Belmore Mountain ASSI

Site Dossier & Common Standards Monitoring (CSM) for Lichens 2023

(VC H33, Co. Fermanagh)



April Windle & John Douglass

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A report for NIEA, CEDaR & NMNI.

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Summary

- **Objectives:** this report details the findings of a five-day lichen survey of Belmore Mountain ASSI, in Co. Fermanagh (VC H 33), between the 7th – 11th August 2023. The site is comprised of a series of limestone escarpments and outcrops, and a raised plateau dominated by heathland/bog and flanked by old-growth woodland to the east and south east. This survey was commission by Northern Ireland Environment Agency (NIEA) and the Centre for Environmental Data and Recording (CEDaR) as a baseline Common Standards Monitoring of the lichen feature of the ASSI.

  Common Standards Monitoring (CSM) was initiated and is designed to assess the current condition of the lichen assemblage features of the ASSI. This is done by a review of the historical records and reports (site dossier) which are assessed in relation to the current lichen assemblages found at the site. Monitoring is then initiated through Direct Monitoring of individual thalli and/or communities and Indirect Monitoring for the wider habitat features. The work also provides management suggestions, designed to conserve and enhance lichen species and communities. This is the first time CSM has been implemented at Belmore Mountain ASSI, making this the baseline for future monitoring.

- **Historic Data:** After consulting the CEDaR and British Lichen Society Database, there has been 1 previous lichen visit in 2010 by Neil Sanderson to the scarp woodland to the east. This baseline CSM was a much-needed effort to collate existing information, generate new lichen data and establish monitoring. Especially as this was a baseline survey for the limestone and heathland habitats.

- **Results (species & habitats):** Lichens are a notified feature on the ASSI designation, where the main notable lichen assemblages include: ***Aspicilion calcareae*** **(limestone):** *Acarospora cervina, Aspicilia contorta subsp. hoffmanniana, Bacidia fuscoviridis, Caloplaca dichroa, Collema fragile, Collema polycarpon, Lecania cuprea, Merismatium deminutum, Opegrapha rupestris, Placynthium subradiatum, Porina byssophila, Protoblastenia lilacina, Pseudoleptogium diffractum, Sclerococcum griseisporodochium, Staurothele guestphalica, Toninia sedifolia, Toninia verrucarioides, Verrucaria parmigerella* and *V. pinguicula.* Most of these limestone records are new to the site and many are new to VC H33, with some new for Northern Ireland. ***Graphidion Pyrenula laevigata – Pyrenula occidentalis*** **(smooth bark):** *Arthonia graphidicola* (2010), *Mycomicrothelia confusa, Mycoporum antecellens, Opegrapha thelotrematis* (2010), *Pyrenula acutispora* (recorded new to the site in 2023), *P. laevigata* and *P. occidentalis.* ***Lobarion pulmonariae*** **(base-rich bark):** *Heterodermia obscurata, Leptogium cyanescens* (2010), *Nephroma laevigatum, N. parile* (2010), *Pannaria conoplea* (recorded new in 2023), *P. rubiginosa* (widespread), *Parmeliella parvula* (2010), *Pectenia atlantica* (2010), *Peltigera collina, P. horizontalis* (recorded new to the site in 2023) and *Protopannaria pezizoides, Sticta ciliata, S. fuliginoides, S. fuliginosa* s. str. *S. limbata* and *S. sylvatica. Lobaria pulmonaria* and *Pectenia cyanoloma* (recorded outside the ASSI). ***Parmelion laevigatae*** **(acid bark):** *Cetrelia cetrarioides* (2010), *C. monachorum* (2010), *C. olivetorum* s. lat., *Heterodermia obscurata, Hypotrachyna sinuosa, Megalaria pulverea* and *Micarea alabastrites.*

- **Results (notable species):** Across the 2010 and 2023 survey, 215 species of lichens and lichenicolous fungi have been recorded across the Belmore Mountain ASSI, in which 134 species were recorded new to the ASSI in 2023. The Threatened (CR, EN, VU), Near Threatened (NT) and Notable (NR, NS, IR) species recorded in the 2010 and 2023 survey

totalled at 56 TNTN species, including 1 Vulnerable (VU), 7 Near Threatened (NT), 8 Nationally Rare (NR), 28 Nationally Scarce (NS) and 23 International Responsibility (IR) species.

- **Results (ASSI Indices):** Various lichen indices were applied to each habitat, including the Heathland, Moorland and Coastal Heath Index (HMCHI scores 8), Limestone Index (LI scores 31), Southern Oceanic Woodland Index (SOWI scores 22). The site qualifies for ASSI designation for its lichens on the LI and SOWI.

- **ASSI Condition Assessment:** The overall condition assessment for the lichen feature at Belmore Mountain is Unfavourable. This is attributed to invading Sitka spruce on heathland, concerns surrounding air pollution and its associated evidence, *Cotoneaster* establishing along certain rockfaces and the increasing density of the understory in the scarp woodland.

- **Habitat Management: Rock:** Belmore Mountain ASSI is a hugely significant site for its lichens, yet faces a large range of threats and issues at the landscape scale. **Rocks:** ensure this habitat remains well-lit and ventilated to allow the development the lichen-rich flora. The priority is to manage the ivy, vascular vegetation and non-native invasives such as *Cotoneaster* that poses a threat to the lichen feature. **Heathland:** clear invading Sitka spruce from heathland sites as a matter of priority and the continuation of a suitable grazing regime. **Woodland:** Establish suitable levels of grazing/browsing in the woodland and ensure that richest trees on the upper slopes of the woodland are in optimum condition (ie. open & devoid of overshading vegetation managed). In the light of ash dieback, general guidance includes retaining all existing ash trees in-situ for as long as possible, retain and further promote tree species diversity, whilst ensuring existing areas of interest are in optimum condition and actively manage areas that could become potentially suitable in the future (Sanderson & Lamacraft, 2022). **Land use:** where possible, address large scale forestry of the periphery of the ASSI and short- to long- range issues regarding nitrogen pollution.

Front Cover: Photo at H 1402 4082 of Carrickmacsparrow facing east showcasing the undulating landscape of the Belmore Mountain, comprised of heathland and exposed limestone outcrops, bordered by coniferous plantations marking the ASSI boundary.

Citation: Northern Ireland Environment Agency (NIEA). 2026. Belmore Mountain Area of Special Scientific Interest (ASSI) - Lichen *Condition Assessment Report.* Windle, A. & Douglass, J.R. 2024, NIEA, DAERA.

A report for NIEA, CEDaR & National Museums.

- **April Windle** • **John Douglass**
  Email: april.windle@btinternet.com **Email:** jrdouglasslichens@gmail.com
  Mobile: 07969 345757 **Mobile:** 07798 532097

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Background

Introduction

Belmore Mountain ASSI is a 461-hectare site situated the south west of Enniskillen, in county Fermanagh (VC H33). For a relatively small area, Belmore exhibits a great diversity of geology and geomorphology which has resulted in a rich variety of habitats and associated wildlife. For lichens specifically, the ASSI supports a wide range of ecological niches, where over 215 species have been recorded to date.

Along the southern flank of the ASSI lies an impressive limestone escarpment called Carrickmacsparrow, with various other limestone outcrops in this area. Heading north from the scarp, is a raised plateau dominated by heathland, with a series of undulating limestone hills underneath. As a result, this landscape supports a mosaic of different habitats, including wet and dry heath, peatland, grassland, exposed limestone and woodland that contours perpendicular along the southern to eastern flank of the ASSI. This 2023 survey was the first time that the limestone exposures and heathland has been surveyed for their lichen interest.

The scarp woodland to the east of the ASSI was surveyed in 2010 by Neil Sanderson, as part of the Lichen Ireland Site Recording project (Sanderson, 2010) and was resurveyed in 2023. These are ash-birch-willow woodlands occupying a steep-sided slope, with an understory of holly, hazel and rowan. These woods are of great importance for their epiphytic lichen interest, including the *Lobarion pulmonariae* (base-rich bark community) and the oceanic node of the *Graphidion* (smooth bark community).

The following has been extracted from the DAERA ASSI citation (lichen feature)…

> *"Belmore Mountain supports an important assemblage of epiphytic lichens due to the diversity of available habitat, the mild wet Atlantic climate, good air quality and historical continuity of woodland cover. The most important locations for epiphytic lichens are the areas of woodland and scrub which still have a relatively open tree canopy due to grazing, or where unstable steep slopes have prevented a closed woodland canopy developing. This more open tree canopy provides the higher light levels which many lichens prefer. The main lichen community at Belmore is the baserich bark woodland community, which has developed on more open grown Willows Salix spp., but with smooth bark species found on Hazel Cory/us avellana, some acid bark species on Downy Birch Betula pubescens and occasional records on Ash Fraxinus excelsior in the darker stands lower in the wood. Lichen species of particular interest include Hypotrachyna sinuosa, which is a strongly oceanic species of twigs in humid sheltered sites, Degelia atlantica, a scarce species found in old woodlands in the west of Ireland and Protopannaria pezizoides, a very rare species which is widespread on the more open Willows Salix spp. in the upper scarp woodland".*

The ASSI citation is largely based on Neil Sanderson's epiphytic lichen survey in 2010, where the scarp woodland to the east of Belmore Mountain ASSI was investigated. However, during this survey, no attention was paid to the saxicolous lichen species on limestone or terricolous heathland lichens. This site exceeds the ASSI lichen threshold for limestone species (scores 31) and is undoubtedly one of the most important lichen sites in Northern Ireland for this community. The ASSI citation should be updated to reflect this and include the lichens on limestone and in addition, lichens occupying willow along forestry tracks, which currently lies outside the ASSI.

The geology, is described by DEARA as…

"The geology of the Belmore Mountain area exerts a strong influence on the topography and characterises the type and quality of the habitats present. Steep gradients to the north and east of the area are associated with the change from Dartry to Knockmore and then Glencar Limestones; these areas support most of the mature woodland. The majority of calcareous grassland is associated with mud mounds within the Knockmore Limestones at Carrickmacsparrow, Gortatole and Moneyouragan; whilst at Rahallan, the grassland has developed on the Glencar Limestone. The northern central plateau is underlain by the Glenade Sandstones, forming higher ground with poor drainage; this supports an area of blanket bog and wet heath.

The rocks of the Belmore Mountain area date from the Carboniferous period, some 350 million years ago. While dominated by limestone, the Belmore Mountain area also holds shale and sandstone rocks originally deposited as soft sediment in marine environments. The oldest rocks within the site are the fossiliferous Benbulben Shale Formation that outcrop in the east of the site below the younger Glencar and Dartry Limestone Formations.

The site also contains the type locality for the Carrickmacsparrow Limestone Member. It occurs near the top of the Dartry Limestone Formation in the Carrickmacsparrow townland and consists of some four metres of unbedded, fawn to medium-grey fine grained and coarse fossil-fragment rich limestone that displays sharp upper and lower contacts with the typical dark grey, cherty Dartry limestone. The fossil fragments are mostly less than 1mm in size and are dominated by crinoids with some brachiopod and bryozoan clasts present. The Carrickrnacsparrow Member becomes finer grained toward its top with more coarse, fossilfragment rich parts found in a matrix of fine grained pellets and calcite cement. It shows an absence of lime-mud, indicating deposition in active, turbulent water with strong currents and shallow water depths at or just below wave base. The occurrence of grading and erosional channels and crosslaminations indicates a probable origin as current-swept carbonate sandbars or shoals and is evidence of at least periodic shallow water conditions in the top part of the Dartry Limestone across the whole basin.

The geological significance of the Belmore Mountain area is enhanced by the presence of surface karst features that include episodic streams, swallow holes, dry valleys. collapse dolines, solution dolines. limestone gorges, natural arches and karst windows".

Conservation Objectives

ASSIs are designated under The Environment (Northern Ireland) Order 2002 (as amended) due to the area's flora, fauna or geological, physiographical or site other site selection features. The Environment Order places certain legal duties and requirements on all Public Bodies (DAERA, 2023). This is also the case elsewhere in the UK (devolved to the relevant statutory bodies), where there is an agreed approach to ensure the 'safeguarding, management and monitoring of ASSIs' (JNCC, 2019). This is through Common Standards Monitoring (CSM), where a set of common principles are used to monitor the condition of statutory sites.

The JNCC (2005) guidance was used to inform the Site Dossier and establishing Common Standards Monitoring for Belmore Mountain ASSI. The first section of this report is the **Site**

Dossier, which summarises all the existing data for the site, including historic information and recent baseline data generated through this survey. This section summarises which areas of the ASSI support the notified features, highlighting biological 'hot-spot' areas and overall condition status.

The second section of this report contains the **Common Standards Monitoring**, which provides a baseline to allow future monitoring of changes to the lichen features within the ASSI. The monitoring was largely informed by the Site Dossier and includes both direct (species/community level) and indirect (community/habitat level) monitoring of the lichen features.

Methodology

Desk-based Assessment

Information sources

The British Lichen Society (BLS) and the Centre for Environmental Data and Recording (CEDaR) national databases were consulted for all existing VC H33 (Co. Fermanagh) lichen records. Unpublished and published literature for the ASSI was also referred to, accessed from the BLS Grey Literature Inventory and lichenologists who have previously surveyed the site.

Table 1: Summary of historic surveys and incidental species records for Belmore Mountain ASSI. Data exported from the British Lichen Society and the Centre for Environmental Data and Recording (CEDaR) national databases.

Unknown	Recorder	Location	Comments
2010	Neil Sanderson	Scarp woodland to the east of Belmore Mountain.	92 records generated during the survey, with various notable species from the *Lobarion* (base-rich bark) and *Graphidion* (oceanic smooth bark). **Report: Sanderson, N.A. (2010) Lichen Ireland Site Recording: Belmore Mountain. Report for NIEA.**
2023	Douglass, J.R. & Windle, A.	Heathland, limestone & scarp woodland.	589 records generated during the survey. **Report: Windle, A. & Douglass, J.R. (2024) Belmore Mountain ASSI: Site Dossier and Common Standards Monitoring for Lichens (VC H33, Co. Fermanagh). A report for CEDaR & National Museums NI.**

Selecting Lichen Interest for the ASSI

The lichen interest for the ASSI was informed by the *Guidelines for the Selection of Biological SSSIs – Lichens (*Sanderson *et al.* 2018). Here, species of importance listed on the ASSI indices and the Threatened, Near Threatened & Notable (TNTN) species were selected and targeted as an initial list. The conservation status of species was derived from the Conservation Evaluation for British Lichens & Lichenicolous Fungi (Woods & Coppins, 2012) and the draft Irish Conservation Evaluation (Douglass & Coppins, *in prep*). The TNTN point score system (Sanderson *et al.* 2018) is summarised in Table 2.

Table 2: Threatened, Near Threatened and Notable Assemblage Scoring (Sanderson *et al.* 2018). More details on the following criteria can be found under the "Notable Species" section.

Conservation Evaluation	Threat / Distribution Status	Scores
GB Threatened (T)	Critically Endangered (CR)	4
	Endangered (EN)	
	Vulnerable (VU)	
GB Near Threatened (NT)	Near Threatened (NT)	2
Notable ** but neither T or NT*	International Responsibility (IR)	1
	Nationally Rare (NR)	
	Nationally Scarce (NS)	

Mapping Lichen Interest

All data, survey routes and direct monitoring plots from this survey have been mapped and can be found within this report. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.

Abbreviations

There are various abbreviations throughout this report relating to the conservation evaluations of lichens and lichenicolous fungi. The following information is extracted from Woods & Coppins (2012) and Sanderson et al (2017).

- **IUCN Red List Threat Categories, Abbreviations: EX** – Extinct, **CR** – Critically Endangered (taxa that meet CR criteria and are at high risk of extinction in the wild), **EN** – Endangered (taxa that meet EN criteria and are at high risk of extinction in the wild), **VU** – Vulnerable (taxa that meet VU criteria and are at high risk of extinction in the wild), **DD** - Data Deficient (in most cases, species have recently been found in GB and there is insufficient data available for evaluation), **NT** – Near Threatened (when taxa do not qualify for CR, EN or VU status, but are close to qualifying least or is likely to qualify in the future, and **LC** – Least Concern.

- **Other abbreviations: NE** – Not Evaluated (conservation status of the taxa has not yet been evaluated), **E** – Endemic (i.e. taxa recorded only from the British Isles), **IR** – International Responsibility (likely Britain supports 10% of the extant European and/or global population, however, further research is required), **NR** – Nationally Rare (taxa that are recorded from 1-15 hectads), **NS** – Nationally Scarce (taxa that are recorded from 16 – 100 hectads, **P** – Priority BAP species (taxa listed within the Biodiversity Action Plan) and **S8** – Schedule 8 (taxa listed on Schedule 8 of the Wildlife & Countryside Act 1981).

- **Taxa on published lists of principal importance: Eng** – England (taxa listed under Section 41 of the NERC Act 2006), **Sc** – Scotland (taxa listed under Section 2 of the Nature Conservation Act 2004) and **Wa** – Wales (taxa listed under Section 42 of the NERC Act 2006).

Fieldwork

Site access

The Northern Ireland Environment Agency sorted landowner persmissions prior to the survey.

Survey Dates & Weather Conditions
A total of five days fieldwork was completed on the 7th – 11th August 2023, with varying weather conditions throughout the survey period but mainly overcast and drizzle. For fieldwork, rain, either during or prior to fieldwork often made identification difficult, due to saturated and swollen lichens. Specific survey dates, field conditions and recommendations can be found for each Direct Monitoring Plot (Appendix 1).

Species Recording
Lichen interest was recorded using a Garmin GPSmap 64, with an accuracy ranging between +/- 3m and +/- 6m. This was recorded in a field notebook or the GPX files generated on the GPS device were exported to .CSV/.SHP format and the associated field notes were added to the waypoints. The routes taken for each survey day were tracked by the Outdoor Active navigation app. These files were then exported to QGIS and mapping outputs can be found in the "Areas Surveyed" section. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.All records generated have been submitted to the British Lichen Society National Database, which subsequently makes its way on to the Centre for Environmental Data and Recording (CEDaR) national database and the National Biodiversity Network's Atlas.

Direct Monitoring Plots
All Direct Monitoring Plots (DMPs) are listed in Appendix 1 and were established for lichens of conservation interest, contributing to the overall condition assessment of the ASSI. For each species, various information was collected including grid references, habitat, management concerns, associated species and health/viability of the lichen interest. The plots have been established as a baseline to ensure repeatable monitoring in the future.

Indirect Monitoring & Condition Assessment
Condition assessments for each ASSI unit were assessed by the Woodland lichens (Special habitat 28) and Upland Cliffs and Block Scree (Special habitat 34) attribute and target tables (JNCC, 2005). Site level issues with regards to structure, composition, regeneration and shade were listed during fieldwork and are summarised in Appendix 3.

