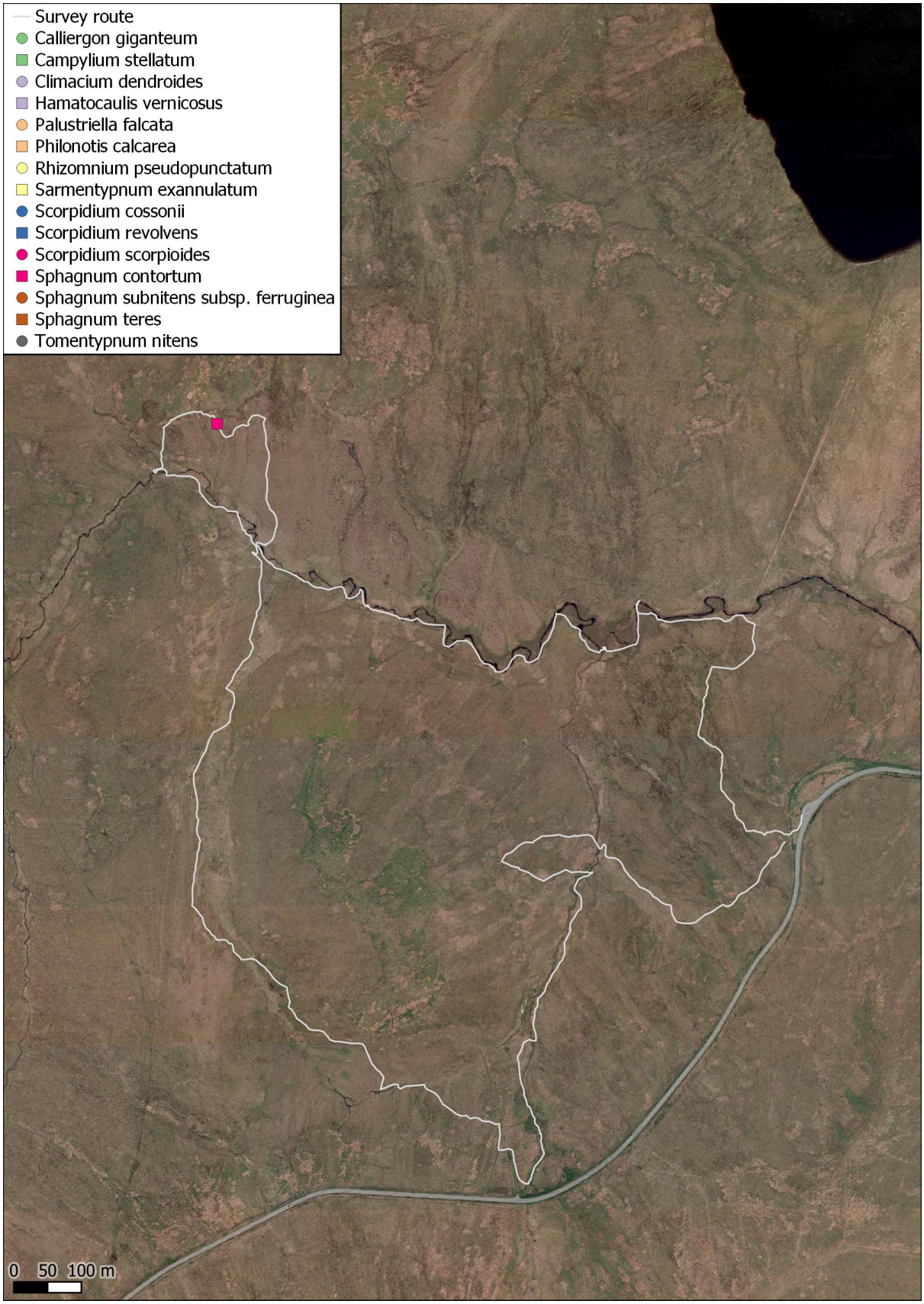

Figure 2. Survey route and location of species at Afon Alwen. Note: only species of conservation concern (*Hamatocaulis vernicosus* and *Tomentypnum nitens*) were mapped in detail during the present study. Locations of all other species comprise a representative sample.

Foelasfechan

The mires comprise vast beds of species-poor M6 and M23, with especially large stretches of M6c surrounding the three lakes. At the source of the main (unnamed) stream, around SH851596 and SH850595, more interesting mires occur, including some good quality M10, M17, M29 and neutral flush, albeit in small quantity (Figure 3). *Hamatocaulis vernicosus* was found in small amount in two flushes, comprising 2 and 3 individual-equivalents (occupied 1 m grid cells), this being a new site for the species (Figure 4–6).

Table 2. Inventory of mire bryophytes and their frequency of occurrence at Foelasfechan.

Species	Frequency
Aneura pinguis	Rare
Aulacomnium palustre	Frequent
Bryum dichotomum	Rare
Bryum pseudotriquetrum	Occassional
Calliergonella cuspidata	Occassional
Campylium stellatum	Rare
Cratoneuron filicinum	Occassional
Hamatocaulis vernicosus	Rare
Palustriella falcata	Rare
Pellia epiphylla	Occassional
Philonotis fontana	Rare
Polytrichum commune	Abundant
Polytrichum strictum	Frequent
Sarmentypnum exannulatum	Occassional
Scapania undulata	Occassional
Scorpidium cossonii	Occassional
Scorpidium revolvens	Rare
Scorpidium scorpioides	Rare
Sphagnum auriculatum	Frequent
Sphagnum contortum	Occassional
Sphagnum cuspidatum	Frequent
Sphagnum fallax	Abundant
Sphagnum inundatum	Rare
Sphagnum medium	Rare
Sphagnum palustre var. palustre	Frequent
Sphagnum papillosum	Frequent
Sphagnum rubellum	Occassional
Sphagnum subnitens subsp. subnitens	Occassional
Sphagnum teres	Rare
Straminergon stramineum	Rare