Additional Recording
An effort was also made to generate a complete species list, to further contribute and update the knowledge of the site. This additional recording gives a wider overview of the species and communities present, and should be used in conjunction with the Direct Monitoring Plots for the condition assessment.

Field Materials & Equipment
- Species records, previous reports and distribution maps.
- OS map of the site and printed versions for annotation.
- Garmin GPS map 64, Outdooractive app (iPhone) and compass.
- Tape measure or something for scale.
- Olympus TG 4 & 6 cameras for macro photographs.
- Samsung S10 note for a variety of shots.
- iPhone 13 pro for landscape shots.
- Pins and markers to highlight lichens in the field.
- X10 Lichen candelaris magnification lens.

- Chemicals for spot testing including K (potassium hydroxide), C (Sodium Hypochlorite) & Pd (*para*-phenylenediamine).
- Lichens of GB & Ireland (ID Guide – electronic).
- Historic reports for the site (electronic).
- Hammer and chisel, knife and secateurs for the removal of specimens.
- Packets of varying sizes for specimens.
- Notebook & pen.

Results

New, Rare and Interesting (NRIs)

- ***Acarospora cervina.*** Irish status: DD, NR. Only 1 previous record for Ireland (BLS unlocalised, W. Donegal)**.**

- ***Collema fragile.*** Irish status: NT, NS, IR. 2nd record for Northern Ireland. This species is classed as VU and a UK BAP species in the UK (Woods & Coppins 2012).

- ***Collema polycarpon*.** Irish status LC. Rare in Northern Ireland (only 4 known sites). Occasional in the west on limestone associated with long ecological continuity.

- ***Graphina ruiziana.*** Irish status: LC, IR. A southern oceanic woodland species that tend to occupy the smooth bark of trees, but is rare in Northern Ireland (a few sites in Fermanagh).

- ***Heterodermia obscurata.*** Irish Status NT, NS. Only 8 modern records for Ireland. A species of ancient wet woodland. Found at Belmore on track from Pollnagollum Cave and within the scarp woodland, outside Belmore Mountain ASSI.

- ***Lobaria pulmonaria.*** Found on willow near Pollnagollum Cave, just outside Belmore Mountain ASSI. Irish Status: Rare in Northern Ireland, IR. Recorded in Northern Ireland mainly from Fermanagh and 2 old records from Antrim (Great Deer Park 2km S. of Glenarm 1972 and an un-localised 1960's record). A species mainly of old woodland in western Ireland. The willow woodland which has allowed the species to persist along the tracks which lead to Belmore Mountain ASSI supports a number of *Lobarion* species, many of which are now threatened on an International scale. These willow wood should be surveyed fully and conserved with the rare species monitored.

- ***Merismatium deminuta* (LF).** Irish status: NS. New for NI.

- ***Micarea adnata.*** Irish status: NS. New for Fermanagh. An old woodland species, known from only 8 hectads in Ireland.

- ***Pannaria conoplea.*** Irish status: IR. Rare in Northern Ireland. Only known from a few sites in Fermanagh and one old record from Antrim. A species within the *Lobarion* community of ancient woodland.

- ***Pectenia cyanoloma.*** Irish Status NS, IR. A recent split from *Degelia plumbea* s. lat. A member of the *Lobarion* community of ancient woodland. This species was recorded on willow outside of the ASSI.

- ***Peltigera collina.*** An uncommon species of old woodland in western Ireland. This species is a relatively rare in Northern Ireland, where this species mainly resides in Fermanagh.**,** in addition to 2 sites in Londonderry a single old record for Antrim. Locally frequent in the woodland leading from Pollnagollum Cave, outside the ASSI. Also occasional in the northern section of woodland E. of the scarp on willow and hazel.

- ***Placynthium hungaricum.*** cf. grey pruinose *Placynthium* (fertile) spores 1 septate, 9-11 x 4-5. The spores appear a little small for *P. hungaricum*? *P. hungaricum* is a very rare species of limestone and only known in Britain from the Great Orme, Wales and a possible record in Derbyshire. A specimen thought to be this species was recorded for Murlough Bay, Antrim but a fertile specimen collected in 2023 turned out to be *P. garovaglioi*. For now, *P. hungaricum* has been attributed to the material at Belmore, but further molecular work is required.

- ***Placynthium subradiatum****.* Irish Status: NS. Rare in NI (only known from 3 other sites). Very rarely seen fertile, as seen at Belmore. 2nd record for Fermanagh.

- ***Protoblastenia lilacina.*** Irish Status: DD, NR. New to Fermanagh. 3rd record for Ireland. 2nd record for NI. Previously known only for Clare and Antrim. Probably under recorded but only found on hard limestone with long ecological continuity.

- ***Pseudoleptogium (Leptogium) diffractum*** Irish status: NT, NS. 2nd modern record for NI (only known in NI for Fermanagh). A rare species of western limestone sites with long ecological continuity.

- ***Pyrenula acutispora.*** Irish Status: VU, NR. 2nd record for Northern Ireland. Only recorded once for Northern Ireland Fermanagh (un-localised 1960). Also known for Clare and N & S Kerry. An ancient woodland species, distinctive in the excentric to lateral perithecial ostiole.

- ***Pyrenula laevigata*** Irish Status: IR. Rare in Northern Ireland. Known for only a few sites in Fermanagh and one site in Londonderry. A species of mostly western ancient woodland.

- ***Sclerococcum griseisporodochium.*** New for Ireland. Irish Status: DD, NR. UK status NT. A very rare species of shaded tufa and limestone. Found on shaded limestone in the woodland east of the scarp. Known in the UK from only E. Lothian Lismore Island, Argyll and now Belmore). This species produces distinctive, grey-mauve sporodochia.

- ***Staurothele guestphalica.*** New for Northern Ireland. Irish Status: NT, NR. A rare limestone pyrenocarp.

- ***Sticta ciliata.*** Irish status: DD, NS, IR. A recent split from the *Sticta fuliginosa* aggregate. A species of the *Lobarion* community of ancient woodland. Identified by the rounded outline, with recurved and crenulate margins (mature lobes). Young lobes are usually flat with marginal cilia. Numerous (microscopic) papillae on the outside walls of the cyphella membrane can help to confirm this species. The presence of apothecia also helps to confirm this species, however *S. fuliginosa* s.str. can rarely have apothecia (both have ciliate apothecia). Found in the woodland leading from Pollnagollum Cave and in northern section of the woodland, east of the scarp on willow and hazel.

- ***Sticta fuliginoides*** Irish status: DD, NR, IR. A recent split from the *Sticta fuliginosa* aggregate. This *Sticta* is distinctive in forming trumpet shaped thalli, steep sided and usually taller than wide, with steep sides. Marginal cilia are only associated with damaged areas. A species of the *Lobarion* community. Only found on willow in the woodland outside the ASSI leading from Pollnagollum Cave.

- ***Toninia verrucarioides* (LF).** Irish status LC. A lichenicolous fungus usually found on *Placynthium* sp. Relatively few records in NI and only found in limestone areas of long ecological continuity.

- ***Verrucaria parmigerella.*** A rare limestone pyrenocarp with a distinctive oily looking olive coloured thallus. New for Northern Ireland. Irish Status: NT, NS.

- ***Vezdaea stipitata.*** Irish Status: VU, NR. Second record for Northern Ireland, where it is also known at Big Dog ASSI, Fermanagh. Found on willow in wet woodland just north of ASSI boundary. Only 1 previous record for Republic of Ireland (Killarney).



Figure 1: The Nationally Scarce *Acarospora cervina*, with its small and scattered squamules, where the young have a dense covering of pruina which is lost as the lichen matures and is only confined to the margins in the older squamules.



Figure 2: The gelatinous thallus of *Collema fragile* with its radiating lobes. The characteristic feature of this jelly lichen is the white and pubescent apices of the lobes. The thallus forms neat and compacted rosettes with radiating margins.



Figure 3: The gelatinous thallus of *Collema polycarpon*, with its ascending lobes (especially in the centre of the thallus, which often channels towards the margins. The apothecia are numerous and terminally orientated on the lobes. Recorded at Carrickmacsparrow, Belmore.



Figure 4: The thallus of the Near Threatened *Heterodermia obscurata* forming a rosette among the mosses. Lip-shaped soralia form on the margins, with orange patches on the underside and neat rhizines.



Figure 5: A large thallus of *Lobaria pulmonaria* growing on the willow along a forestry track outside of the ASSI. This species was not recorded within the ASSI. This was the only time this species was recorded during the 2023 survey.



Figure 6: The purple to grey thallus of *Pannaria conoplea,* recorded new to the ASSI in 2023. This species has a dense covering of isidia over the surface of the thallus, unlike *P. rubiginosa,* where the isidia are absent and is abundantly fertile instead.



Figure 7: Sterile *Pectenia cyanoloma* with *Normandina pulchella* on a single willow leading from Pollnagollum Cave to Belmore Mountain ASSI. This is the only time this species was recorded (outside of the ASSI).



Figure 8: The foliose thallus of *Peltigera collina* growing ona mossy willow leading from Pollnagollum Cave to Belmore Mountain ASSI. A large and fertile population of this species was also recorded on large willows in the upper scarp woodlands.



Figure 9: The unidentified *Placynthium* species, but fertile material was recorded as *P. hungaricum* cf. until further molecular work can confirm the identification. The thallus is comprised of a series of small isidiate squamules with a covering of pruina.



Figure 10: Fertile *Placynthium subradiatum* on limestone, Belmore. This species starts off by forming complete rosettes, which then forms hollow rings / narrows arcs as the thallus dies away from the centre. This species is rarely found fertile.



Figure 11: *Protoblastenia lilacina* with a striking violet pigment in the hypothecium. This was recorded new for Co. Fermanagh in 2023, making this the second record for this species in Northern Ireland.



Figure 12: *Pseudoleptogium (Leptogium) diffractum* forming discrete patches upto 1cm. This species starts off with a series of small, lobed areoles that then become confluent and form much larger patches.



Figure 13: The Near Threatened *Pyrenula acutispora* forming mosaics on the smooth bark of the hazel stems. This species is characterised by large perithecia and an offset ostiole, which is identifiable under close inspection in the field. Found on a single hazel stool at Belmore.



Figure 14: The thallus of *Pyrenula laevigata*, a specialist of smooth bark in oceanic woodlands. This species is characterised by the white to immersed thallus, with black perithecia (large fruits) and pycnidia arranged in distinct lines. Found on a single hazel stool.



Figure 15: The Near Threatened and Nationally Rare *Sclerococcum griseisporodochium* growing on a sheltered, east-facing limestone outcrop within a woodland setting. This species was growing in mass abundance and was recorded new to Ireland (H 14717 42705).

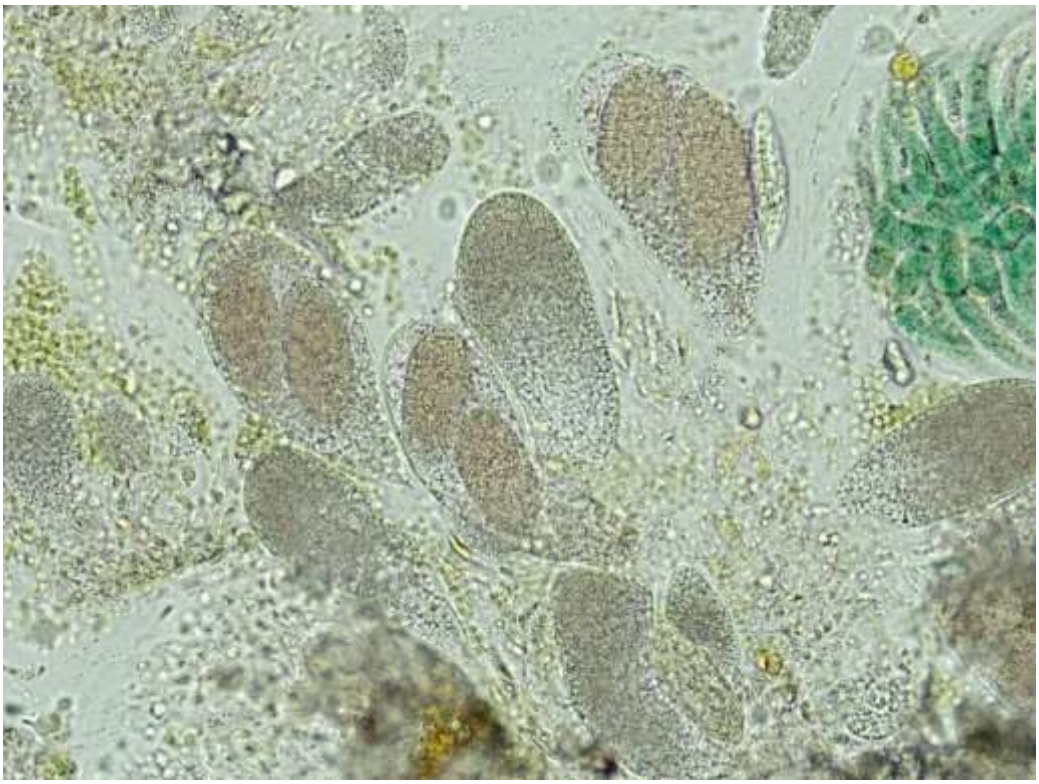


Figure 16: The 2 spored asci with muriform ascospores of *Staurothele guestphalica* which separates this species from *S. caesia*. Found on limestone at Belmore Mountain ASSI. This species was recorded new for Northern Ireland in 2023.



Figure 17: The scattered squamules of *Toninia verrucarioides* overgrowing *Placynthium nigrum,* which was locally frequent in this area of limestone. This species scores on the ASSI Limestone Index.



Figure 18: *Verrucaria parmigerella* on limestone, Carrickmacsparrow, Belmore. This species is characterised by the sometimes immersed, but dark grey thallus, with a glossy upper surface. The perithecia are almost completely immersed in pits in the rock.



Figure 19: Close-up of *Verrucaria parmigerella*, recorded new to Ireland with its shiny thallus going from a white green to grey-green, with the distinct halo-ing with a small perithecia in the centre. This species is an indicator of high-quality limestone sites.

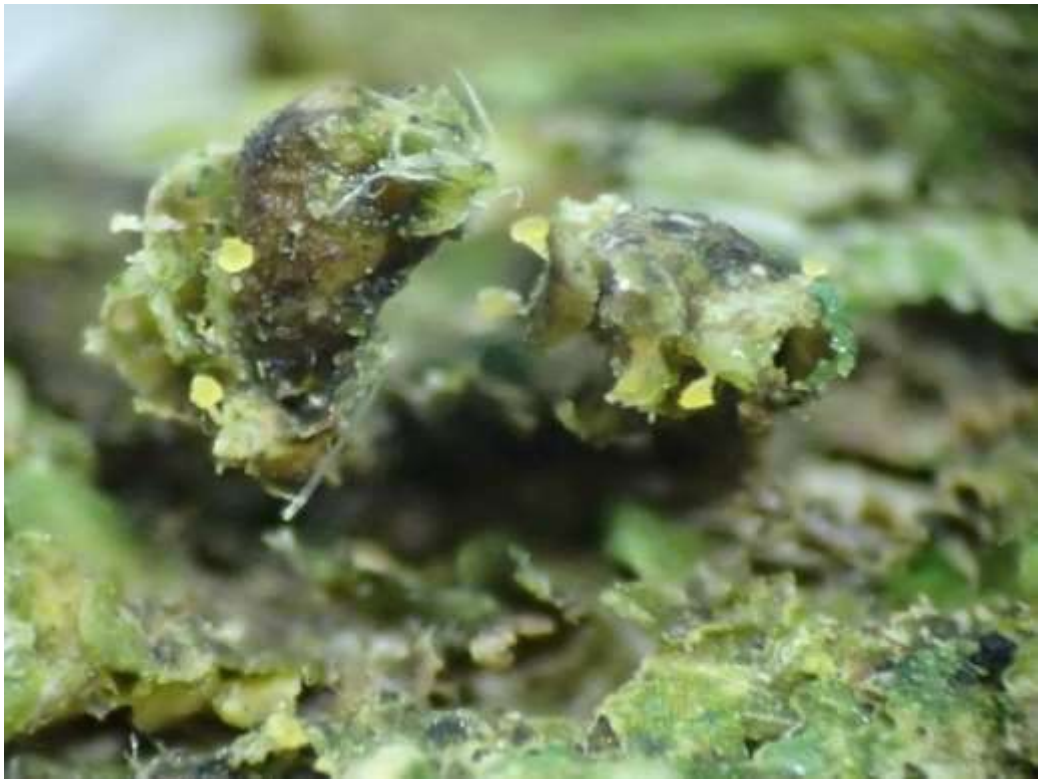


Figure 20: *Vezdaea stipitata* - 2nd record for Northern Ireland. Found on willow in wet woodland just north of ASSI boundary. Only 1 previous record for ROI (Killarney). This species has an indistinct, thin & filmy thallus, with tiny mushroom-like apothecia.

Lichen Species & Communities

- ***Aspicilion calcareae* (limestone):** This is a varied lichen community, which is comprised of a wide variety of sub-associations, where the following species were recorded in 2023. This community is dominated by *Caloplacas*, *Collemas, Scytiniums* and pyrenocarps including *Thelidiums* and *Verrucarias.* Species include: *Caloplaca cirrochroa, C. dichroa, C. flavescens, C. flavocitrina* and *C. oasis; Collema auriforme, C. crispum* var. *crispum, C. cristatum* var. *cristatum, C. fuscovirens, C. polycarpon* and *C. tenax* var. *tenax.* Here, the IUCN Vulnerable *Collema fragile* was recorded. *Scytiniums* include species formerly known as *Leptogiums,* including: *S. gelatinosum, S. plicatile, S. pulvinatum, S. schraderi* and *S. turgidum.* Large populations were recorded of *Pseudoleptogium diffractum,* a Near Threatened and Nationally Scarce species and *Staurothele guestphalica* a Data Deficient (DD) Nationally Rare (NR) species new for Northern Ireland. *Verrucaria* species that were recorded include *Verrucaria baldensis, V. caerulea, V. dufourii, V. nigrescens* f. *nigrescens, V. pinguicula* and *Verrucaria viridula.* There were good populations of the Nationally Scarce *V. parmigerella,* which was often recorded growing on the damp interface between vegetation and exposed rock.

  On the limestone, in both sheltered and exposed conditions, the following species were recorded: *Acarospora cervina* (Nationally Scarce), *Acrocordia conoidea, A. salweyi, Belonia nidarosiensis, Bilimbia sabuletorum, Botryolepraria lesdainii, Clauzadea immersa, C. monticola, Dermatocarpon miniatum and Placynthium nigrum.* On the limestone cliff *an* extensive area supported a pruinose and fertile *Placynthium* species. When investigated under the microscope, the material appeared to be *Placynthium hungaricum* (NR), albeit the spores being slightly too small for this species. This is the name that has been attributed to the record, until molecular work is undertaken to reach an accurate species identification.

  Various *Protoblastenia* species were also recorded, including *P. calva, P. incrustans, P. lilacina* (NR) and *P. rupestris.* The Nationally Rare *Protoblastenia lilacina* is likely locally abundant in this area and is only known from one other site in Northern Ireland. Other lichens recorded include *Romjularia lurida, Solorina saccata, Thelidiums* including *T. decipiens, T. incavatum* and *T. papulare* f. *papulare. Toninia aromatica, T. sedifolia* and *Toninia verrucarioides* were also recorded, with the latter parasitising *Placynthium nigrum.*

  In the woodland along the east scarp, and shaded limestone outcrop was recorded to support *Sclerococcum griseisporodochium,* determined by Brian Coppins and was recorded new for Ireland.

- ***Cladonia* (heathland) communities:** The heathland showcased good age profile of heather, but areas of bare peat/soils were limited which proves a particularly important niche for the development of *Cladonia* heath, hence why species were limited. The *Cladonias* recorded include *Cladonia ciliata* var. *tenuis, Cladonia diversa, Cladonia floerkeana, Cladonia pocillum, Cladonia portentosa, Cladonia ramulosa, Cladonia rangiformis* and *Cladonia uncialis* subsp. *biuncialis*

- ***Graphidion Pyrenula laevigata – Pyrenula occidentalis* (smooth bark):** This is an assemblage of lichens that develops on trees with smooth bark in oceanic to hyperoceanic to hyperoceanic areas. At Belmore Mountain, this community was best developed on hazel stands, where the young and mature stems supported mosaics of smooth bark species.

Many common and widespread species were recorded here including those within the genera *Graphis, Graphina* and *Pertusaria,* alongside *Enterographa crassa, Pyrenula macrospora* and *Thelotrema lepadinum.*

The rarer members of this alliance include *Arthonia graphidicola* (2010), *Mycomicrothelia confusa, Mycoporum antecellens, Opegrapha thelotrematis* (2010), *Pyrenula acutispora* (recorded new to the site in 2023), *Pyrenula laevigata* and *Pyrenula occidentalis.* This hyperoceanic node is extremely scarce across Northern Ireland, making Belmore Mountain a site of high conservation significance.

- ***Lobarion pulmonariae* (base-rich bark):** The community occupies the base-rich bark of trees in old woodland settings, that are subject to clean air and an oceanic climate. This community was best developed on the old willows along the western edge of the scarp woodland, where light levels were high and gentler slopes allowed stands to veteranise.

  This mainly constituted macro-*Lobarion* species, including *Heterodermia obscurata, Leptogium cyanescens (*2010), *Scytinium (Leptogium) lichenoides, Mycobilimbia epixanthoides, Nephroma laevigatum, N. parile* (2010), *Normandina pulchella, Pannaria conoplea* (recorded new in 2023), *P. rubiginosa* (widespread), *Parmeliella parvula* (2010), *Pectenia atlantica* (2010), *Peltigera collina, P. horizontalis* (recorded new to the site in 2023) and *Protopannaria pezizoides* was widespread. Various *Stictas* were recorded, including *Sticta ciliata, S. fuliginoides, S. fuliginosa* s. str., *S. limbata* and *S. sylvatica.*

  In 2023, *Lobaria pulmonaria* and *Pectenia cyanoloma* were recorded on a willow along a forestry track outside of the ASSI. These species should be excluded from the overall list for the ASSI, but are notable and significant nonetheless. The willow woodlands bordering the forestry tracks are of great conservation significance and conservation measures should be employed here to secure their future, through appropriate management.

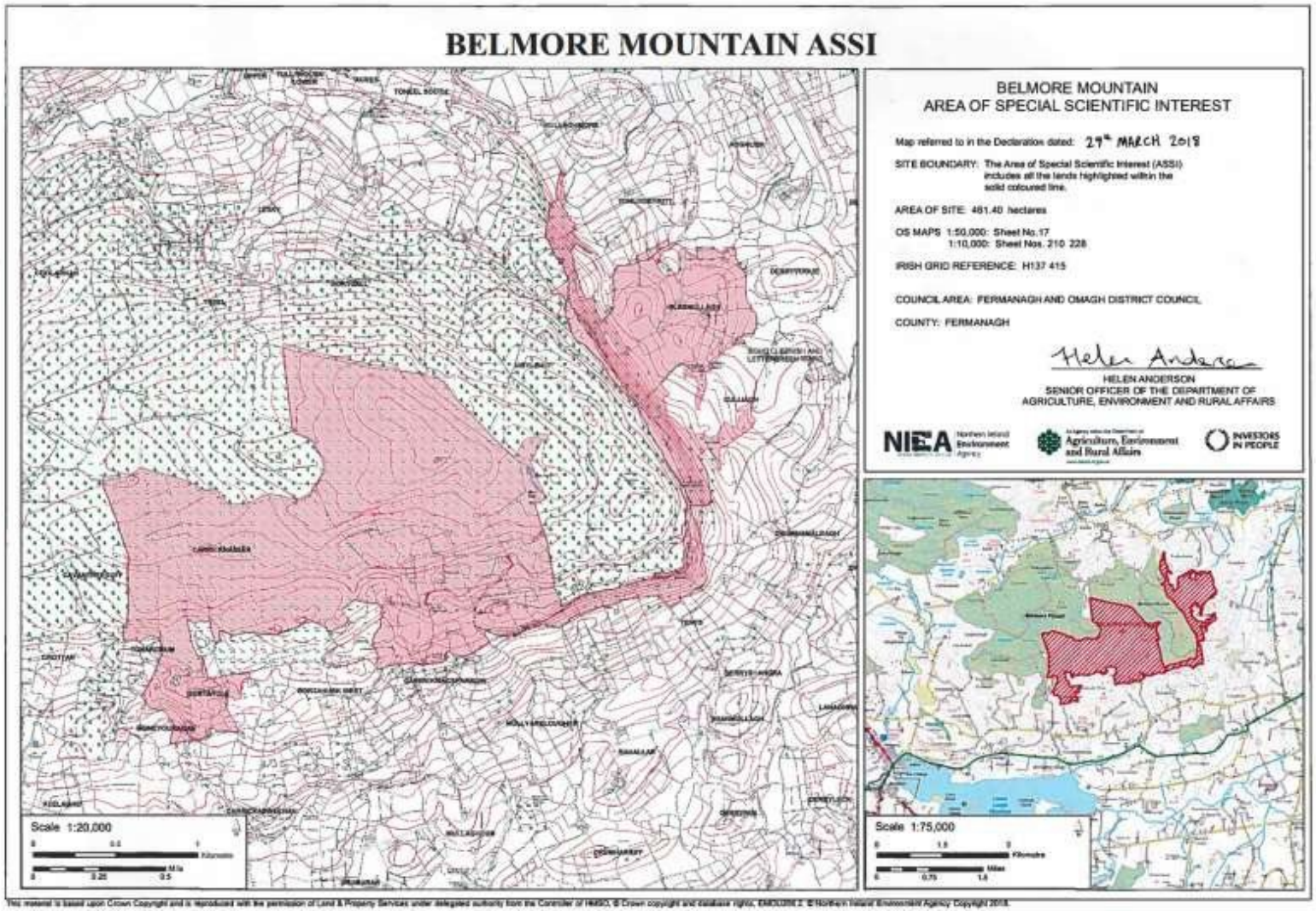
- ***Parmelion laevigatae* (acid bark):** This species occupies the leached acid bark, in high rainfall situations and was relatively species-poor within the woodlands, due to limited habitat availability. Despite this, noteworthy species were still recorded including: *Cetrelia cetrarioides* (2010), *C. monachorum* (2010), *C. olivetorum* s. lat., *Heterodermia obscurata, Hypotrachyna sinuosa, Megalaria pulverea* and *Micarea alabastrites.* When encountered, this community was recorded on birch and willow, were on the latter was best developed on the younger branches and twigs.

Direct Monitoring Plots

This section summarises the Direct Monitoring Plots (DMPs) established during the 2023 survey, providing a baseline for repeatable monitoring. The table below corresponds with the DMPs listed in Appendix 1, which are also supplemented by target notes. The direct monitoring here should be used in conjunction with the indirect monitoring established in Appendix 2.

Table 3: Direct Monitoring Plots established across Belmore Mountain ASSI, to be used as a baseline for repeatable monitoring for future condition assessments of the lichen feature.

DMP	Area	Grid Reference	Species
DMP 1	Belmore Mountain	H 14462 41292	Possible *Placynthium hungaricum*
DMP 2	Carrickmacsparrow	H 14025 40822	*Pseudoleptogium diffractum & Verrucaria parmigerella*
DMP 3	Carrickmacsparrow	H 14025 40822	*Pseudoleptogium diffractum & Verrucaria parmigerella*
DMP 4	Carrickmacsparrow	H 14312 40703	*Protoblastenia lilacina*
DMP 5	Carrickmacsparrow	H 14610 40872	*Pseudoleptogium diffractum* and *Placynthium subradiatum.*
DMP 6	Woodland – east scarp	H 14725 42711	*Pyrenula acutispora* & *Sclerococcum griseisporodochium*
DMP 7	Woodland – east scarp	H 15095 42127	*Pyrenula acutispora*
DMP 8	Woodland – east scarp	H 14720 42698	*Graphina ruiziana*
DMP 9	Woodland – east scarp	H 14744 42642	*Pannaria conoplea, P. rubiginosa, Protopannaria pezizoides & Sticta sylvatica*
DMP 10	Woodland – east scarp	H 14843 42502	*Pannaria conoplea, P. rubiginosa, Protopannaria pezizoides & Sticta sylvatica*
DMP 11	Woodland – east scarp	H 15113 42093	*Peltigera horizontalis*
DMP 12	Woodland – east scarp	H 15144 42053	*Pyrenula laevigata*
DMP 13	Woodland – east scarp	H 15153 42037	*Pannaria conoplea* & *Sticta spp.*
DMP 14	Woodland – east scarp	H 15160 42020	*Pyrenula occidentalis*
DMP 15	Woodland – east scarp	H 15183 41935	*Peltigera collina*
DMP 16	Woodland – south scarp	H 15392 41031	*Acarospora cervina* & possible *Placynthium hungaricum* cf.



Map 1: The boundary map of the ASSI, extracted from the ASSI citation – Northern Ireland Environment Agency (NIEA, 2018).

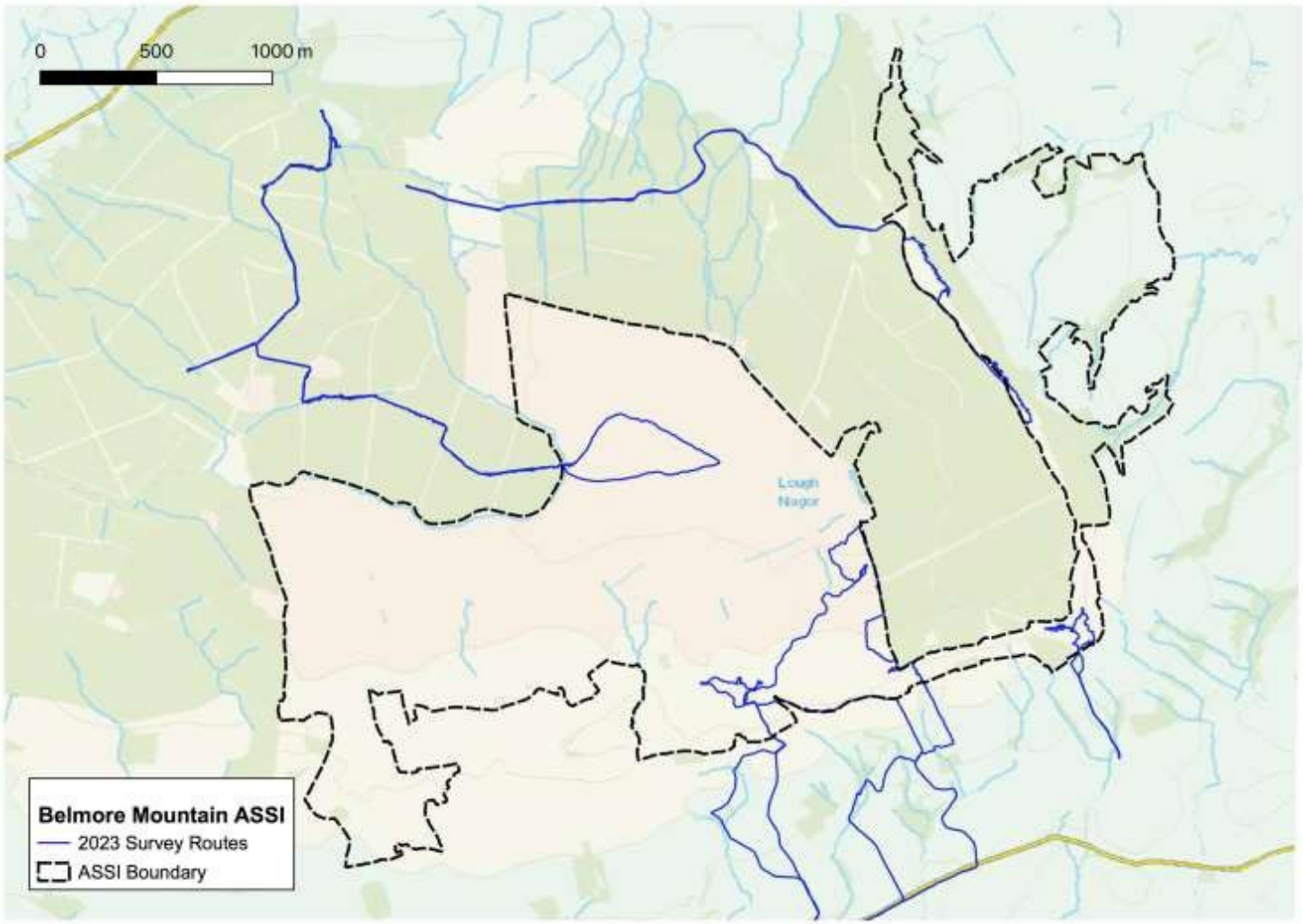


Map 2: Historic Ordnance Survey C. Fermanagh maps (six inch to the mile) – Sheet 26. Surveyed 1834, Engraved 1935, Printed 1835. Reproduced with the permissions of National Library of Scotland under CC-BY (NLS).