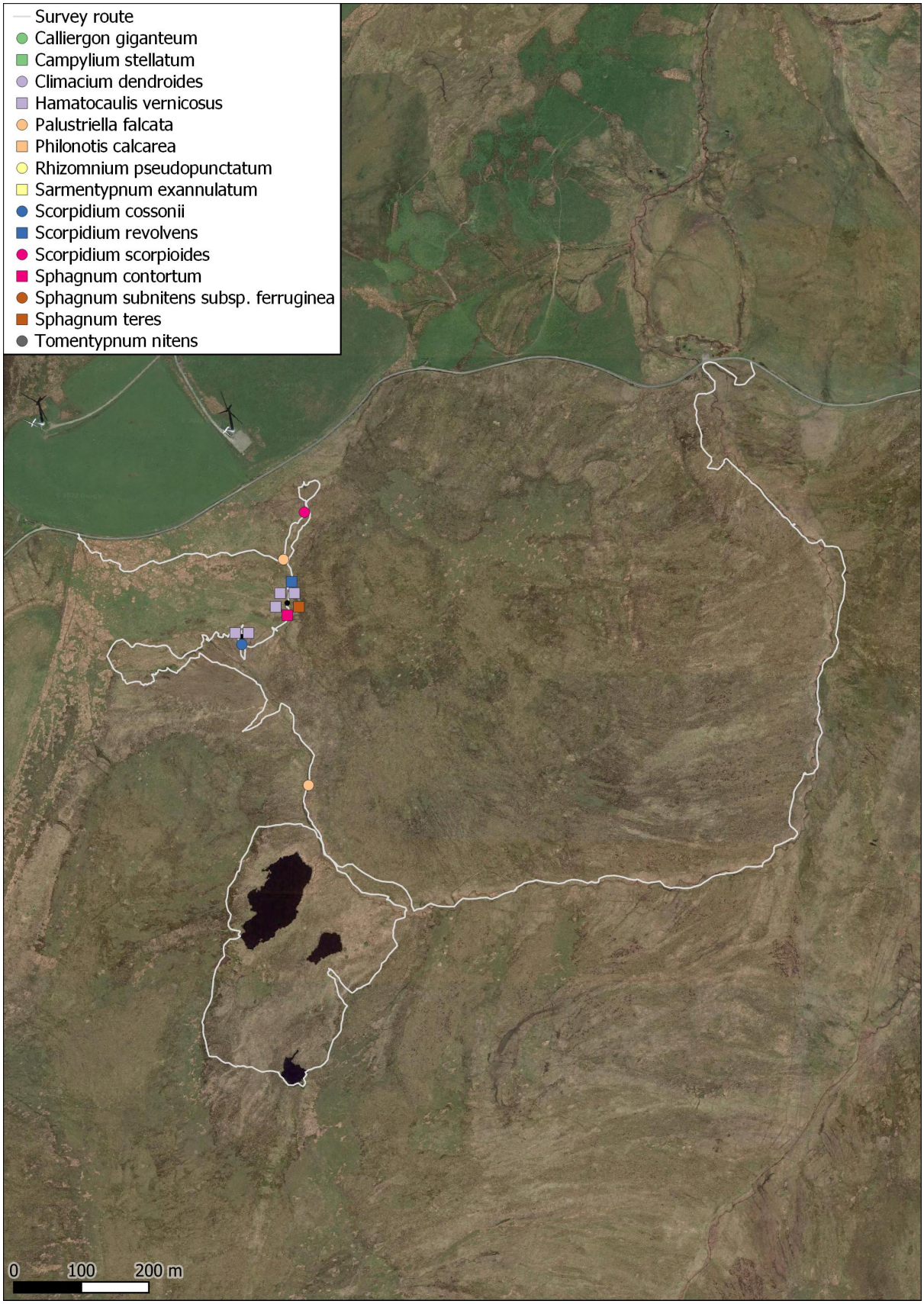

Figure 3. Survey route and location of species at Foelasfechan. Note: only species of conservation concern (*Hamatocaulis vernicosus* and *Tomentypnum nitens*) were mapped in detail during the present study. Locations of all other species comprise a representative sample.

Figure 4. Location of *Hamatocaulis vernicosus*, comprising 3 individual-equivalents (occupied 1 m grid cells). SH8515559584.

Figure 5. Location of *Hamatocaulis vernicosus*, comprising 2 individual-equivalents (occupied 1 m grid cells). SH8508659541.

Figure 6. *Hamatocaulis vernicosus* at Foelasfechan.

Gors Dopiog

The central part of the site comprises a degraded M18 mire, with scattered M1 pools, where a moderate assemblage of bryophytes typical of this habitat occur. Around the edge of the bog, large expanses of species-poor M6c and M23 occur. Some small and over-grown M10 and M29 flushes also occur on the southern slopes (Figure 7). The most notable mire habitat comprises a flush complex on the northern slopes, of which three flushes support a good population of *Tomentypnum nitens*, comprising 140 individual-equivalents (occupied 1 m grid cells) (Figures 8–12). One of these flushes, at SH89456064, has been degraded by recent bunding works, which requires remedy (Figure 11). The species was found at this site by Mark Hill in 1972, but the location details were vague and it had not been seen since, despite previous attempts to refind it.

Table 3. Inventory of mire bryophytes and their frequency of occurrence at Gors Dopiog.