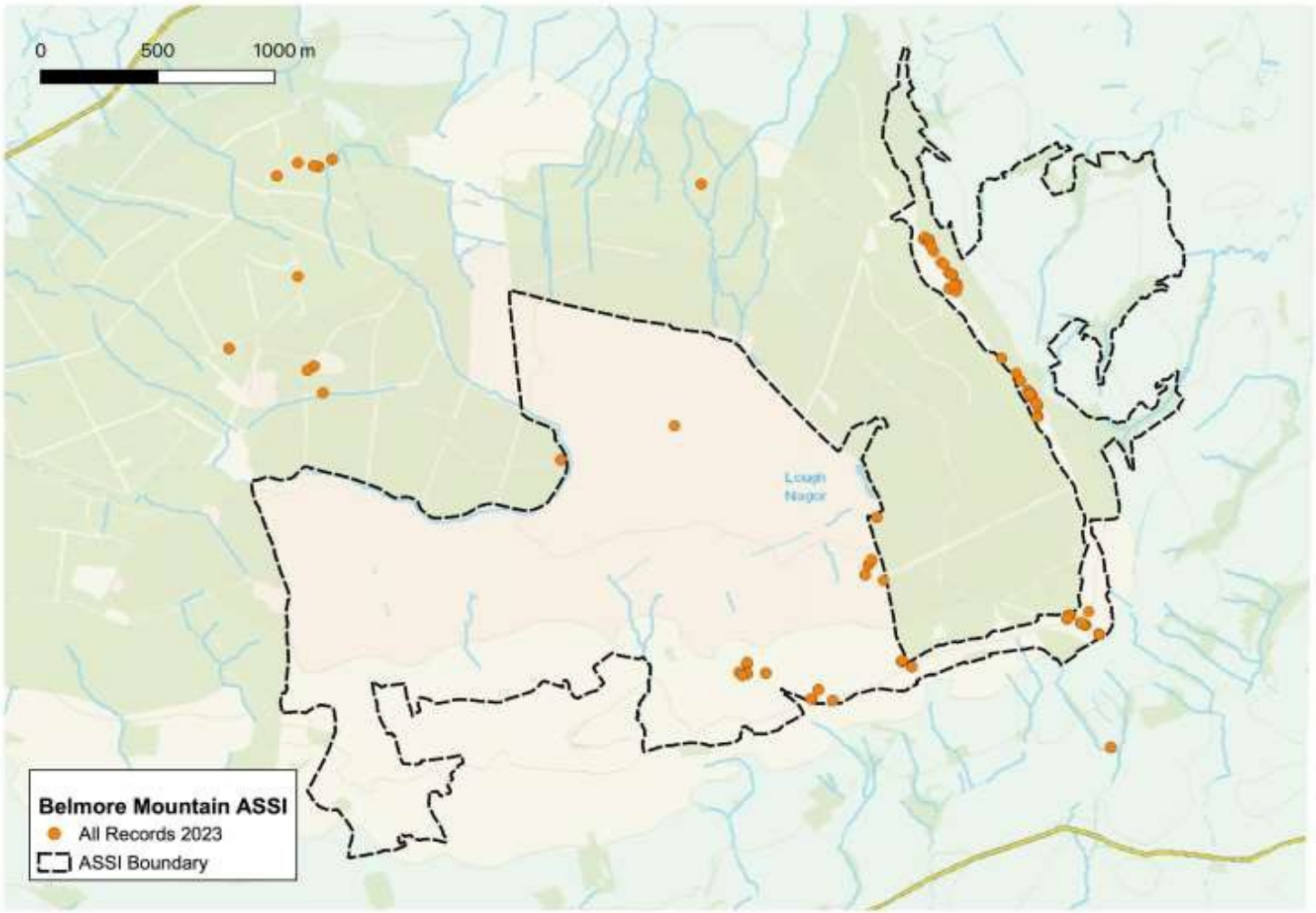
Areas Surveyed



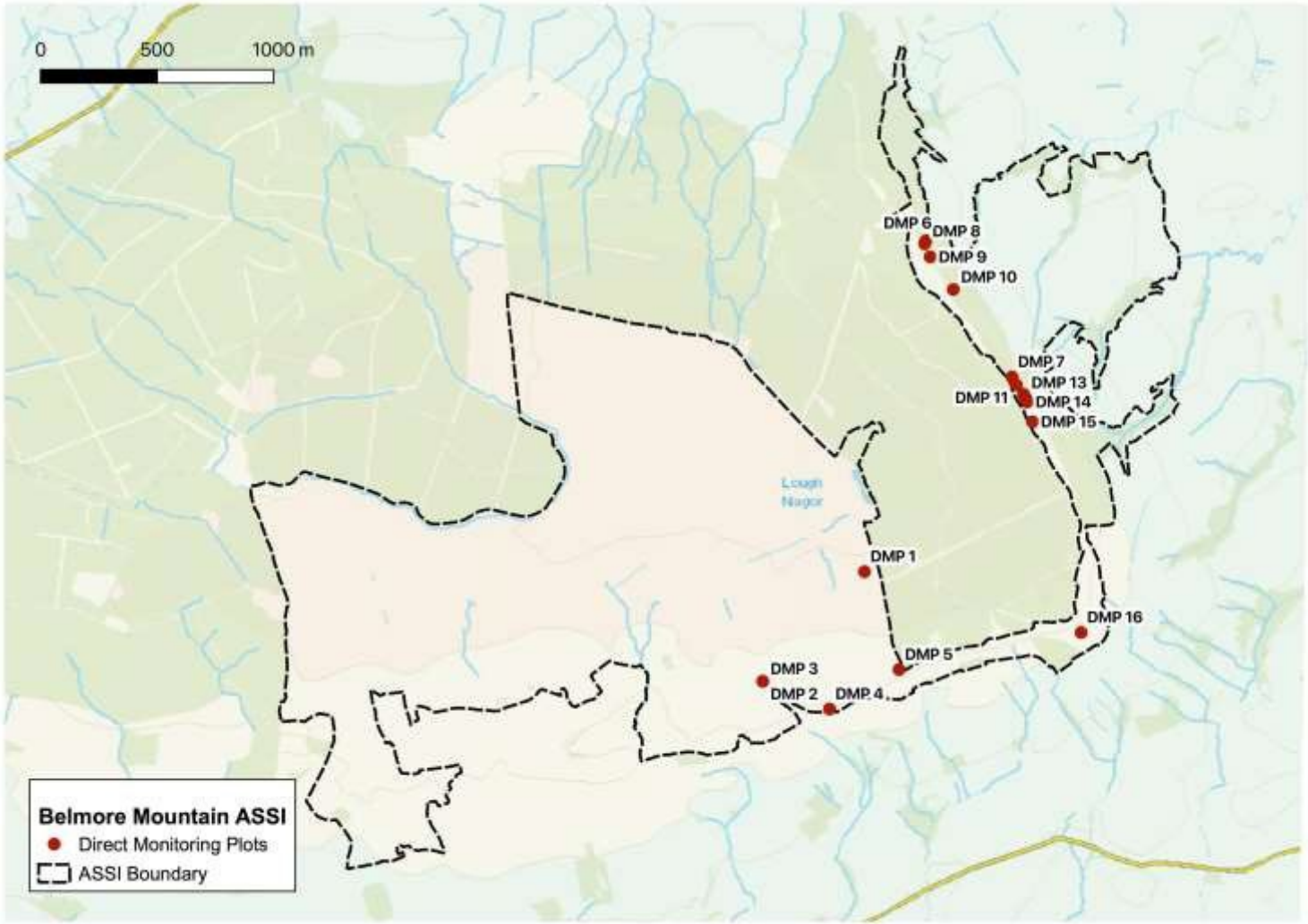
Map 3: Belmore Mountain ASSI mapping with NIEA ASSI boundary. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.



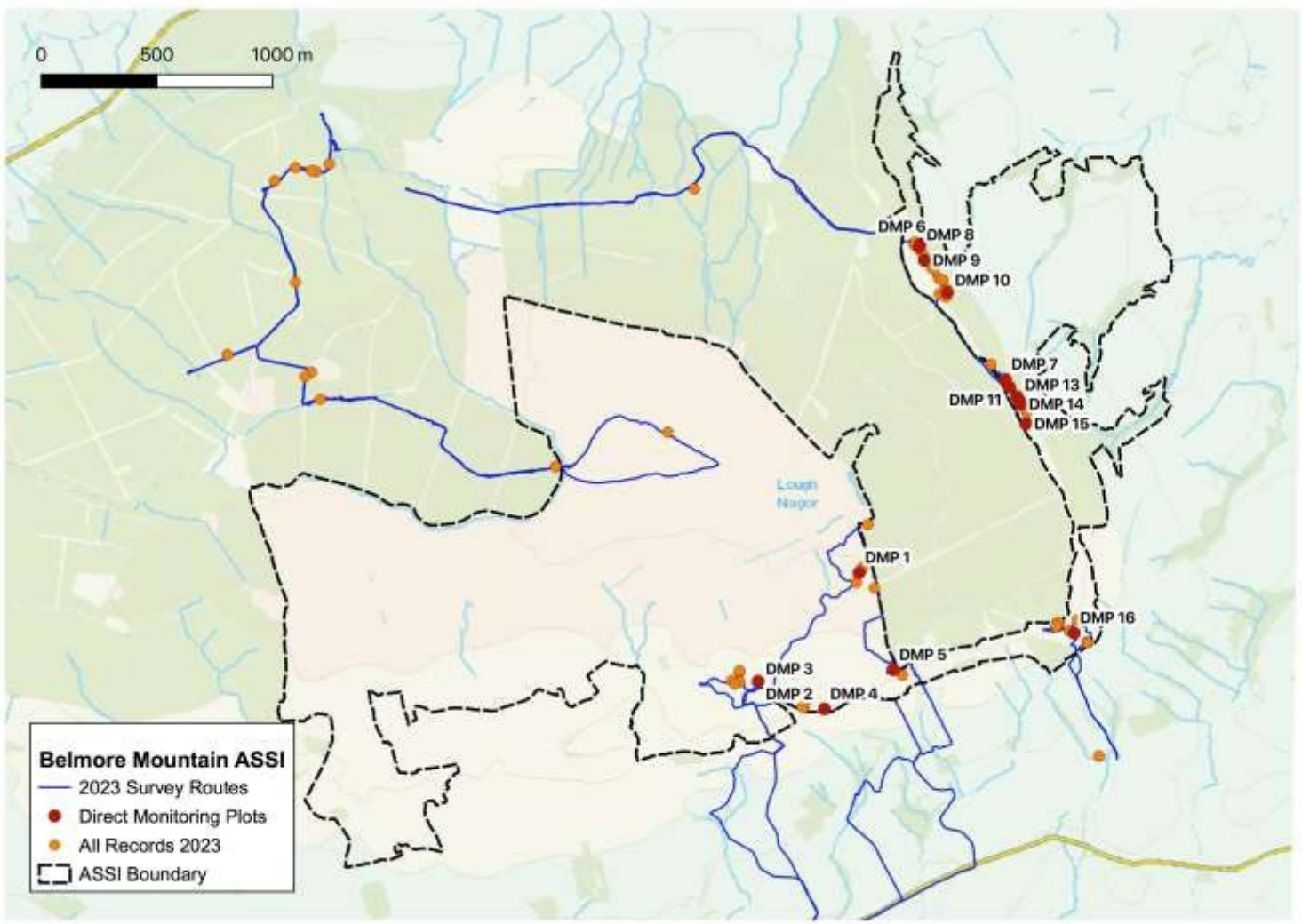
Map 4: Belmore Mountain ASSI mapping with NIEA ASSI boundary and 2023 survey routes. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.



Map 5: Belmore Mountain ASSI mapping with NIEA ASSI boundary and all records generated in 2023. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.



Map 6: Belmore Mountain ASSI mapping with NIEA ASSI boundary and 2023 direct monitoring plots. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.



Map 7: Belmore Mountain ASSI mapping with NIEA ASSI boundary, 2023 direct monitoring plots, all records generated and survey routes. **Mapping:** QGIS.org (2024). QGIS Geographic Information System. Open Source Geospatial

Foundation Project. http://qgis.org. **Basemaps:** © Crown Copyright & Database Right 2023, © Ordnance Survey Ireland.

Lichen ASSI Indices

Overall Species List (2010 & 2023)

Table 4: All lichen records from Belmore Mountain ASSI, including Neil Sanderson's survey results of the woodland scarp to the east of the site, alongside all records generated during the 2023 survey. Between both years, 215 species of lichen and lichenicolous fungi have been recorded. During the 2023 survey, 134 species were recorded new to the ASSI, which were predominantly limestone species of areas that has not been surveyed previously.

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Acarospora cervina	LC NS		+				+			
Acrocordia conoidea	LC	+	+				+			
Acrocordia salweyi	LC						+			
Agonimia tristicula	LC	+	+				+	+		+
Anisomeridium ranunculosporum	LC							+	+	+
Arthonia cinnabarina	LC						+	+	+	+
Arthonia elegans	LC						+	+	+	+
Arthonia graphidicola	LC NS Sc IR							+		+
Arthonia radiata	LC		+				+			
Arthopyrenia salicis	LC							+	+	+
Aspicilia calcarea	LC		+				+			
Aspicilia contorta subsp. *hoffmanniana*	LC NS		+							
Bacidia absistens	LC							+		+
Bacidia fuscoviridis	LC NS Sc		+							

Bacidia laurocerasi	LC				+	+			+	+
Bacidia squamellosa	LC NS							+		+
Belonia nidarosiensis	LC		+				+			

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Biatora epixanthoides	LC							+		+
Bilimbia sabuletorum	LC		+							
Botryolepraria lesdainii	LC	+						+		+
Brianaria lutulata	LC				+	+				
Caloplaca cerinella	LC							+		+
Caloplaca chrysodeta	LC	+								
Caloplaca cirrochroa	LC		+							
Caloplaca dichroa	LC NS Sc		+							
Caloplaca ferruginea s. lat.	LC				+	+			+	+
Caloplaca flavescens	LC	+	+				+	+		+
Caloplaca flavocitrina	LC	+	+				+			
Caloplaca oasis	LC		+				+			
Candelariella reflexa	LC		+							
Catillaria lenticularis	LC		+				+			
Catillaria nigroclavata	LC NS		+							
Celothelium ischnobelum	LC						+	+		+
Cetrelia cetrarioides	LC							+		+
Cetrelia monachorum	LC				+	+				

Cetrelia olivetorum s. lat.	LC							+	+	+
Chrysothrix flavovirens	LC								+	+
Cladonia chlorophaea s. str.	LC				+	+				
Cladonia ciliata var. *tenuis*	LC	+			+	+				
Cladonia coniocraea	LC							+	+	+

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Cladonia cornuta	LC				+	+				
Cladonia diversa	LC	+								
Cladonia fimbriata	LC				+	+				
Cladonia floerkeana	LC	+								
Cladonia furcata subsp. *furcata*	LC				+	+				
Cladonia ochrochlora	LC				+	+				
Cladonia pocillum	LC	+	+				+			
Cladonia polydactyla var. *polydactyla*	LC				+	+			+	+
Cladonia portentosa	LC	+			+	+				
Cladonia pyxidata	LC		+				+	+	+	+
Cladonia ramulosa	LC	+					+			
Cladonia rangiformis	LC	+	+				+			
Cladonia squamosa var. *subsquamosa*	LC								+	+

Cladonia uncialis subsp. *biuncialis*	LC	+								
Clauzadea immersa	LC	+	+				+			
Clauzadea monticola	LC		+				+			
Collema auriforme	LC		+		+	+	+			
Collema crispum var. *crispum*	LC		+				+			
Collema cristatum var. *cristatum*	LC		+				+			
Collema fragile	VU B NS P Eng Sc Wa		+				+			

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Collema fuscovirens	LC	+	+				+			
Collema polycarpon	LC NS		+							
Collema tenax var. *tenax*	LC		+							
Degelia atlantica	LC L IR							+		+
Dermatocarpon miniatum	LC	+					+			
Dimerella lutea	LC L*				+	+		+	+	+
Diploschistes muscorum	LC		+							
Diplotomma alboatrum	LC	+								
Enterographa crassa	LC						+	+		+
Eopyrenula grandicula	LC NS Sc IR							+		+
Evernia prunastri	LC				+	+		+		+

Flavoparmelia caperata	LC	+		+	+	+			+	+
Fuscidea lightfootii	LC		+							
Graphina anguina	LC							+		+
Graphis elegans	LC	+			+	+		+	+	+
Graphis inustuloides	LC								+	+
Graphis ruiziana	LC NS Sc IR								+	+
Graphis scripta	LC		+				+	+	+	+
Gyalecta jenensis var. *jenensis*	LC		+							
Heterodermia obscurata	NT NS Sc			+	+	+			+	+
Hypogymnia physodes	LC			+	+	+		+	+	+
Hypogymnia tubulosa	LC			+	+	+	+	+	+	+
Hypotrachyna afrorevoluta	LC	+	+		+	+	+		+	+

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Hypotrachyna revoluta	LC			+		+		+		+
Hypotrachyna revoluta s. str.	LC	+			+	+				
Hypotrachyna sinuosa	LC Sc IR				+	+	+	+	+	+
Japewiella tavaresiana	LC								+	+
Lecania cuprea	LC NS		+							
Lecania naegelii	LC				+	+			+	+
Lecanora albescens	LC		+				+			
Lecanora alboflavida	LC NS				+	+				

Lecanora chlarotera	LC		+	+	+	+	+	+		+
Lecanora farinaria	LC				+	+		+		+
Lecanora jamesii	LC				+	+		+	+	+
Lecidella elaeochroma f. *elaeochroma*	LC		+	+	+	+		+	+	+
Lepraria finkii	LC		+				+		+	+
Lepraria incana s. lat.			+							
Lepraria lobificans	LC							+		+
Lepraria nivalis	LC NS	+	+					+		+
Lepraria rigidula	LC							+		+
Leptogium cyanescens	LC Sc IR							+		+
Leptogium diffractum	NT NS Sc		+				+			
Leptogium gelatinosum	LC				+	+				
Leptogium lichenoides	LC				+	+	+	+	+	+
Leptogium plicatile	LC						+			
Leptogium pulvinatum	LC	+	+		+	+	+			
Leptogium schraderi	LC	+	+				+			
Leptogium turgidum	LC						+			

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Lichenomphalia umbellifera	LC	+							+	+
Lobaria pulmonaria	LC Sc L IR				+	+				
Megalaria pulverea	LC				+	+		+	+	+

Melanelixia fuliginosa subsp. glabratula	LC			+		+				
Melanohalea exasperatula	LC		+							
Merismatium deminutum	LC NS		+							
Micarea adnata	LC NS						+			
Micarea alabastrites	LC Sc IR								+	+
Micarea cinerea f. *cinerea*	LC							+		+
Micarea coppinsii	LC NS	+			+	+				
Micarea lignaria var. *lignaria*	LC	+								
Micarea peliocarpa	LC								+	+
Micarea prasina s. lat.								+	+	+
Micarea xanthonica	LC NS Sc IR							+		+
Mycobilimbia epixanthoides	LC								+	+
Mycoblastus caesius	LC			+	+	+	+	+	+	+
Mycomicrothelia confusa	LC						+	+		+
Mycoporum antecellens	LC							+	+	+
Nephroma laevigatum	LC Sc L IR				+	+		+		+
Nephroma parile	LC L							+		+
Normandina pulchella	LC L*		+		+	+	+	+	+	+

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**

Opegrapha atra	LC		+				+			
Opegrapha rupestris	LC NS		+				+			
Opegrapha thelotrematis	LC NS Sc IR							+		+
Opegrapha vulgata	LC							+		+
Pannaria conoplea	LC Sc L IR								+	+
Pannaria rubiginosa	LC Sc L IR				+	+		+	+	+
Parmelia saxatilis	LC			+		+				
Parmelia sulcata	LC	+	+		+	+		+	+	+
Parmeliella parvula	LC Sc L* IR							+		+
Parmotrema perlatum	LC		+	+	+	+	+	+	+	+
Pectenia cyanoloma	LC ?NS IR				+	+				
Peltigera collina	LC Sc L IR				+	+		+	+	+
Peltigera horizontalis	LC L*								+	+
Peltigera hymenina	LC		+		+	+				
Peltigera membranacea	LC				+	+			+	+
Peltigera praetextata	LC							+	+	+
Pertusaria albescens var. *albescens*	LC						+		+	+
Pertusaria albescens var. *corallina*	LC							+		+
Pertusaria hemisphaerica	LC L*							+		+
Pertusaria hymenea	LC						+			
Pertusaria leioplaca	LC							+		+
Pertusaria pertusa	LC						+		+	+
Petractis clausa	LC						+			
Phaeographis smithii	LC		+						+	+

Area:	Conservation Evaluation	Belmore Mountain (heathland)	Carrickmacsparrow	Outside ASSI boundary			Woodland & limestone south of scarp	Woodland east of scarp		
Year:		2023	2023	2010	2023	Both years	2023	2010	2023	Both years
Phlyctis agelaea	NT NS Sc				+	+			+	+
Phlyctis argena	LC		+		+	+		+		+
Physcia adscendens	LC		+							
Physcia tenella	LC		+		+	+	+		+	+
Placopyrenium fuscellum	LC	+	+				+			
Placynthiella icmalea	LC	+			+	+				
Placynthium nigrum	LC	+	+				+			
Placynthium hungaricum cf.	NA	+	+				+			
Placynthium subradiatum	LC NS		+				+			
Platismatia glauca	LC				+	+		+	+	+
Porina aenea	LC				+	+				
Porina borreri	LC NS							+		+
Porina byssophila	DD NR Sc						+			
Porina linearis	LC	+	+				+			
Protoblastenia calva	LC		+				+			
Protoblastenia incrustans	LC	+	+				+			
Protoblastenia lilacina	LC NR	+	+				+			
Protoblastenia rupestris	LC	+	+				+			
Protopannaria pezizoides	LC							+	+	+

Punctelia subrudecta s. lat.			+							
Pyrenula acutispora	NT NR Sc								+	+

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Pyrenula laevigata	LC NS Sc IR							+	+	+
Pyrenula macrospora	LC						+	+	+	+
Pyrenula occidentalis	LC Sc IR							+	+	+
Ramalina farinacea	LC		+	+	+	+	+	+	+	+
Ramalina fastigiata	LC		+							
Rhizocarpon umbilicatum	LC	+								
Rinodina sophodes	LC		+							
Romjularia lurida	LC	+	+				+			
Roselliniella cladoniae	NE NR				+	+				
Sclerococcum griseisporodochium	NT NR								+	+
Skyttea nitschkei	LC							+	+	+
Solorina saccata	LC		+							
Staurothele guestphalica	DD NR						+			
Sticta ciliata	NE IR				+	+			+	+
Sticta fuliginoides	NE IR				+	+				
Sticta fuliginosa s. lat.	LC Sc L IR							+	+	+
Sticta fuliginosa s. str.	LC IR				+	+			+	+
Sticta limbata	LC Sc L IR							+	+	+

Sticta sylvatica	LC Sc L IR				+	+		+	+	+
Stigmidium microspilum	LC						+	+	+	+
Tephromela atra var. *torulosa*	LC NS				+	+				
Thelidium decipiens	LC	+	+				+			
Thelidium incavatum	LC						+			
Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Thelidium papulare f. *papulare*	LC		+							
Thelotrema lepadinum	LC L*				+	+		+	+	+
Toninia aromatica	LC	+	+							
Toninia sedifolia	LC P Eng Wa		+							
Toninia verrucarioides	LC NS		+							
Trapeliopsis pseudogranulosa	LC							+		+
Usnea cornuta	LC			+	+	+		+	+	+
Usnea esperantiana	NT NR Sc IR		+	+		+		+		+
Usnea subfloridana	LC			+	+	+		+		+
Verrucaria baldensis	LC	+	+				+			
Verrucaria caerulea	LC	+	+				+			
Verrucaria dufourii	LC		+							
Verrucaria nigrescens f. *nigrescens*	LC	+	+				+			
Verrucaria parmigerella	LC NR		+							
Verrucaria pinguicula	LC NS	+	+				+			

Verrucaria viridula	LC		+							
Vezdaea stipitata	NT NR				+	+				
Xanthoria parietina	LC		+		+	+	+		+	+
Total (all years): 215		**45**	**85**	**15**	**63**	**67**	**74**	**77**	**69**	**107**

Threatened, Near Threatened & Notable (TNTN) Species

Table 5: The Threatened (CR, EN, VU), Near Threatened (NT) and Notable (NR, NS, IR) species recorded in the 2010 and 2023 survey. Overall, 56 TNTN species were noted, including 1 Vulnerable (VU), 7 Near Threatened (NT), 8 Nationally Rare (NR), 28 Nationally Scarce (NS) and 23 International Responsibility (IR) species. Conservation Evaluation according to the GB & I (Woods & Coppins, 2012), this would be different when the Irish red list is applied upon completion. Lichenicolous fungi omitted as conservation status is non-reflective due to these species being underrecorded.

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Acarospora cervina	LC NS		+				+			
Aspicilia contorta subsp. *hoffmanniana*	LC NS		+							
Bacidia fuscoviridis	LC NS Sc		+							
Bacidia squamellosa	LC NS							+		+
Caloplaca dichroa	LC NS Sc		+							
Catillaria nigroclavata	LC NS		+							
Collema fragile	VU B NS P Eng Sc Wa		+				+			
Collema polycarpon	LC NS		+							

Degelia atlantica	LC L IR							+		+
Eopyrenula grandicula	LC NS Sc IR							+		+
Graphis ruiziana	LC NS Sc IR								+	+
Heterodermia obscurata	NT NS Sc			+	+	+			+	+
Hypotrachyna sinuosa	LC Sc IR				+	+	+	+	+	+
Lecania cuprea	LC NS		+							

Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Lecanora alboflavida	LC NS				+	+				
Lepraria nivalis	LC NS	+	+					+		+
Leptogium cyanescens	LC Sc IR							+		+
Leptogium diffractum	NT NS Sc		+				+			
Lobaria pulmonaria	LC Sc L IR				+	+				
Merismatium deminutum	LC NS		+							
Micarea adnata	LC NS						+			
Micarea alabastrites	LC Sc IR								+	+
Micarea coppinsii	LC NS	+			+	+				
Micarea xanthonica	LC NS Sc IR							+		+
Nephroma laevigatum	LC Sc L IR				+	+		+		+

Opegrapha rupestris	LC NS		+				+			
Pannaria conoplea	LC Sc L IR								+	+
Pannaria rubiginosa	LC Sc L IR				+	+		+	+	+
Parmeliella parvula	LC Sc L* IR							+		+
Pectenia cyanoloma	LC ?NS IR				+	+				
Peltigera collina	LC Sc L IR				+	+		+	+	+
Phlyctis agelaea	NT NS Sc				+	+			+	+
Placynthium subradiatum	LC NS		+				+			
Porina borreri	LC NS							+		+
Porina byssophila	DD NR Sc						+			
Protoblastenia lilacina	LC NR	+	+				+			
Area:	**Conservation Evaluation**	**Belmore Mountain (heathland)**	**Carrickmacsparrow**	**Outside ASSI boundary**			**Woodland & limestone south of scarp**	**Woodland east of scarp**		
Year:		**2023**	**2023**	**2010**	**2023**	**Both years**	**2023**	**2010**	**2023**	**Both years**
Pyrenula acutispora	NT NR Sc								+	+
Pyrenula laevigata	LC NS Sc IR							+	+	+
Pyrenula occidentalis	LC Sc IR							+	+	+
Sclerococcum griseisporodochium	NT NR								+	+
Staurothele guestphalica	DD NR						+			
Sticta ciliata	NE IR				+	+			+	+
Sticta fuliginoides	NE IR				+	+				
Sticta fuliginosa s. lat.	LC Sc L IR							+	+	+

Sticta fuliginosa s. str.	LC IR				+	+			+	+
Sticta limbata	LC Sc L IR							+	+	+
Sticta sylvatica	LC Sc L IR				+	+		+	+	+
Tephromela atra var. *torulosa*	LC NS				+	+				
Toninia verrucarioides	LC NS		+							
Usnea esperantiana	NT NR Sc IR		+	+		+		+		+
Verrucaria parmigerella	LC NR		+							
Verrucaria pinguicula	LC NS	+	+				+			
Vezdaea stipitata	NT NR				+	+				
Total TNTN species: 53		**4**	**18**	**2**	**16**	**17**	**11**	**18**	**17**	**27**

Limestone Index (LI)

The limestone lichen index applies to both rock and associated bare ground habitats in hard limestone landscapes (Edwards and Sanderson, in prep). The list comprises 104 species balanced to cover southern and northern non-montane (below 600m) limestone in Britain; TNTN scoring should be used for calcareous assemblages above 600m. The index is designed to cover coherent outcrops of limestone in a distinct landscape relationship (spatial, geological or climatic) covering areas of between 100 to 1,000ha. The number of recorded species/species pairs in Table 5 is used to assess sites. **A site with 30 or more should be considered for notification.**

Table 6: The Limestone Index (LI) applied to the relevant habits surveyed at Belmore Mountain ASSI. 14 species on the limestone index were recorded during 2023, with two additionals from 2018 – totalling **31 species,** which exceeds the ASSI threshold. This was the first baseline survey conducted on limestone at Belmore Mountain and further survey efforts will undoubtedly foster more species.

Limestone Species	2023	Limestone Species	2023	Limestone Species	2023
Acarospora cervina	+	*Dermatocarpon miniatum*	+	*Placynthium subradiatum*	+

Acarospora glaucocarpa		*Diploschistes gypsaceus*		*Poeltinula cerebrina*	
Acarospora macrospora		*Diploschistes muscorum*	+	*Polyblastia albida*	
Acrocordia conoidea	+	*Diplotomma hedinii*		*Polyblastia cupularis*	
Agonimia globulifera		*Farnoldia jurana*		*Porina byssophila*	
Arthopyrenia saxicola		*Fulgensia fulgens*		*Porina ginzbergeri*	
Bacidia bagliettoana		*Gyalecta hypoleuca*		*Porina linearis*	+
Bacidia herbarum		*Gyalecta jenensis var. jenensis*	+	*Protoblastenia calva / P. lilacina*	+
Belonia calcicola		*Gyalecta ulmi*		*Protoblastenia cyclospora*	
Biatorella fossarum		*Hymenelia epulotica*		*Protoblastenia incrustans*	+
Bilimbia lobulata		*Hymenelia heteromorpha*		*Psora decipiens*	
Brigantiaea fuscolutea		*Hymenelia prevostii*		*Psorotichia schaereri*	
Bryobilimbia hypnorum		*Lecania cuprea*	+	*Ramonia calcicola*	
Caloplaca alociza		*Lecanora agardhiana*		*Rhizocarpon umbilicatum*	+
Caloplaca chalybaea		*Lecanora pruinosa*		*Rinodina bischoffii*	
Caloplaca cirrochroa	+	*Lecanora semipallida*		*Rinodina immersa*	
Limestone Species	**2023**	**Limestone Species**	**2023**	**Limestone Species**	**2023**
Caloplaca granulosa		*Lempholemma botryosum*		*Romjularia lurida*	+
Caloplaca marmorata		*Lempholemma cladodes*		*Sagiolechia protuberans*	

Caloplaca ochracea		*Lepraria nivalis*	+	*Solorina saccata*	+
Caloplaca xantholyta		*Leptogium diffractum*	+	*Solorina spongiosa*	
Catapyrenium cinereum		*Leptogium massiliense*		*Squamarina cartilaginea*	
Catapyrenium psoromoides		*Leptogium plicatile*	+	*Staurothele bacilligera*	
Catillaria aphana		*Megaspora verrucosa*		*Staurothele caesia*	
Cladonia convoluta		*Merismatium deminutum*	+	*Staurothele guestphalica*	+
Cladonia foliacea		*Opegrapha dolomitica*		*Staurothele hymenogonia*	
Cladonia symphycarpia		*Opegrapha mougeotii*		*Staurothele rupifraga*	
Clauzadea chondrodes		*Opegrapha rupestris*	+	*Staurothele succedens*	
Clauzadea immersa	+	*Peltigera leucophlebia*		*Synalissa ramulosa*	
Clauzadea metzleri		*Peltigera rufescens*		*Thelidium decipiens*	+
Collema callopismum		*Petractis clausa*	+	*Thelidium incavatum*	+
Collema fragile	+	*Placidiopsis custnani*		*Thelidium papulare*	+
Collema multipartitum		*Placidium pilosellum*		*Toninia sedifolia*	+
Collema polycarpon	+	*Placidium squamulosum*		*Toninia verrucarioides*	+
Collema undulatum		*Placopyrenium canellum*		*Verrucaria caerulea*	+
Collolechia caesia		*Placynthium garovaglii*		*Verrucaria dufourii*	+

Southern Oceanic Woodland Index (SOWI)

This replaces the New Index of Ecological Continuity (NIEC) (Coppins and Coppins 2002; Hodgetts 1992; Rose 1992). The list is designed to be applied across a wide swathe of southern Oceanic Britain.

For the core areas of interest (associated with a strongly southern oceanic climate with clean air, in south west England and north Wales), all sites with scores of 30 or more should be considered for notification. To the north and east of these areas, in south-east England, the rest of Wales and south-west Scotland (where the more strongly southern oceanic).

The SOWI ASSI threshold for Ireland is 15.

Table 7: The Southern Oceanic Woodland Index (SOWI) applied to the woodland habitats across the Belmore Mountain ASSI. The total number of SOWI species **scored 22** on the index (2010 & 2023), which exceeds the ASSI threshold. This is an east facing scarp, where the upper limits of the wood and the eastern fringe support the greatest lichen diversity. This woodland also proved of great importance for the oceanic smooth bark, *Graphidion* community including *Pyrenula acutispora, P. laevigata* and *P. occidentalis.*

SOWI Species	202 3	2010	SOWI Species	202 3	2010	SOWI Species	202 3	2010
Agonimia allobata			*Lecanographa amylacea*			*Parmeliella triptophylla*		
Agonimia flabelliformis			*Lecanographa lyncea*			*Parmotrema crinitum*		
Agonimia octospora			*Lecanora alboflavida*			*Peltigera collina*	+	+
Anisomeridium ranunculosporum	+	+	*Lecanora jamesii*	+	+	*Peltigera horizontalis*	+	
Arthonia astroidestera			*Lecanora quercicola*			*Pertusaria multipuncta*		
Arthonia ilicina			*Lecanora sublivescens*			*Phaeographis dendritica*		
Arthonia vinosa			*Leptogium cyanescens*		+	*Phaeographis inusta*		
Bacidia biatorina			*Leptogium lichenoides*	+	+	*Phaeographis lyellii*		
Buellia erubescens			*Leptogium teretiusculum*			*Phyllopsora rosei*		

Catinaria atropurpurea			*Lobaria amplissima*			*Piccolia ochrophora*		
Cetrelia olivetorum s. lat.	+	+	*Lobaria pulmonaria*			*Porina coralloidea*		
Chaenotheca brachypoda			*Lobaria scrobiculata*			*Porina hibernica*		
Chaenotheca brunneola			*Lobaria virens*			*Porina rosei*		
Chaenotheca chlorella			*Loxospora elatina*			*Punctelia reddenda*		
SOWI Species	**202 3**	**2010**	**SOWI Species**	**202 3**	**2010**	**SOWI Species**	**202 3**	**2010**
Chaenotheca chrysocephala			*Megalospora tuberculosa*			*Rinodina isidioides*		
Chaenotheca hispidula			*Micarea alabastrites*	+		*Schismatomma niveum*		
Chaenotheca stemonea			*Micarea cinerea* f. *cinerea*		+	*Schismatomma quercicola*		
Chaenotheca trichialis			*Micarea pycnidiophora*			*Stenocybe septata*		
Cladonia caespiticia			*Mycobilimbia epixanthoides*	+	+	*Sticta fuliginosa* s. lat.	+	+
Cladonia parasitica			*Mycobilimbia pilularis*			*Sticta limbata*	+	+
Collema furfuraceum			*Mycoporum antecellens*	+	+	*Sticta sylvatica*	+	+
Collema subflaccidum			*Nephroma laevigatum*		+	*Thelopsis rubella*		
Cresponea premnea			*Nephroma parile*		+	*Thelotrema lepadinum*	+	+
Degelia atlantica		+	*Opegrapha corticola*			*Usnea ceratina*		
Degelia cyanoloma			*Opegrapha prosodea*			*Usnea florida*		
Degelia plumbea s. str.			*Pachyphiale carneola*			*Varicellaria velata*		
Enterographa sorediata			*Pannaria conoplea*	+		*Wadeana dendrographa*		
Heterodermia obscurata	+		*Pannaria rubiginosa*	+	+			
Inoderma subabietinum			*Parmeliella parvula*		+			

Heathland, Moorland and Coastal Heath Index (HMCHI)

Building on the work of Sanderson (2011, 2015), the *Cetraria*, *Cladonia* and *Pycnothelia* (CCP) index developed for southern England heathland has been augmented to cover all nonmontane heaths, including non-montane moorland, coastal heathland, acid dunes and comparable habitats. For hard rock coasts and associated grassland communities, use Maritime Rock and Coastal Slope Index.

The index should be applied to a heathland or moorland area of about 100ha. The index score is calculated by adding the number of recorded taxa in each genus listed in the left- hand column of Table 7 below to the number of recorded species in the right-hand column. For example, a site supporting 23 *Cladonia* taxa, two *Cetraria* taxa, *Pycnothelia papillaria* and *Leptogium palmatum*, would score 27.

Sites scoring **20 or more** should be considered for notification.

Table 8: Overall *Cladonia* species lists for Belmore Mountain ASSI, with those recorded specifically on the heathland indicated with a +. In total, 17 Cladonia species were recorded, in which 8 of these from the heathland. This does not exceed the ASSI lichen threshold.

Taxon (2023)	**Conservation Evaluation**	**Belmore Mountain (heathland)**
Cladonia chlorophaea s. str.	LC	
Cladonia ciliata var. *tenuis*	LC	+
Cladonia coniocraea	LC	
Cladonia cornuta	LC	
Cladonia diversa	LC	+
Cladonia fimbriata	LC	
Cladonia floerkeana	LC	+
Cladonia furcata subsp. *furcata*	LC	
Cladonia ochrochlora	LC	
Cladonia pocillum	LC	+
Cladonia polydactyla var. *polydactyla*	LC	
Cladonia portentosa	LC	+
Cladonia pyxidata	LC	
Cladonia ramulosa	LC	+
Cladonia rangiformis	LC	+
Cladonia squamosa var. *subsquamosa*	LC	
Cladonia uncialis subsp. *biuncialis*	LC	+
17 *Cladonia* species recorded in the ASSI		**8 heathland species**

Habitat Management

The habitat management guidance within this section relates to lichens and associated habitats only. Therefore, this advice should be integrated with other management objectives for the general biodiversity, geological and archaeological interest of the site.

Belmore Mountain ASSI supports a huge variety of habitats across this landscape, reflective in the species diversity encountered, where this ASSI proves an important site for rare and threatened species – particularly in an Irish context. Management advice has been compartmented below based on habitat and should be used in conjunction with the Direct Monitoring Plots (Appendix 1) and the Indirect Monitoring and Attribute tables (Appendix 2).

Recommendations below relate to each attribute/target set by Natural England and are listed below for saxicolous, terricolous (heathland) and woodland habitats.

Saxicolous (Rock) Habitats

Niche Availability: For the development of lichen-rich rock faces, this requires open, well-lit and ventilated conditions, devoid of vascular vegetation. Across Belmore Mountain ASSI, there is a wide variety of rocky substrata which is reflective in the species diversity encountered here. The main threat to this habitat across the ASSI is in relation to overshading by vascular vegetation, which can be managed through appropriate levels of grazing and browsing.

There is no threat to existing habitat from developments, e.g. creation of new paths, steps, quarrying or building work. However, the impacts of surrounding land use need to be accounted for, particularly if farming intensifies and forestry increases within the area.

Negative Indicators: Pollution: Both short- and long- range sources of air pollution have the potential to negatively impact important lichen communities. There are areas of farmland, on the periphery of the ASSI that are managed intensively e.g. artificially greened, but the ASSI itself is traditionally managed, with a low input approach.

Within the ASSI, there was evidence to suggest that pollution that this is having a direct impact on lichen species and communities. This evidence includes, the presence of Nitrophilic species on rocks and and twigs of the trees within the ASSI, where *Xanthoria parietina* was recorded on the limestone. On the heathland, *Hormidiopsis* sp. (algal gunge/gel) was recorded on the heather and some exposed rock faces.

Considering the conservation significance of Belmore Mountain ASSI, it should be a priority to address N pollution from adjacent land around the periphery of the site. This includes both short- and long- range influences. The NIEA should take a landscape scale approach to address nitrogen pollution in neighbouring land.

Negative Indicators: Shade: Scrub and climbing vegetation are important for other biodiversity interests of the site, particularly invertebrates and birds. However, inappropriate levels can overshade existing lichen species and communities, but also makes potentially suitable habitats unsuitable.