Species	Frequency
Aneura pinguis	Rare
Aulacomnium palustre	Frequent
Brachythecium rivulare	Rare
Bryum pseudotriquetrum	Occassional
Calliergonella cuspidata	Frequent
Calypogeia fissa	Rare
Campylium stellatum	Rare
Campylopus flexuosus	Rare
Cephaloziella divaricata	Rare
Climacium dendroides	Rare
Cratoneuron filicinum	Rare
Dicranum scoparium	Rare
Fissidens dubius	Rare
Kindbergia praelonga	Rare
Lophozia ventricosa var. silvicola	Rare
Mylia anomala	Occassional
Odontoschisma sphagni	Occassional
Pellia epiphylla	Occassional
Philonotis calcarea	Rare
Philonotis fontana	Occassional
Polytrichum commune	Abundant
Polytrichum strictum	Frequent
Riccardia multifida	Rare
Sarmentypnum exannulatum	Occassional
Scapania undulata	Occassional

Species	Frequency
Scorpidium cossonii	Occassional
Scorpidium scorpioides	Rare
Sphagnum auriculatum	Abundant
Sphagnum contortum	Rare
Sphagnum cuspidatum	Frequent
Sphagnum fallax	Abundant
Sphagnum inundatum	Rare
Sphagnum medium	Frequent
Sphagnum palustre var. palustre	Frequent
Sphagnum papillosum	Frequent
Sphagnum rubellum	Frequent
Sphagnum subnitens subsp. subnitens	Frequent
Sphagnum tenellum	Occassional
Sphagnum teres	Rare
Straminergon stramineum	Rare
Tomentypnum nitens	Rare

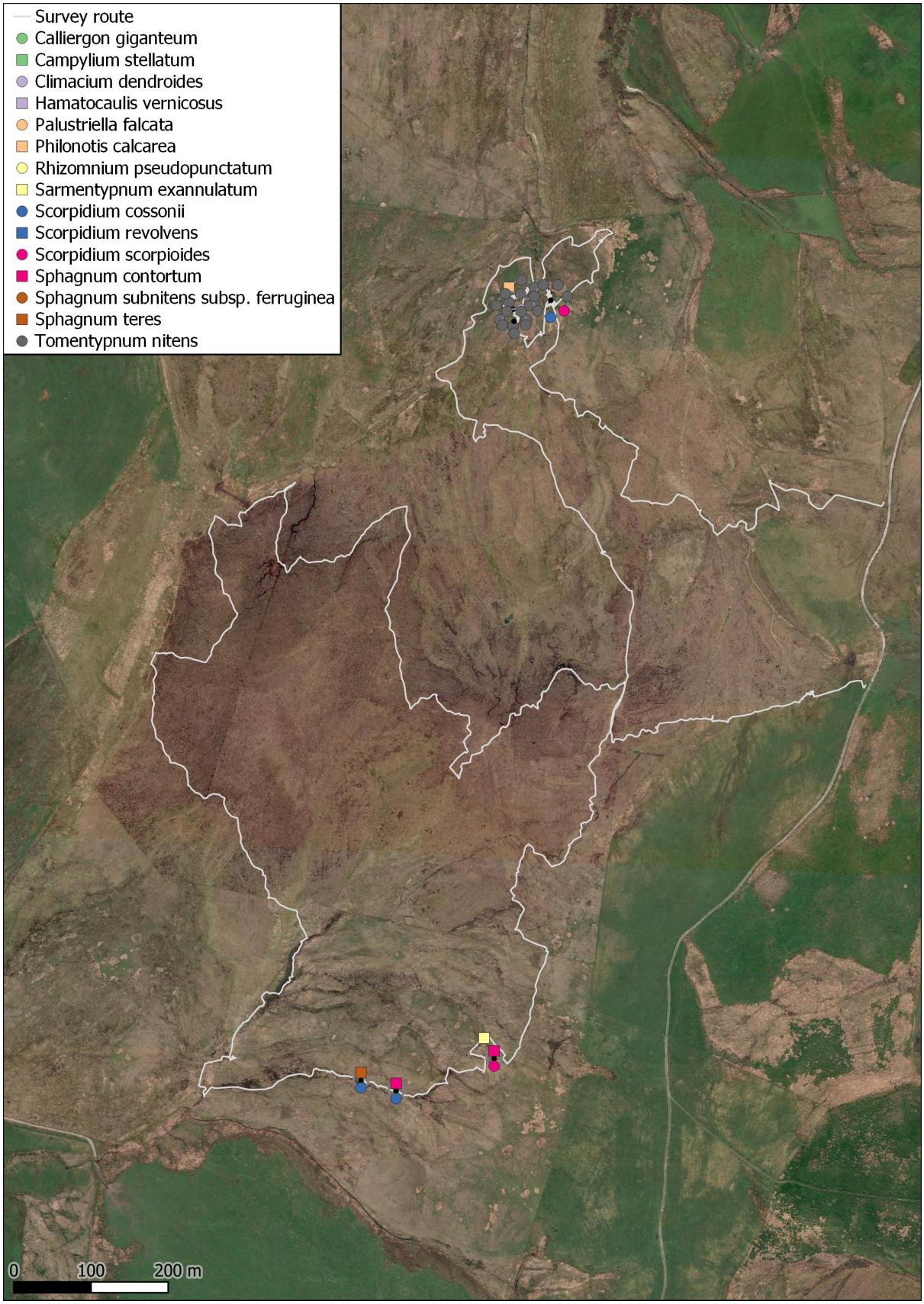

Figure 7. Survey route and location of species at Gors Dopiog. Note: only species of conservation concern (*Hamatocaulis vernicosus* and *Tomentypnum nitens*) were mapped in detail during the present study. Locations of all other species comprise a representative sample.