The only long-term and viable means of managing levels of scrub and ivy at a site such as Belmore Mountain ASSI, is through suitable levels of grazing and browsing. If dense thicketed areas occur (which was rarely the case), then mechanical management will be required, but this is only considered necessary, if grazing alone cannot control these levels.

Ivy and bramble levels were localised, which from a lichen perspective is acceptable. However, *Cotoneaster* is starting to establish around certain rockfaces (noted in the relevant DMPs (Appendix 1) and an aim should be to totally eradicate this species from the site.

Negative Indicators: Disturbance: Recreational disturbance is not considered an issue across the ASSI, however landuse that is likely to impact the ASSI is intensive forestry, where conifers are becoming established within the ASSI. It is therefore important that this is monitored over time and addressed accordingly.

Negative Indicators: Burning: Heath, grass & scrub fires can largely damage adjacent lichen habitats on rock and in terricolous (ground-dwelling) situations. No evidence of burning was encountered during the 2023 survey, but this of course is an important technique to manage the heathland. When burning is required, it is essential that this does not occur within the vicinity of any rocky features.

Heathland & Peatland Habitats

Heathland and moorland habitats are of great importance for lichens, showcasing various microhabitats which support a plethora of lichen species and communities. This includes areas of exposed peats or soils, age diversity across heather stands, wet and dry conditions etc. Some of the most extensive studies in this habitat demonstrates the importance of a combination of grazing and controlled burning – where these management practices are interdependent on one another and are primary requirements to conserve and enhance lichen diversity on heathland habitats (Sanderson, 2017).

However, it is not recommended that burning occurs on the blanket bog on the Belmore plateau. Currently the peatland lichen flora is poor and this site is better managed for the current *Sphagnum* dominated flora which exists here and is subject to a wetter regime than most lichens would prefer. Active primary blanket bog is becoming rarer across Europe for a number of reasons including peat extraction, climate change, afforestation, developments e.g. windfarms and nitrogen deposition. The current management regime appears to have been very successful in restoring the active blanket bog at Belmore. The main issue at present is the conifer regeneration across the bog. The conifers should be removed and the bog hydrology needs to be maintained by damming any previously man made drainage.

Ben Averis (2013) describes bog habitats and management below:

> "A wetland on deep, wet, acidic peat which receives most of its rainwater from rainfall. More water comes in as rain than leaves by means of evaporation or (through vegetation) transpiration. This is why bogs are restricted to cool, wet parts of the world such as Britain and Ireland.
>
> …Blanket bogs (M17–20) cover large areas of level and gently sloping peat-covered ground in the N and W; their large extend is significant in a global context….'
>
> ….Draining or burning can make bogs drier, with more heather and Purple Moor-grass and a reduced abundance of *Sphagnum* mosses and other bog plants. Heavy grazing can cause losses of dwarf shrubs and increases of grasses and sedges. Combinations of draining, burning and heavy grazing can cause bog vegetation to become wet heat (M15), Purple Moor-grass Mire (M25), Hare's Tail Cottongrass bog (M20) or Heath Rush-dominated vegetation (U6)" (Averis 2013).

A useful summary below has been extracted from the British Lichen Society website, for management on heathland and moorland habitats, written by N.A. Sanderson, December 2023 (NB. Not relevant to management of blanket bog, see above).

In heathlands and moorlands (as in other habitats) over cautious conservation management is a frequent problem, with the resultant taller shadier swards a poor habitat for lichens (Timmermann et al, 2015 & Sanderson & Cross, 2023), Conservationists are failing to conserve by careful management the biodiversity richness that commoners and farmers produced by happenstance in the past.

Grazing:

- Grazing is an essential part of heathland management and should be revived or maintained where possible. Where there is room, varied grazing pressures should be aimed for.
- On larger sites some areas of heavily browsed short heather should be accepted.
- Grazing animals should include at least some course grass graziers such as cattle and ponies.
- If rabbit populations revive, their localised hard grazing is to be valued for creating short open lichen rich swards.

Burning and Mowing:

- Most heaths will be grazed at level that allows Heather swards to mature across large areas of the site. To maintain lichen diversity in these, effective cyclic management to rejuvenate the swards is required.
- To be effective treatment to rejuvenate the stands needs to remove the top layer of late succession mosses and loose humus to expose lichen propagules and Calluna and Erica seeds in the compacted humus below.
- Prescribed burning does this effectively and should be deployed wherever possible. Mowing does not and should be used as little as possible.
- Where prescribed burning is not possible raking off patches of the top layer of late succession mosses and loose humus in mown areas could be experimented with.

Disturbance:

- Disturbance exposing raw bare soil that takes many decades to fully revegetate is an important habitat supporting lichen diversity.
- This is most easily developed where the grazing is heavier.
- Smaller conservation scrapes in lightly or ungrazed situations appear ineffectual as lichen conservation measures; they revegetate too fast.
- Large disturbed areas, with a mix of very shallow disturbance exposing hard black humus along with deeper excavations with steep consolidated sides are likely to be more effective.
- A good deal of recreational path erosion, where it creates complex rutted topographies that then force abandonment and shifting paths has proved to be more effective than conservation scrapes at promoting lichen diversity.
- Valuable features need to be protected, but a less precious attitude to heathland erosion would aid lichen conservation.
- In heathland restoration slow colonisation of bare surfaces, as in old gravel pits, that takes decades, is far more likely to promote lichen diversity than more intrusive methods of rapidly creating dense Heather swards

The management principles within the ASSI citation state…

"Blanket bog and heath are important habitats for wildlife. Much of the ASSI contains a mosaic of Heather-dominated habitats such as wet heath, dry heath and blanket bog. The Department would encourage the maintenance and enhancement of this mosaic through the conservation of its associated native plants and animals.

Bogs and wet heaths depend on rainwater and maintaining a high water table is vital to their "health". In addition, the peat soils and many of the species that grow there are very sensitive to physical disturbance. However, most heathland communities need some management to retain their interest. Small patches of scrub within heathland are valuable in providing additional habitat niches but, in the absence of management, woody species can quickly take over. On the other hand, too much grazing, especially through the winter, can cause heathers to be replaced by coarse grasses. Shepherding can help to spread grazing pressure over a wider area while fencing may also be useful in some cases to control stock numbers and movement (NIEA, 2018)".

Specific objectives include (as copied from the ASSI citation)…

Specific management objectives	**Windle & Douglass, comment:**
"Low intensity grazing has contributed to the conservation and enhancement of the bog and heath. The Department would encourage a regime that avoids overgrazing or poaching".	Previous studies in heathland habitats (Sanderson, 2017) show that to sustain lichen diversity, that a "*mix of extensive but very uneven grazing" is required"*. Where, "uneven" relates to areas of low, moderate and intense grazing, across a large area. For lichen diversity, areas considered "overgrazed" or "poached" is not necessarily an issue, see point below…
"Where the habitat has been subjected to heavy grazing, the Department would encourage a reduction in stocking density to allow the bog and heath to recover. Shepherding and fencing to control the movement of stock may also be beneficial in some situations".	Sanderson states *"It is important not to overreact to periods of very high grazing, for instance by reducing grazing so much that lichen poor tall heath is produced"* (Sanderson, 2015). Here studies have shown that areas that have been previously poached/intensively grazed, result in bare ground, representing diversification in the habitat and is important in heathland dynamics (Sanderson, 2017). For the areas surveyed during 2023, there was no evidence of "heavy grazing" on the heath, but there was excellent age diversity of heather seen across the site. Heather cover was extensive, with no bare ground encountered, which is likely the reason in those areas surveyed, the *Cladonia* heath was limited and dominated mainly by *Cladonia portentosa.*

"Where appropriate, prevent the loss of light-demanding species through the control of scrub and bracken. In general, this can be achieved through the appropriate grazing regime. In some cases other methods of control, such as cutting, may be required".	Agreed, with the addition of the complete eradication of Sitka spruce invasion, alongside other conifers from heathland. This is considered a profound issue in the western area of the ASSI and needs addressing immediately before the problem exacerbates.

Specific management objectives	**Windle & Douglass, comment:**
	Sanderson notes that "*mowing is acceptable, but on a small scale…but is not a suitable substitute for burning*" *Sanderson, 2017). Burning should **NOT** be undertaken on the peatland plateau. It could be argued that burning is not appropriate in the case of the heathland/grassland either as the current regime is maintaining the limestone outcrops in good condition (with the exception of invasive scrub including *Cotoneaster* on some of the outcrops and some degree of eutrophication which is not currently impacting the limestone outcrops, but is having a limited effect on some of the scrub/woodland at the site).
"Where burning is considered appropriate, it should only be undertaken after close consultation with, and the agreement of, the Department. Burning can cause the loss of more specialised plants and animals, and may damage the peat soils, leading to erosion. The burning of blanket bog should be avoided as the habitat is particularly sensitive to it".	Agreed. However, there should be an investigation across the ASSI by experts, as to which areas are deemed as suitable to be included within a burning cycle. Peatland / blanket bog on the plateau is definitely not suitable for burning.
"Where appropriate, encourage the blocking of drains to prevent the vegetation from drying out".	Agreed.

Additional comment: Incorporate into specific management objectives.	It was noted, that heathland surrounded by large blocks of coniferous plantation were dominated by swathes of *Molinia* (purple moor grass), which reduces the condition status of the habitat, by significantly impacting the lichen and plant diversity. This is likely attributed to the water demands of the conifers, resulting in a drier heath that is more favourable for *Molina.* Consideration should be given to discussing a possible phasing out the growth of conifers in this area. Conifers (particularly Sitka spruce) have a tendency to 'escape' and colonise land including peat bogs and heathland. They can be extreamly difficult to eradicate from areas, where they are not wanted and can cause irretractable damage to peat bogs which can be turned into degraded habitats dominated by *Molinia.* This is an important point bearing in mind that peat bogs are an extremely effective store of carbon and can release large quantities of carbon if their integrity is damaged/degraded (Averis *et al*. 2004, Averis *et al.* 2013 & Douglass, 2024).
Specific management objectives	**Windle & Douglass, comment:**
Additional comment: Incorporate into specific management objectives.	The impacts of both short- and long- range nitrogen pollution requires monitoring, as there is various evidence across the heath signposting to elevated levels of nitrogen. Evidence consists of the "nitrophilic" *Xanthorion parietinae* and *Physcietum ascendentis on Calluna* stems (communities that are tolerant of nitrogen pollution) and layers of algae (<20%).

Woodland Habitats

A block of old woodland lies along the eastern and southern flank of the scarp at Belmore Mountain. This was predominantly an ashwood, with birch, willow and an understory of holly, hazel and rowan. Here, the long continuity and hyper-oceanic climate has resulted in an interesting development of noteworthy lichens. This woodland is structurally diverse due to the dynamism created by the steep slopes, resulting in a series of wooded terraces down the slope. The upper reaches support large willows, which prove a particularly important lichen feature in a national context.

Niche availability. This old woodland lies along the eastern and southern scarps of Belmore Mountain. Interestingly, these woodlands do not feature on the 1834 maps, but support evidence of old-woodland lichen indicators and veteran trees to suggest that this is an ancient site. After speaking to a local landowner, he mentioned that the development of the woodland on the southern scarp is recent and established when that area of the ASSI was fenced. This

is reflected in the lichens, where this area was relatively limited of old-growth lichens, in comparison to the eastern scarps – where communities were better developed as a result of a long continuity.

Woodland expansion is not feasible on the upper slopes of these woodlands, as they are bordered by coniferous plantations, where expansion is only feasible to the south, down and into the grazed pastures. This is worth considering, however the feasibility of this would be dependent on surrounding land use and consultation with local farmers / residents. Woodland expansion through natural regeneration is favoured over tree planting. However, if the decision is made to plant trees, then it is important habitat suitability is assessed, stock is locally sourced and woodland structure/composition fostering the lichen interest is accounted for.

Overtime, it is likely there will be a drastic alteration to the ash-dominated treescape, in the light of ash dieback. Therefore, this needs to be accounted for in woodland management going forward. See paragraph below on “Stand Composition”.

Stand Structure. The woodland is on a steep, east facing slope that contours perpendicular around the scarp to the south. There are a series of limestone outcrops and terraces, resulting in an open structure within the canopy. It is recommended that for the development of lichenrich woodlands that the canopy should cover 30-70%, where 30% of the stand (as a minimum) should consist of gladed habitats (Coppins & Coppins, 2002). This woodland is extremely dynamic, where open areas and breaks in the canopy are created from the steep slopes, where trees fall and diversify the tree canopy.

However, the understory within these woodlands is extremely dense, where bramble and ivy are well-established. Here, appropriate levels of grazing and browsing are essential for maintaining an open woodland structure and increasing light levels, and is the only long-term and viable mechanism of maintaining structure in these woods. Signs of grazing in these woods was limited, only including deer tracks in the upper limits of the wood. The woodland is enclosed by fenclines on the upper and lower slopes and where feasible should be removed. There were areas throughout this woodland where the understory was completely impenetrable, which is unfavourable for its lichen interest.

It is important to note that light is a limiting factor, due to the topography and aspect of the woodland. However, light cuts in here from the south, but also along the pastures to the west. This is where the richest trees were recorded and the upper limits are a priority for management.

With regards to regeneration, there are few signs of natural regeneration of canopy species e.g. ash-birch-willow across the majority of this woodland, but dense regeneration of other species such as ivy and bramble. This is likely inhibiting trees from establishing due to limited light levels.

Fallen and standing deadwood is in abundance across the ASSI and proves an important habitat feature for lichens. Tree senescence will ensure the natural continuation of deadwood within these woodlands and any management works that results in the creation of deadwood should be retained in-situ.

Stand composition. Across the woodland and treescape more widely, there is a diversity of tree species within the canopy and sub-canopy, which provides a variety of different bark texture and pH. This in turn increases lichen diversity through the provision of more available niches for colonisation. This woodland is ash-birch-willow occupying a steep-sided slope, with

an understory of holly, hazel and rowan. In general, there is good species diversity across the site and diversifying the tree species composition is not considered necessary. The composition is reflected in the geology and soil types encountered here.

The main lichen interest was confined to the large willows that are found along the upper limits of the eastern scarp where light levels were elevated. These stands proved particularly interesting for the *Lobarion pulmonariae* community. The hazel and Rowan on the upper reaches proved noteworthy for the oceanic node of the *Graphidion,* including *Pyrenula acutispora, P. laevigata* and *Pyrenula occidentalis.*

In the light of ash dieback, this has the potential to significantly alter the woodland, where guidance in this document should be followed: **Sanderson, N. A. and Lamacraft, D. (2022) Impacts of Ash Dieback *Hymenoscyphus fraxineus* (Chalara) on priority lichens and potential mitigation options. Natural England Research Report NECR428. Natural England: Peterborough.** To summarise, it states that in the light of ash dieback, general guidance includes (1) retain all existing ash trees in-situ for as long as possible, (2) retain and further promote tree species diversity, (3) whilst ensuring existing areas of interest are in optimum condition and actively manage areas that could become potentially suitable in the future. The ash investigated was of limited interest for the lichens, but is still important to plan and mitigates against its loss.

Negative indicators: invasive non-native species. Species such as *Rhododendron* or cherry laurel have the ability to decimate lichen populations within a woodland. Their evergreen leaves cast permanent shade, resulting in areas devoid of lichens, bryophytes and woodland flora. These non-native invasives were not considered an issue within this woodland, but young stands were encountered. However, if these species begin to establish then there should be an aim to eradicate them asap. The presence of *Rhododendron* (at any level) marks the woodland as unfavourable.

Negative indicators: shade. Native or near native species such as holly, ivy and bramble are important for the general biodiversity of the wood. However, inappropriate levels of these species have the ability to cast dense shade and adversely affect lichen diversity. This can occur both directly (e.g. holly casting permanent shade on a tree trunk) and indirectly (e.g. high levels of epiphytic ivy creating dark and shaded conditions within the woodland). Levels of epiphytic ivy and bramble exceed the JNCC targets of “no more than 10% ivy and/or bramble”, this target alone fails all of the units within this ASSI.

The existing levels are considered an issue and management should be prioritised around core areas. Mechanical management is required in the accessible areas, followed by instating suitable levels of grazing and browsing. This is somewhat complicated considering the fence lines on the upper and lower slopes.

Negative indicators: pollution. Within the woodland, pollution is not considered an issue at present, as this is likely sheltered by the scarp and buffered by the trees. However, there was evidence suggesting pollution on the western edge of the scarp including the *Xanthorion* and *Physcietum* communities on the hazel stems, both communities tolerant of nitrogen. Layers of algae (<20%) on trees were also present, but not considered and issue.

It is important that the NIEA take a landscape-scale approach to addressing nitrogen pollution in the areas on the periphery of the ASSI.

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Appendices

Appendix 1: Direct Monitoring & Target Notes

Direct Monitoring and Target Notes have been arranged by subsite across the ASSI.

Belmore Mountain (heathland & blanket bog)



Figure 21: Fixed point photography taken from H 13202 41760 – view direction facing east towards Belmore Mountain summit. The encroachment of conifers onto the blanket bog would mark this habitat as unfavourable.



Figure 22: Mound of *Cladonia portentosa* at H 13388 41961, a frequent species found growing throughout the blanket bog, forming distinct mounds. View direction facing east towards the Belmore Mountain summit.



Figure 23: *Cladonia portentosa* and *Cladonia uncialis* subsp. *biuncialis* at H 13840 41782. *Cladonia* habitat on this heathland was limited due to lack of available habitat e.g. exposed peat. Conifer encroachment needs to be addressed.



Figure 24: Fixed point photography taken from H 13840 41782– view direction facing west towards Belmore Mountain summit. The encroachment of conifers onto the blanket bog / heathland would mark this habitat as unfavourable.



Figure 25: Blanket bog, west of cairn showing considerable numbers of Sitka spruce invading the bog. This bog appears to have a reasonable diversity of bryophytes including various *Sphagnum* spp. However, the lichen component is particularly poor in diversity with a terricolous community including: *Cladonia ciliata* var. *tenuis, C. diversa, C. floerkeana, C. portentosa* and *C. ramulosa Lichenomphalia umbellifera, M. lignaria* var. *lignaria* and *Placynthiella icmalea*. It is recommended that a bryophyte survey is undertaken.

Species recorded on the *Calluna* include: *Flavoparmelia caperata, Graphis elegans*, *Hypotrachyna afrorevoluta, H. revoluta* s.str., *Micarea coppinsii, M. lignaria* var. *lignaria* and *Parmelia sulcata* at H 133 418. View direction east towards cairn on 7th August 2023.



Figure 26: The green alga *Hormidiopsis* sp. occasional on *Calluna* stems suggesting elevated levels of nitrogen deposition at H 135 419 on the 7th August 2023. Many of the heather stems in this area were covered in algae.



Figure 27: Fixed point photography of Belmore Mountain cairn at H 13854 41771 – with the view direction facing south west, with Lough MacNean Lower and the Cuilcagh Mountains in the background.



Figure 28: The north and west side of the cairn, dominated by bryophytes and supporting an abundance of *Leptogium gelatinosum*. Unusually, the cairn had 360° coverage of bryophytes, including the well-lit south and west side, likely reflective of the high rainfall in this area.



Figure 29: The north and west side of the cairn, dominated by bryophytes and supporting an abundance of *Leptogium gelatinosum*. *Xanthoria parietina*, a Nitrophilic species seen growing on the eastern side of the cairn.



Figure 30: *Leptogium gelatinosum* growing among the bryophytes on the cairn at H 13854 41771. This species has a gelatinous thallus and is abundantly fertile. Its presence due to the calcareous substrate in an area of high moisture.



Figure 31: Eastern edge of blanket bog, just south of Lough Nagor. Small patch of bog supporting a few species including: *C. ciliata* var. *tenuis, C. diversa, C. floerkeana, C. portentosa, C. ramulosa* and *Micarea lignaria* var. *lignaria* at H 1445 4148.



Figure 32: Detail of section of bog in photo above. Note the algal gunge (right) a possible indication of elevated nitrogen levels. Some of the *Cladonia* species looked in poor health

with algae growing on top and some of the *C. portentosa* appeared bleached (more possible sign of elevated levels of N. deposition) H 1445 4148.

DMP 1 – Possible *Placynthium hungaricum*

Survey Information

- **Site Name:** South facing limestone cliff (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Wednesday 9th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Possible Placynthium hungaricum	DD	NR	-	-	-

- **Substrate:** Limestone.
- **GPS (grid reference):** H 14462 41292 [4 m +/-] **Altitude:** 337 m
- **Habitat:** A south facing limestone scarp within the heathland**.**
- **Abundance:** At H 14462 41292 (with 7 distinct patches supporting 30-50 thalli) to H 14477 41316 (5 distinct patches supporting 50+ thalli).
- **Thallus health / viability:** All thalli are in good health and population is deemed viable.
- **Associated species: Lichens:** *Agonimia tristicula, Caloplaca cirrochroa, C. chrysodeta, C. flavescens, Cladonia pocillum, Clauzadea immersa, Dermatocarpon miniatum, Gyalecta jenensis var. jenensis, Lepraria nivalis, Placidium squamulosum, Placynthium nigrum, Protoblastenia rupestris, Rhizocarpon umbilicatum, Toninia aromatica, Verrucaria baldensis, Placopyrenium fuscellum* and *Verrucaria nigrescens* f. *nigrescens.*
- **Comments:** *Cotoneaster* growing close to DMP 1. In general, the limestone across the ASSI is in good condition, where it remains well-lit and well-ventilated, but *Cotoneaster* is occasional throughout the site. Hazel, hawthorn and blackthorn also grow here. It is also important to monitor any scrub and/or ivy invasion as this could have deleterious impacts if it establishes on or near the outcrops.



Figure 33: Photo taken from H 14532 41231 facing north west towards the vertical limestone cliff face supporting the possible *Placynthium hungaricum.* See figures below for areas indicated by the orange arrows.



Figure 34: The orange boxes highlighting the areas occupied by the possible *Placynthium hungaricum*. The area on the left hand side at H 14462 41292 (with 7 distinct patches supporting 30-50 thalli) and the right at H 14477 41316 (5 distinct patches supporting 50+ thalli).



Figure 35: The left-hand box in figure 34 above at H 14462 41292, with 7 distinct patches supporting 30 - 50 thalli of the possible *Placynthium* hungaricum. Molecular work is required to provide a true identification of this species.



Figure 36: The right-hand box in fig 34 above at H 14477 41316, with 5 distinct patches supporting 50+ thalli) of the possible *Placynthium hungaricum.* See photo below for more photographs closer up.



Figure 37: Fossiliferous limestone at H 14477 41316 supporting a strong population of the possible *Placynthium hungaricum*. See photo below for a close-up photograph. Here, grazing is essential to ensure the limestone remains free from vascular vegetation.



Figure 38: Dark grey patches of *Placynthium hungaricum* cf. growing with the white leprose thalli of *Lepraria nivalis*. See figure bove for a wider view of the limestone rock face.



Figure 39: *Placynthium hungaricum* cf., here, in a fertile state. The thallus is comprised of a series of small isidiate squamules with a covering of pruina. *Placynthium nigrum* looks superficially similar but lack the pruinose surface.



Figure 40: *Cotoneaster* growing close to DMP 1. In general, the limestone across the ASSI is in good condition, where it remains well-lit and well-ventilated, but *Cotoneaster* is occasional throughout the site an should be eradicated. Hazel, hawthorn and blackthorn also grow here.

Carrickmacsparrow



Photo 41: Photo at H 1402 4082 of Carrickmacsparrow facing east showcasing the undulating landscape of the Belmore Mountain, comprised of heathland and exposed limestone outcrops, bordered by coniferous plantation in the distance marking the ASSI boundary.



Figure 42: Photo taken from H 14628 40710 facing north west towards the vertical, limestone cliff faces of Carrickmacsparrow. These rush pastures were grazed by cattle, ensuring a short sward and management of vegetation on the rock face.

DMP 2 – *Leptogium diffractum & Verrucaria parmigerella*

Survey Information

- **Site Name:** Carrickmacsparrow (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Thursday 10th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Leptogium diffractum	NT	NS	-	-	-
Verrucaria parmigerella	LC	NR	-	-	-

- **Substrate:** Limestone.
- **GPS (grid reference):** H 14025 40822 [4 m +/-] **Altitude:** 270 m
- **Habitat:** A series of limestone exposures within a heathland setting.
- **Abundance:** Large quantities of *Verrucaria parmigerella* growing on the vegetation / limestone interface. The population of *Leptogium diffractum* is much more restricted.
- **Thallus health / viability:** Thalli are in good health and considered viable.
- **Associated species: Lichens:** *Acrocordia conoidea, Bacidia fuscoviridis, Caloplaca flavescens, Cladonia pocillum, Clauzadea immersa, Collema fuscovirens, Petractis clausa, Petractis clausa, Placidium squamulosum, Placynthium nigrum, Protoblastenia incrustans, Protoblastenia rupestris, Toninia verrucarioides, Verrucaria baldensis* and *V. nigrescens* f. *nigrescens.*
- **Comments:** *Cotoneaster* is an issue here and should be monitored and managed. Nationally Rare *Verrucaria parmigerella*, recorded new for Northern Ireland.



Figure 43: A south facing limestone outcrop at H 14025 40822 with *Leptogium diffractum* in orange and the Nationally Rare *Verrucaria parmigerella*, recorded new for Northern Ireland, highlighted in yellow – although is found frequently along the damp rock-vegetation interface.



Figure 44: Close up of the left hand side of the monitoring plot at H 14025 40822 in figure 43 above, with the Nationally Rare *Verrucaria parmigerella* and the Nationally Scarce *Leptogium diffractum*.



Figure 45: Close up of the right hand side of the monitoring plot at H 14025 40822 in figure 43 above, with the Nationally Rare *Verrucaria parmigerella* and the Nationally Scarce *Leptogium diffractum*.



Figure 46: The Nationally Rare *Verrucaria parmigerella*, recorded new to Ireland with its shiny thallus going from a white green to grey-green, with the distinct halo-ing with a small perithecia in the centre. This species is an indicator of high-quality limestone sites.



Figure 47: The scattered squamules of *Toninia verrucarioides* overgrowing *Placynthium nigrum,* which scores on the SSSI Limestone Index. This species was locally frequent in this area of limestone.



Figure 48: *Petractis clausa* with its immersed apothecia and a thalline exciple covering the disc giving a star shaped appearance. This species was frequent on the limestone throughout the site and scores on the ASSI Limestone Index.

DMP 3 – *Leptogium diffractum & Verrucaria parmigerella*

Survey Information

- **Site Name:** Carrickmacsparrow (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Thursday 10th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Leptogium diffractum	NT	NS	-	-	-
Verrucaria parmigerella	LC	NR	-	-	-

- **Substrate:** Limestone.
- **GPS (grid reference):** H 14025 40822 [4 m +/-] **Altitude:** 266 m
- **Habitat:** A series of limestone exposures within a heathland setting.
- **Abundance:** Large quantities of *Verrucaria parmigerella* growing on the vegetation / limestone interface. The population of *Leptogium diffractum* is much more limited.
- **Thallus health / viability:** All thalli are in good health and are viable.
- **Associated species: Lichens:** *Acarospora cervina, Acrocordia conoidea, Bacidia fuscoviridis, Caloplaca flavescens, Cladonia pocillum, Clauzadea immersa, Collema auriforme, C. fuscovirens, Petractis clausa, Petractis clausa, Placidium squamulosum, Placynthium nigrum, Placynthium subradiatum, Protoblastenia incrustans, Protoblastenia lilacina, Protoblastenia rupestris, Toninia verrucarioides, Verrucaria baldensis* and *V. nigrescens* f. *nigrescens.*
- **Comments:** A hawthorn in close proximity supported a suite of Nitrophilic species including *Xanthoria parietina, Physcia adscendens* and *P. tenella.*



Figure 49: Location of DMP 3 on an east facing rock with *Verrucaria parmigerella* (yellow tags and J. Douglass pointing) and *Leptogium diffractum* (green tag) at H 13948 40819. Photo taken facing west.



Figure 50: Location of DMP 3 on an east facing rock with *Verrucaria parmigerella* (yellow tags and J. Douglass pointing) and *Leptogium diffractum* (green tag) at H 13948 40819. Photo taken facing west.



Figure 51: Position of *Toninia sedifolia* (UK BAP, where Belmore Mountain is only the 3rd record for Fermanagh, last recorded in 1988). Outcrop at H 13945 40862, photo taken facing c. south.



Figure 52: *Positions of Toninia sedifolia* in solution hollows of limestone boulder, where Belmore Mountain is only the 3rd record for Fermanagh, last recorded in 1988). Outcrop at H 13945 40862, photo taken facing c. south.



Figure 53: Upper patch of *Toninia sedifolia* growing on bryophytes in a solution hollow of limestone boulder in photos above. This species has densely pruinose areoles, with black lecideine fruits scattered across the surface.



Figure 54: Prostrate Cotoneaster sp., growing over limestone outcrop. The outcrop supports species including *Acarospora cervina*, *Leptogium diffractum, Placynthium subradiatum* and *Verrucaria parmigerella* at H 13945 40838. This non-native garden escape is frequent in this area and should be removed as a matter of priority at H 13945 40838.



Figure 55: A group of hawthorn trees at H 13925 40812, showcasing evidence likely attributed to nutrient enrichment. See figure below for additional information.



Figure 56: Hawthorn twig with *Hormidiopsis* sp. (green filamentous algae). Hawthorn twigs also support an abundant *Xanthorion* community likely indicative of elevated nutrient levels. This could be partly due to the lime rich soils and lime dust impregnation, but can also indicate N. deposition (Ammonia from cattle excrement, application of fertiliser on nearby fields and atmospheric deposition from wider sources) - H 13925 40812.



Figure 57: Prostrate *Cotoneaster* sp., growing over the limestone outcrop. This non-native garden escapee is occasional to locally frequent in this area and should be removed from this site before it covers more areas of limestone. H 13935 40811.



Figure 58: Limestone valley to the NW section of Carrickmacsparrow. This valley was not surveyed, but will probably support several species of conservation interest. Further survey work should be commissioned to study areas not investigated in 2023.

DMP 4 – *Protoblastenia lilacina*

Survey Information

- **Site Name:** Carrickmacsparrow (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Thursday 10th August 2023
- **Weather:** Overcast and rain.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Protoblastenia lilacina	LC	NR	-	-	-

- **Substrate:** Limestone.
- **GPS (grid reference):** H 14312 40703 [4 m +/-] **Altitude:** 239 m
- **Habitat:** A south west facing, exposed limestone cliff.
- **Abundance:** Multiple thalli of *Protoblastenia lilacina.*
- **Thallus health / viability:** Thalli was in good health. Population deemed viable providing overshading vascular vegetation is managed.
- **Associated species: Lichens:** *Aspicilia calcarea, Caloplaca dichroa, C. flavocitrina, Protoblastenia lilacina* and *P. rupestris.*
- **Comments:** Vascular vegetation is well established on the upper cliffs and is not considered an issue. However, this needs to be monitored and managed if becomes too densely vegetated.

  Ivy is also well-established on certain areas of the cliff, as seen in figure 60 – this is currently acceptable levels, but again should be monitored as ivy can cast permenant shade from its evergreen leaves.



Figure 59: John studying the population of *Protoblastenia lilacina* at H 14312 40703, growing alongside *Aspicilia calcarea, Caloplaca dichroa, C. flavocitrina* and *P. rupestris.* Photo taken from the track facing north west.



Figure 60: Photo taken facing north east of Carrickmacsparrow, with ivy and vascular vegetation abundant on the limestone faces at H 14230 40696. This area is west of DMP 4 and should be monitored to ensure ivy remains localised.

DMP 5 – *Leptogium diffractum* & *Placynthium subradiatum.*

Survey Information

- **Site Name:** Carrickmacsparrow (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Wednesday 9th August 2023.
- **Weather:** Overcast and rain.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Leptogium diffractum	NT	NS	-	-	-
Placynthium subradiatum	LC	NS	-	-	-

- **Substrate:** Limestone.
- **GPS (grid reference):** H 14610 40872 [5m +/-] **Altitude:** 270 m
- **Habitat:** A series of limestone exposures within a heathland setting at Carrickmacsparrow.
- **Abundance:** *Leptogium diffractum* (several thalli and scattered lobes) and *Placynthium subradiatum* (100+ thalli) at H 14605 40873.
- **Thallus health / viability:** All thalli are in good health and viable.
- **Associated species: Lichens:** *Acrocordia conoidea, Agonimia tristicula, Aspicilia calcarean, A. contorta* subsp. *contorta, Caloplaca flavescens, C. flavocitrina, C. oasis, Catillaria lenticularis, Cladonia pocillum, Clauzadea immersa, Collema fuscovirens, Dermatocarpon miniatum, Gyalecta jenensis* var. *jenensis, Lepraria nivalis, Leptogium plicatile, Petractis clausa, Placynthium nigrum, Porina linearis, Protoblastenia calva, P. incrustans, Protoblastenia rupestris, Romjularia lurida, Romjularia lurida, Verrucaria baldensis, Verrucaria caerulea, Placopyrenium fuscellum, Verrucaria nigrescens* f. *nigrescens* and *Xanthoria parietina.*
- **Comments:** Bramble and hawthorn encroachment has the potential to be an issue here and management is recommended, to ensure that rock faces remain free from vegetation.



Figure 61: DMP 5 - Photo facing north west of the upper limestone outcrops of Carrickmacsparrow at H 14610 40872 at 270m altitude. These rock faces supported a good diversity of limestone species. See photo below for Direct Monitoring Plot in orange.



Figure 62: DMP 5 - Monitoring plot for *Leptogium diffractum* (several thalli and scattered lobes) and *Placynthium subradiatum* (100+ thalli) at H 14605 40873. See photo below for close up of the rock face.

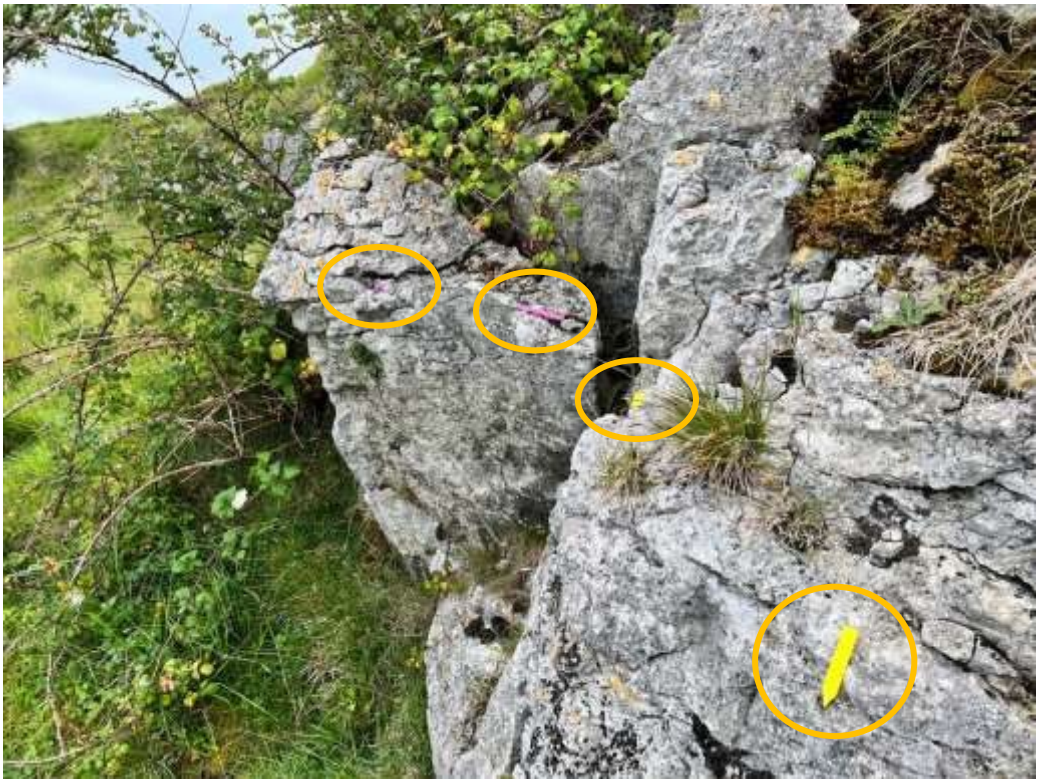


Figure 63: DMP 5 - Pegs marking out the thalli of *Leptogium diffractum* [?], with *Placynthium subradiatum* frequent on the rocks in this area. Note the bramble and hawthorn encroachment, where management should be implemented to keep the rock face free from vegetation.



Figure 64: *Dermatocarpon miniatum* and the nitrophilic species *Xanthoria parietina* growing on limestone in close proximity to the direct monitoring plot. The latter species is likely reflective of increases in nitrogen pollution



Figure 65: *Leptogium diffractum* with its gelatinous thallus and small, delicate lobes. This species lacks any vegetative propagules (soredia / isidia). In the majority of cases, the centre has partially fallen apart, leaving radiating lobes (as seen below).