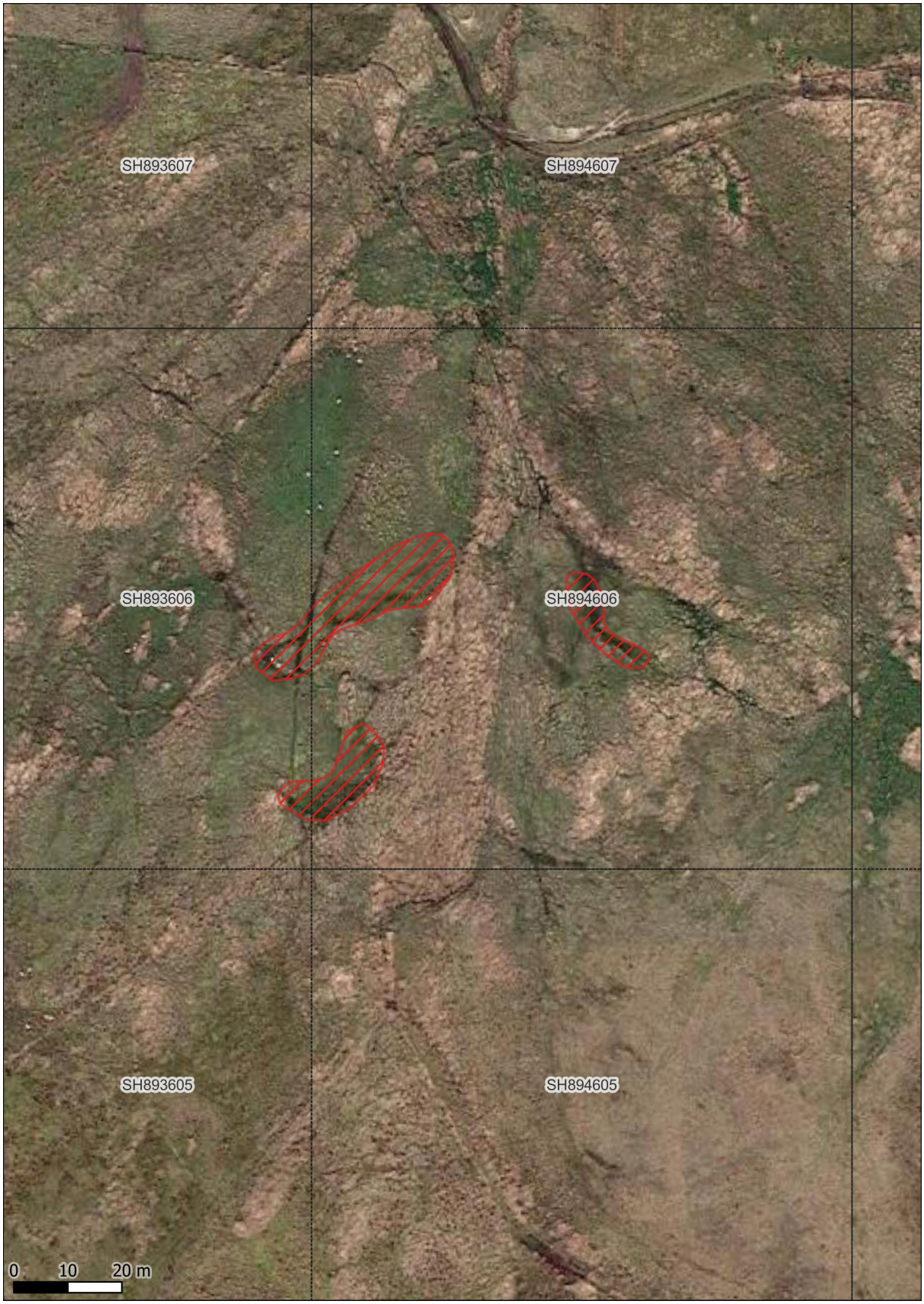

Figure 8. Extent of habitat supporting *Tomentypnum nitens* at Gors Dopiog.

Figure 9. General zone occupied by a large population of *Tomentypnum nitens*, comprising 54 individual-equivalents (occupied 1 m grid cells). Associates include *Climacium dendrioides, Scorpidium cossonii* and *Philonotis calcarea*. SH89416065.

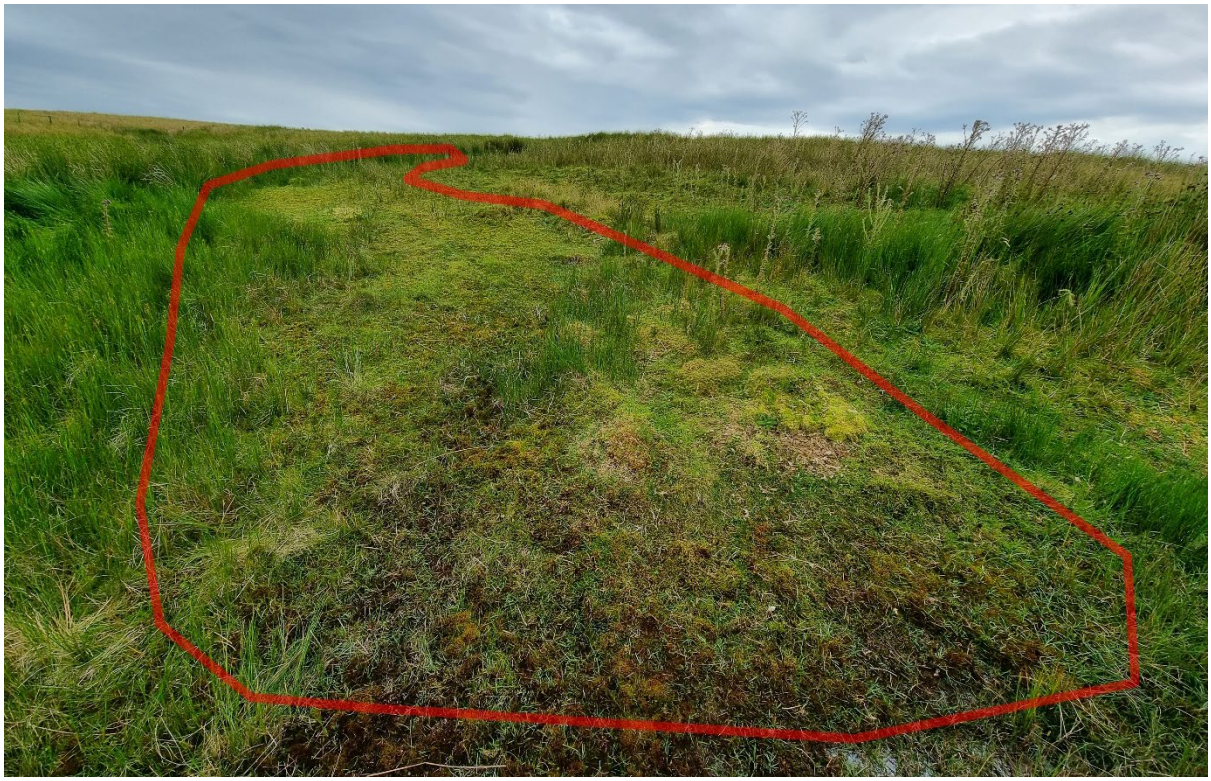

Figure 10. General zone occupied by a large population of *Tomentypnum nitens*, comprising 56 individual-equivalents (occupied 1 m grid cells). SH89406062.

Figure 11. General zone occupied by a large population of *Tomentypnum nitens*, comprising 30 individual-equivalents (occupied 1 m grid cells). Note: the flush has been degraded by recent bunding works. SH89456064.

Figure 12. *Tomentypnum nitens* at Gors Dopiog.

Gors Maen Llwyd

The mire habitat is dominated by large expanses of species-poor M6c and M23. Within the vicinity of the reservoir, some very small areas of neutral and M10 flush occur (Figure 13), but they are mostly over-grown and the component bryophytes are present in low abundance. No species of conservation concern were found. In 1972, Mark Hill recorded *Hamatocaulis vernicosus* at this site, but it was not found during the present survey and very little potential habitat was seen. It may have been lost due to under-grazing and associated competitive exclusion.

Table 4. Inventory of mire bryophytes and their frequency of occurrence at Gors Maen Llwyd.

Species	Frequency
Aulacomnium palustre	Rare
Bryum pseudotriquetrum	Rare
Calliergonella cuspidata	Occassional
Campylium stellatum	Rare
Pellia epiphylla	Occassional
Philonotis fontana	Rare
Polytrichum commune	Frequent
Sarmentypnum exannulatum	Rare
Scapania undulata	Occassional
Scorpidium cossonii	Rare
Scorpidium scorpioides	Rare
Sphagnum angustifolium	Occassional
Sphagnum auriculatum	Frequent
Sphagnum contortum	Rare
Sphagnum fallax	Abundant
Sphagnum palustre var. palustre	Frequent
Sphagnum papillosum	Occassional
Sphagnum subnitens subsp. subnitens	Rare
Sphagnum teres	Rare
Straminergon stramineum	Rare

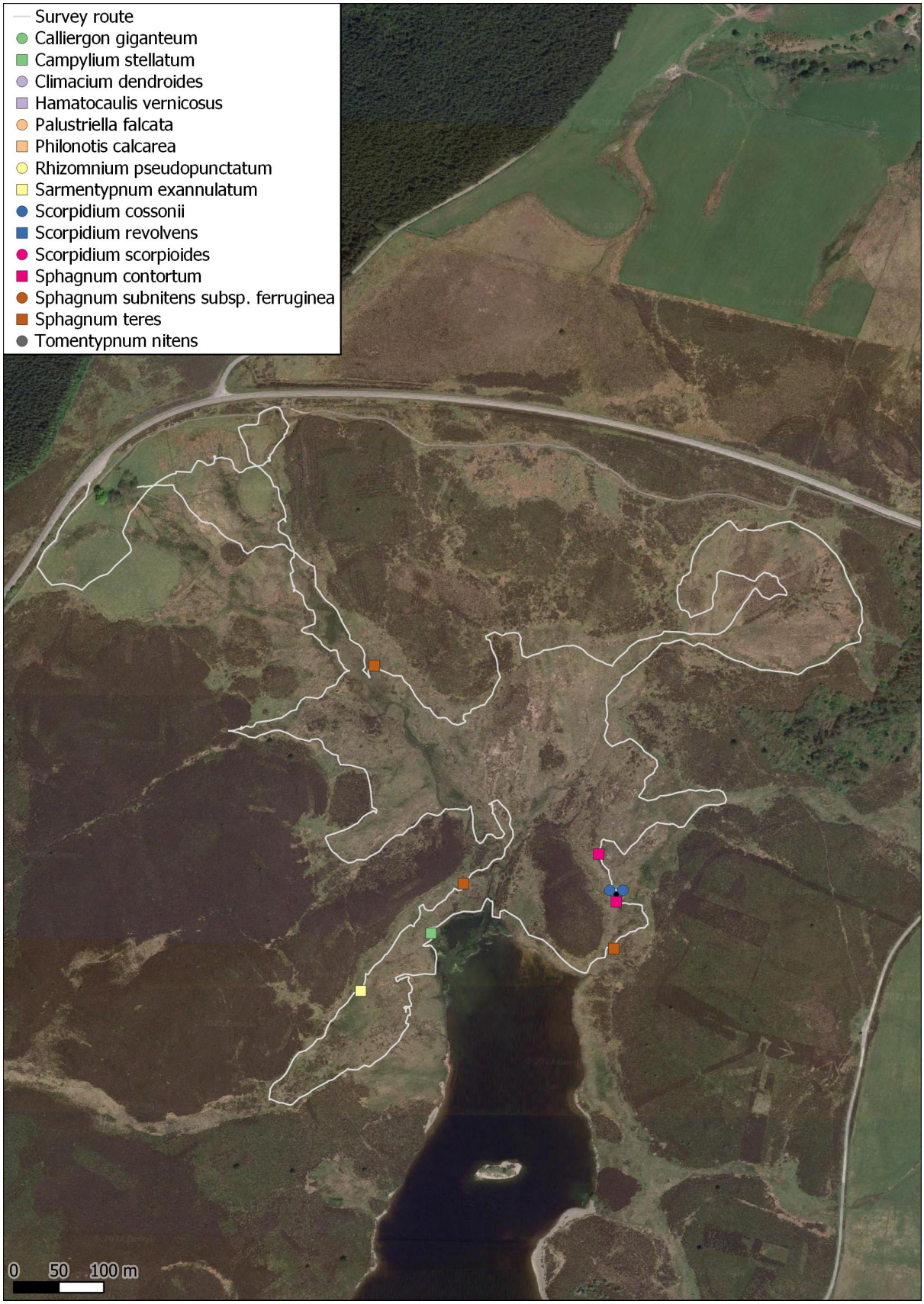

Figure 13. Survey route and location of species at Gors Maen Llwyd. Note: only species of conservation concern (*Hamatocaulis vernicosus* and *Tomentypnum nitens*) were mapped in detail during the present study. Locations of all other species comprise a representative sample.

Hafod Elwy Moor

The mire habitat comprises large expanses of species-poor M6c and M23 on the southern slopes, and smaller expanses on the northern slopes. A very small area, about 20 x 5 m, of M17 occurs along a bunded drain in the south-east of the site (SH95155614), with *Sphagnum papillosum, S. medium* and some other typical species. Mire bryophytes are poorly represented within the site and no species of conservation concern were found.

Table 5. Inventory of mire bryophytes and their frequency of occurrence at Hafod Elwy Moor.

Species	Frequency
Aulacomnium palustre	Occassional
Pellia epiphylla	Occassional
Sphagnum auriculatum	Frequent
Sphagnum cuspidatum	Rare
Sphagnum fallax	Abundant
Sphagnum medium	Rare
Sphagnum palustre var. palustre	Frequent
Sphagnum papillosum	Occassional
Sphagnum rubellum	Occassional

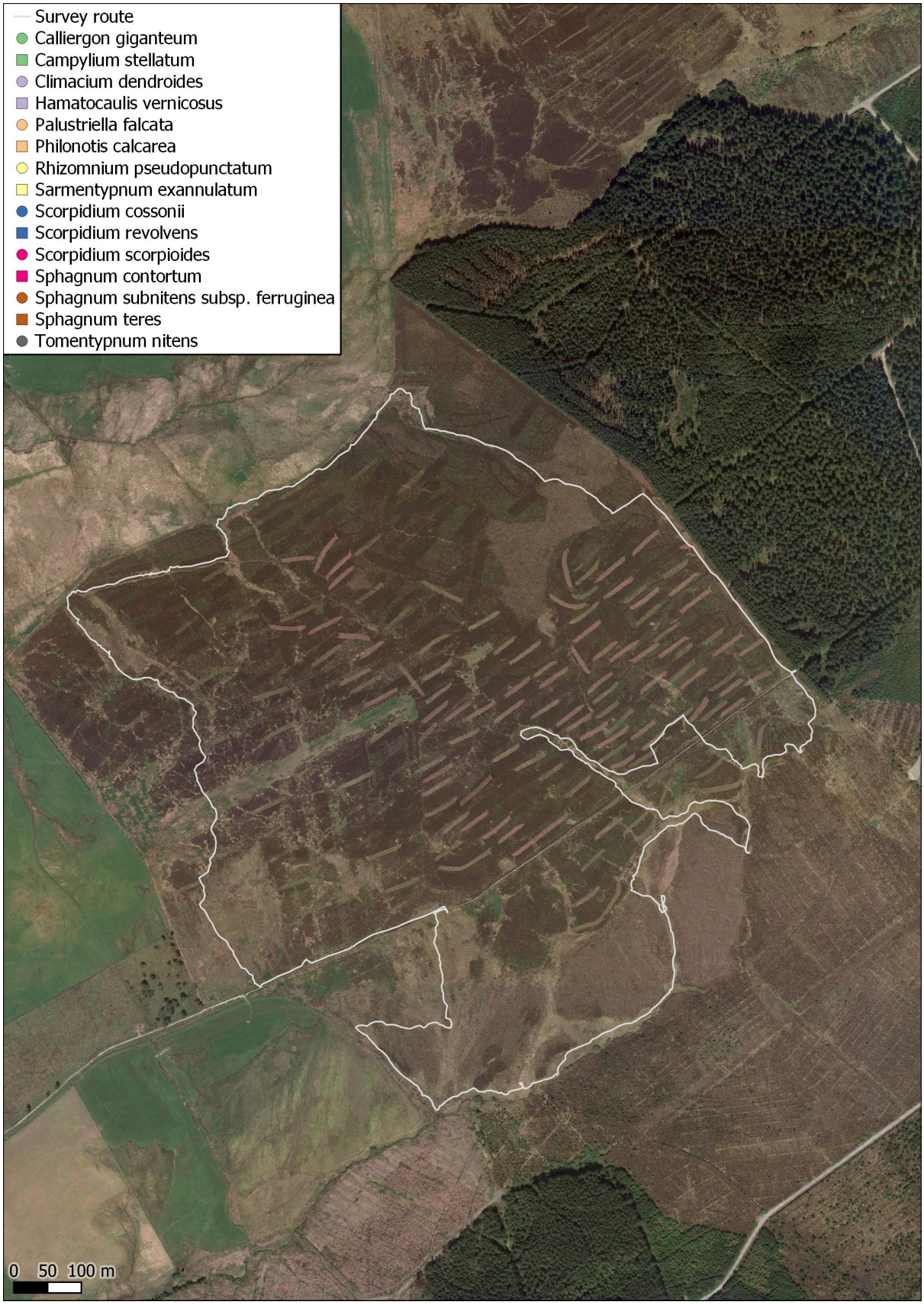

Figure 14. Survey route at Hafod Elwy Moor. No species of note were found.

Llyn y Foel Frech

The mire habitat is dominated by large expanses of species-poor M6c and M23, including on the hillsides, around Llyn y Foel Frech and in the valley bottoms. Some small areas of M18 vegetation occur, in which the bryophyte assemblage is limited and includes no bog liverworts. Small and scattered areas of neutral flush and M10 also occur, each assemblage rarely more than a few square meters in extent, often close to streams (Figure 15). Many of the M10 flushes contain only *Scorpidium cossonii*. M29 also occurs occassionally, with abundant *Sphagnum auriculatum*. Two location were found for *Hamatocaulis vernicosus*, including a large colony (13 individual-equivalents; Figure 16) and a very small colony (1 individual-equivalent; Figure 17), this being a new site for the species.

Table 6. Inventory of mire bryophytes and their frequency of occurrence in region of Llyn y Foel Frech.

Species	Frequency
Aneura pinguis	Rare
Aulacomnium palustre	Frequent
Calliergon giganteum	Rare
Calliergonella cuspidata	Frequent
Campylium stellatum	Occassional
Climacium dendroides	Rare
Ctenidium molluscum	Rare
Hamatocaulis vernicosus	Rare
Lophocolea bidentata	Rare
Palustriella falcata	Rare
Pellia epiphylla	Occassional
Philonotis calcarea	Rare
Philonotis fontana	Occassional
Plagiomnium elatum	Rare
Plagiomnium undulatum	Rare
Polytrichum commune	Abundant
Polytrichum strictum	Frequent
Rhizomnium pseudopunctatum	Rare
Riccardia multifida	Rare
Sarmentypnum exannulatum	Occassional
Scapania irrigua	Rare
Scorpidium cossonii	Occassional

Species	Frequency
Scorpidium revolvens	Rare
Scorpidium scorpioides	Occassional
Sphagnum auriculatum	Abundant
Sphagnum contortum	Occassional
Sphagnum cuspidatum	Frequent
Sphagnum fallax	Abundant
Sphagnum fimbriatum	Occassional
Sphagnum inundatum	Occassional
Sphagnum medium	Occassional
Sphagnum palustre var. palustre	Frequent
Sphagnum papillosum	Frequent
Sphagnum rubellum	Frequent
Sphagnum russowii	Rare
Sphagnum subnitens subsp. subnitens	Frequent
Sphagnum teres	Occassional

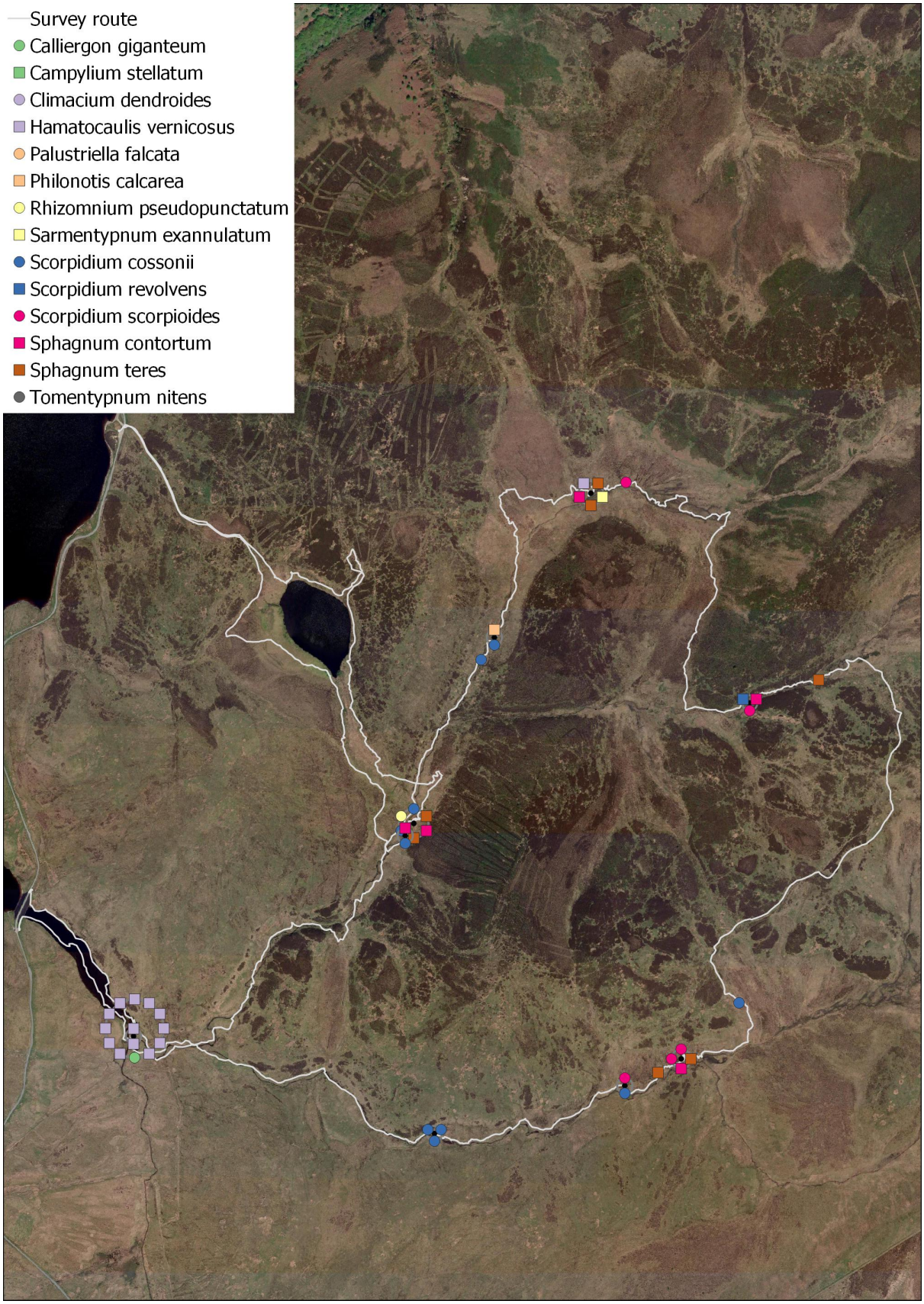

Figure 15. Survey route and location of species in region of Llyn y Foel Frech. Note: only species of conservation concern (*Hamatocaulis vernicosus* and *Tomentypnum nitens*) were mapped in detail during the present study. Locations of all other species comprise a representative sample.

Figure 16. Locations of *Hamatocaulis vernicosus*, including 13 individual-equivalents (occupied 1 m grid cells), spread along a well-grazed mire formed in an old channel of the adjacent stream. Associates include *Plagiomnium elatum, Calliergon giganteum, Climacium dendroides* and *Scorpidium cossonii*. SH9157458524.

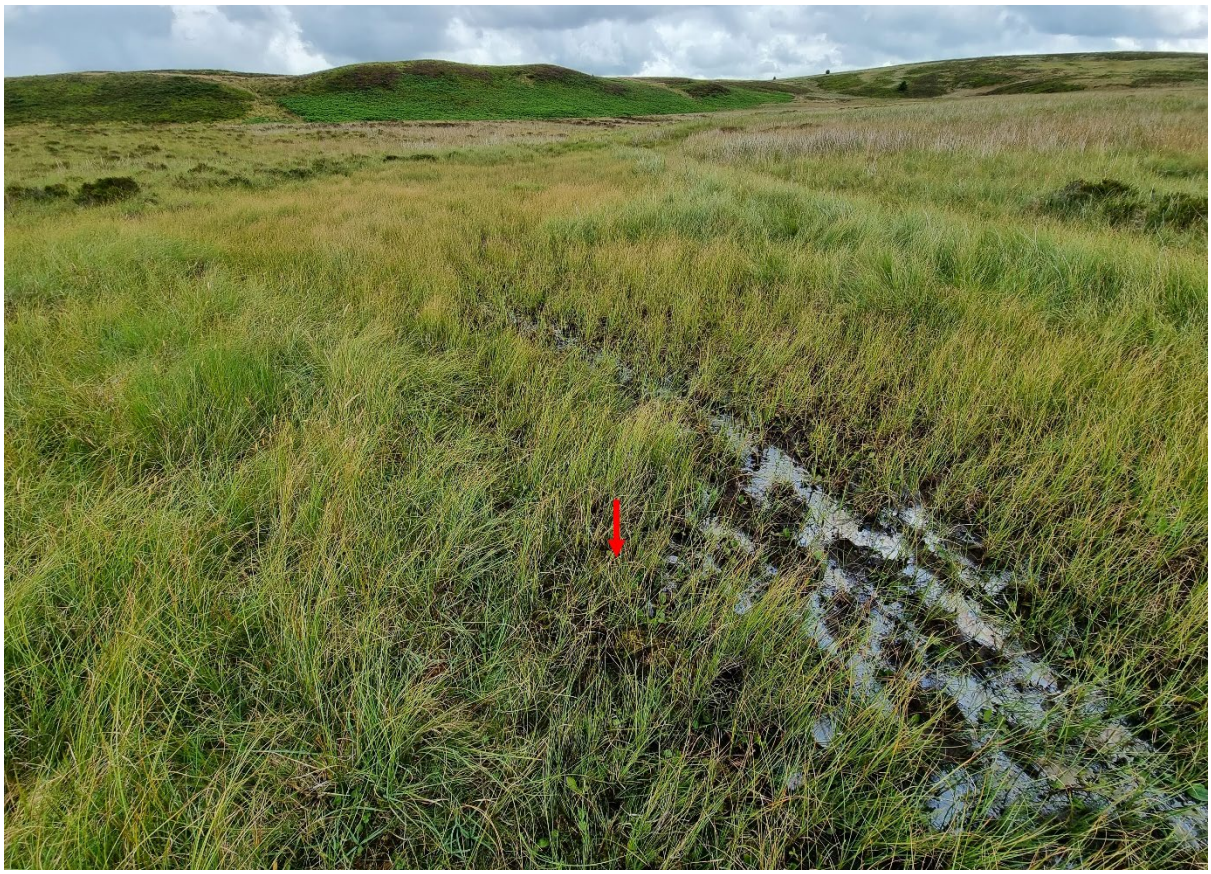

Figure 17. Location of *Hamatocaulis vernicosus*, including 1 individual-equivalent (occupied 1 m grid cells), alongside a rill. SH9250559610.

6. Acknowledgements

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7. References

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