Figure 66: *Leptogium diffractum* with its gelatinous thallus and small, delicate lobes. This species lacks any vegetative propagules (soredia / isidia). In the majority of cases, the centre has partially fallen apart, leaving radiating lobes (as seen here).



Figure 67: The black squamulose thallus of *Placynthium subradiatum* growing on the limestone, forming distinct arcs where the lichen dies away in the centre. This species was frequent growing on the rocks here.



Figure 68: Fertile *Placynthium subradiatum* on limestone, Belmore. This species starts off by forming complete rosettes, which then forms hollow rings / narrows arcs as the thallus dies away from the centre. This species is rarely found fertile.

Woodland East of Scarp

DMP 6 – *Pyrenula acutispora* & *Sclerococcum griseisporodochium*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Pyrenula acutispora	NT	NR	-	-	-
Sclerococcum griseisporodochium	NT	NR	-	-	-

- **Substrate:** Limestone and hazel.
- **GPS (grid reference):** H 14725 42711 [6 m +/-] **Altitude:** 180 m
- **Habitat:** An area of sheltered limestone within an east facing woodland, with a hazel dominated understory. The exposed limestone was noteworthy for *Sclerococcum griseisporodochium* and the smooth bark of the hazel in this vicinity supported *Pyrenula acutispora.*
- **Abundance:** Five+ thalli of *Pyrenula acutispora r*ecorded on a single hazel stem and a large sheet of *Sclerococcum griseisporodochium* growing on the shaded limestone.
- **Thallus health / viability:** Thalli of both species are in good health and considered viable, with plenty of available habitat. It is important that the limestone here remains devoid of encroaching vegetation such as ivy.
- **Associated species: Lichens:** *Arthonia cinnabarina, Graphis scripta, Thelotrema lepadinum* and *Pertusaria leioplaca.*
- **Comments:** This is an ash-hazel-willow woodland on an east facing scarp, with *Sclerococcum griseisporodochium* recorded new for Ireland and *Pyrenula acutispora* recorded new to the ASSI.



Figure 69: Area of birch, hazel and willow at H 14725 42711 [c. 180m], where hazel stems supported five+ thalli of the *Pyrenula acutispora*, growing alongside other smooth bark species. This area was below a large vertical limestone outcrop. Photo facing north.



Figure 70: The Near Threatened *Pyrenula acutispora* forming mosaics on the smooth bark of the hazel stems. This species is characterised by large perithecia and an offset ostiole, which is identifiable under close inspection in the field.



Figure 71: The exposed rock face at H 14717 42705 is a useful feature to relocate the area of hazel supporting *Pyrenula acutispora.* View direction facing south west. The limestone here supported the Near Threatened *Sclerococcum griseisporodochium.*



Figure 72: The Near Threatened and Nationally Rare *Sclerococcum griseisporodochium* growing on a sheltered, east-facing limestone outcrop within a woodland setting. This species was growing in mass abundance and was recorded new to Ireland (H 14717 42705).

DMP 7 – Pyrenula acutispora

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Overcast with heavy showers.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Pyrenula acutispora	NT	NR	-	-	-

- **Substrate:** Hazel.
- **GPS (grid reference):** H 15095 42127 [4 m +/-] **Altitude:** c.265m
- **Habitat:** Hazel/willow/birch woodland near top of scarp.
- **Abundance:** At least three thalli on two hazel stems. There was also at least one additional thallus on one hazel stem on a different stool at H 15093 42121, around 12 meters to the north and east of the track.
- **Thallus health / viability:** Some perithecia are old and no longer producing spores.
- **Associated species: Lichens:** *Arthonia cinnabarina, Graphis scripta* with *Stigmidium microspilum, Thelotrema lepadinum*. **Bryophytes:** *Frullania* sp.
- **Comments:** This is the first modern record for Northern Ireland. Known from only three 1km squares since 1980. Under the Irish Red Data Book Evaluation, this species is assessed as Vulnerable (Douglass & Coppins in prep).



Figure 73: Position of hazel stool at H 15095 42127 supporting *Pyrenula acutispora* just to the west and down slope of the track. At least three thalli on 2 of the hazel stems were recorded. Photo taken facing south.



Figure 74: *Pyrenula acutispora* on stem of hazel stool in photo above, recorded just west and down slope of the track. At least three thalli on 2 hazel stems were recorded. Photo taken facing south.



Figure 75: The Near Threatened (Irish red list Vulnerable) *Pyrenula acutispora* forming mosaics on the smooth bark of the hazel stems. This species is characterised by large perithecia and an offset ostiole, which is identifiable under close inspection in the field.



Figure 76: The Near Threatened (Irish red list Vulnerable) *Pyrenula acutispora* forming mosaics on the smooth bark of the hazel stems. This species is characterised by large perithecia and an offset ostiole, which is identifiable under close inspection in the field.

DMP 8 – *Graphina ruiziana*

Survey Information

- **Site Name:** (Belmore Mountain ASSI) Woodland east of scarp.
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Overcast with heavy showers.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Woodland Indices	International Responsibility
Graphina ruiziana	-	NS		LRI, URI	IR

- **Substrate:** Hazel.
- **GPS (grid reference):** H 14720 42698 [4 m +/-] **Altitude:** c.270m
- **Habitat:** Hazel-willow-birch woodland to the top of the scarp.
- **Abundance:** 2 patches in total on two stems.
- **Thallus health / viability:** Healthy and fertile, with plenty of suitable habitat nearby.
- **Associated species: Lichens:** *Arthonia cinnabarina, Cladonia* sp.*, Graphis scripta* with *Stigmidium microspilum, Lepraria finkii, Peltigera* sp.*, Sticta ciliata, Thelotrema lepadinum*. **Bryophytes:** *Frullania* sp.
- **Comments:** *G. ruiziana* is only known for 3 other sites in Fermanagh and was found on 5 more hazel stools in this woodland at H 14724 42708, H 14727 42688, H 14806 42563, H 14819 42556, H 14841 42517. This species is a southern oceanic woodland indicator species.



Figure 77: Positions of hazel stool supporting *Graphina ruiziana* at H 14720 42698. This is a species of lichen that occupies the smooth bark in high rainfall settings. This species was frequent throughout the upper limits of the woodland. View direction SE.



Figure 78: Hazel stool supporting *Graphina ruiziana* at H 14720 42698. This is a species of lichen that occupies the smooth bark in high rainfall settings. Upper patch of *Graphina ruiziana* as demonstrated by the arrow in figure 77.



Figure 79: Hazel stool supporting *Graphina ruiziana* at H 14720 42698. This is a species of lichen that occupies the smooth bark in high rainfall settings. Lower patch of *Graphina ruiziana* as demonstrated by the arrow in figure 77.



Figure 80: Close up of *Graphina ruiziana* growing on the smooth bark of the hazel stem. This species was recorded throughout the upper limit of the woodland and scores on the upland and lowland rainforest index.

DMP 9 – *Pannaria conoplea, P. rubiginosa & Protopannaria pezizoides*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Overcast with heavy showers.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Pannaria conoplea	LC	-	-	-	IR

- **Substrate:** *Salix (*willow)
- **GPS (grid reference):** H 14744 42642 [5 m +/-] **Altitude:** 240 m
- **Habitat:** Large willow on the upper limits of the woodlands, dominated by bryophytes and supporting a plethora of *Lobarion* species.
- **Abundance:** Several thalli of *Pannaria conoplea* occupying the eastern and southern side of the trunk.
- **Thallus health / viability:** Thalli were in good health and viable, with this species recorded occasionally throughout the upper woodland of the scarp.
- **Associated species: Lichens:** *Cladonia* sp., *Pannaria conoplea, P. rubiginosa, Peltigera praetextata, Phyllopsora rosei, Protopannaria pezizoides* and *Sticta sylvatica.*
- **Comments:** This is a steep ash-hazel-willow woodland, on the east facing scarp of Belmore Mountain. This site has a dense understory, reflective of insufficient levels of grazing.

  In 2011, Neil Sanderson accessed the lower limits of this woodland, but unfortunately this could not be accessed due to dense bramble cover. Encouraging more grazing animals into this woodland, would prove beneficial.

  Due to the precipitous nature of the slope, this area was frequently gladed, where trees had fallen and providing space in the canopy.



Figure 81: DMP 9 - A large willow at the upper limits of the woodland at H 14744 42642 [240m] supporting various species associated with the *Lobarion pulmonariae* alliance, including *Pannaria conoplea.* Photo taken facing south west.



Figure 82: DMP 9 – *Pannaria conoplea* (arrows) at H 14744 42642 occupying the south and eastern side of the willow stems. This species was recorded growing in abundance on the large willows in the upper woodland.



Figure 83: DMP 9 – *Pannaria conoplea* (arrows) at H 14744 42642 occupying the south and eastern side of the willow stems. This species was recorded growing in abundance on the large willows in the upper woodland.



Figure 84: DMP 9 – Large thallus of *Pannaria conoplea* at H 14744 42642 occupying the south and eastern side of the willow stems. This species was recorded growing in abundance on the large willows in the upper woodland.

DMP 10 – *Heterodermia obscurata, Pannaria rubiginosa & Protopannaria pezizoides*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Overcast with heavy showers.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Heterodermia obscurata	NT	NS	-	-	-
Pannaria rubiginosa	LC	-	-	-	IR
Protopannaria pezizoides	LC	-	-	-	-
Sticta sylvatica	LC	-	-	-	IR

- **Substrate:** *Salix* (willow)
- **GPS (grid reference):** H 14843 42502 & H 14830 42508 & H 14808 42495 [5 m +/-] **Altitude:** 252 m
- **Habitat:** Two large diameter willows on the upper edge of the scarp woodland and a cluster of hazel trees. These trees supported a good *Lobarion* community.
- **Abundance:** The *Protopannaria pezizoides* and *Sticta sylvatica* was growing is large abundance in this area and throughout this site on the mossy and base-rich trunks of willow and ash. *Pannaria rubiginosa* was occasional and a single thallus of *Heterodermia obscurata* was recorded.
- **Thallus health / viability:** All thalli are in good health.
- **Associated species: Lichens:** *Cladonia pyxidata, Megalaria pulverea, Normandina pulchella, Pannaria rubiginosa, Peltigera praetextata, Pertusaria pertusa, Protopannaria pezizoides* and *Sticta sylvatica.*
- **Comments:** The large, open-grown willows are of huge importance for their base-rich bark (*Lobarion*) communities. Willow proves an important surrogate species in the light of ash dieback.



Figure 85: DMP 10 - Large willow on the upper limits of the wooded scarp at H 14843 42502 supporting *Protopannaria pezizoides* and *Sticta sylvatica.* This willow is well-lit, where there is a gladed area to the west. Photo taken facing south.



Figure 86: A large patch of *Protopannaria pezizoides* occupying a willow on the upper limits of the woodland at H 14843 42502. This cyanolichen is comprised of a series a squamules that coalesce, where the upper surface is covered in apothecia.



Figure 87: Dense, vascular vegetation encroaching from the west, with willow H 14843 42502 to the right. This proves problematic due to overshading of the trunks. These upper limits are lichenologically rich due to the high light levels.



Figure 88: Another large willow by a fence line at H 14830 42508 supporting an abundance of *Sticta sylvatica* (orange), alongside *S. limbata, Pannaria rubiginosa* and *Heterodermia*

obscurata (yellow) on a fallen branch. Photo taken facing south.



Figure 89: A huge population of *Sticta sylvatica* overgrowing the bryophytes on the leaning willow trunk at H 14830 42508 by the fence. This stand also supported *Heterodermia obscurata* and *Sticta limbata* (see figure below).



Figure 90: Fallen branch of the willow at H 14830 42508 supporting *Heterodermia obscurata* and *Sticta limbata* on the fallen branch. For relocation, note the fence line, with photo taken facing north east.



Figure 91: *Sticta limbata* and the Near Threatened *Heterodermia obscurata* growing on a fallen, mossy willow branch at H 14830 42508. This species was infrequent throughout this area of woodland despite plenty of suitable



Figure 92: The thallus of the Near Threatened *Heterodermia obscurata* forming a rosette among the mosses. Lip-shaped soralia form on the margins, with orange ochraceous patches on the underside and neat rhizines.



Figure 93: Hazels at H 14808 42495 supporting various *Lobarion* species including *Peltigera collina, Pannaria rubiginosa, Leptogium lichenoides, Sticta fuliginosa* and *S. limbata.* Nitrophilic species were also recorded including *Physcia tenella* and *Xanthoria parietina.*



Figure 94: Hazel twigs supporting Nitrophilic species including *Physcia tenella* (in photo) and *Xanthoria parietina.* This is suggestive of nutrient enrichment from either long-range or shortrange sources. Nitrophilic species only recorded on the boundary of the woodland.

DMP 11 – *Peltigera horizontalis*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Overcast with heavy showers.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Peltigera horizontalis	LC	-	-	-	-

- **Substrate:** Fallen mossy trunk.
- **GPS (grid reference):** H 15113 42093 [3 m +/-] **Altitude:** 248 m
- **Habitat:** Fallen mossy trunk on the upper limit of the wooded scarp, by a neglected fence line. Tree unidentifiable.
- **Abundance:** Two medium-sized thalli on two small-diameter trunks.
- **Thallus health / viability:** Thalli were in good health.
- **Associated species: Lichens:** NA – moss covered trunk.
- **Comments:** This species was recorded new to this site in 2023.



Figure 94: Two large thalli of *Peltigera horizontalis* at H 15113 42093 occupying fallen and mossy trunk on the upper limits of the scarp woodland. *Sticta sylvatica* was also present in this area.



Figure 95: *Peltigera horizontalis* growing among the mosses, this species has a large and leafy thallus with large apothecia orientated horizontally on the margins of the lobes. This is the only locality of this species recorded in 2023.

DMP 12 – *Pyrenula laevigata*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Pyrenula laevigata	LC	NS	-	-	IR

- **Substrate:** *Corylus avellena* (hazel).
- **GPS (grid reference):** H 15144 42053 [5 m +/-] **Altitude:** 258 m
- **Habitat:** An open grown hazel on the upper limits of the woodland. The small diameter hazel stems support extensive mosaics of *Pyrenula laevigata* on the smooth bark.
- **Abundance:** Large abundance of *Pyrenula laevigata.*
- **Thallus health / viability:** All thalli are in good health and considered viable.
- **Associated species: Lichens:** *Arthonia cinnabarina, Dimerella lutea, Graphis scripta, Normandina pulchella and Thelotrema lepadinum.*
- **Comments:** This species was recorded once during the 2023 survey, but was recorded by Neil Sanderson in 2010 where he notes the species as abundant (see below)…

  Sanderson 2010: *"Pyrenula laevigata*: a very scarce oceanic species. Abundant on Hazels for a short stretch in the upper wood between H1496 4235 and H1496 4229. The Hazels are on the edge of a glade below a cliff (Sanderson, 2010)". An attempt was made to refind these hazels, but there were difficulties with access dropping down the slope.



Figure 96: Open-grown hazel supporting an abundance of *Pyrenula laevigata* on two stems, on the western edge of the woodland scarp at H15144 42053. This species forms mosaics on the smooth bark of small diameter hazel stems.



Figure 97: *Pyrenula laevigata* growing on the hazel. This species was recorded frequently in the woodland by Neil Sanderson in 2010, but was only recorded once from this hazel in 2023. Here, survey efforts targeted different stretches of the woodland.



Figure 98: The thallus of *Pyrenula laevigata*, a specialist of smooth bark in oceanic woodlands. This species is characterised by the white to immersed thallus, with black perithecia (large fruits) and pycnidia arranged in distinct lines.

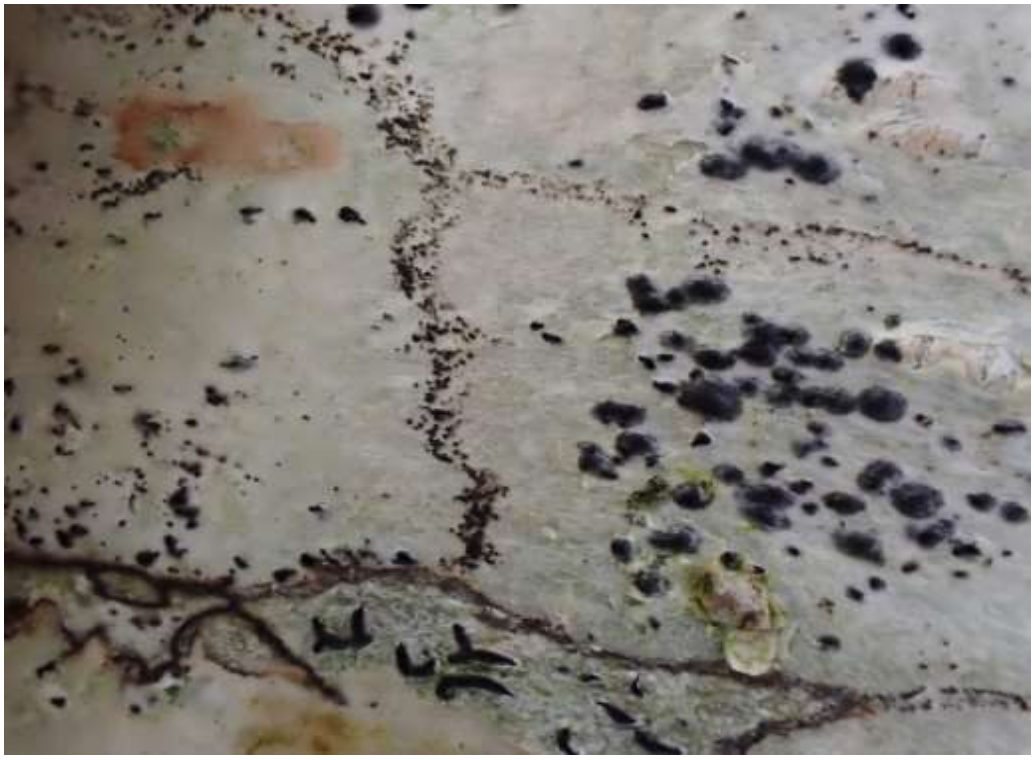


Figure 99: The thallus of *Pyrenula laevigata*, a specialist of smooth bark in oceanic woodlands. This species is characterised by the white to immersed thallus, with black perithecia (large fruits) and pycnidia arranged in distinct lines.

DMP 13 – *Pannaria conoplea* & *Sticta* spp.

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Pannaria conoplea	LC	-	-	-	IR

- **Substrate:** *Salix* (willow)
- **GPS (grid reference):** H 15153 42037 [4 m +/-] **Altitude:** 265 m
- **Habitat:** Large willow on the upper limits of the woodlands, dominated by bryophytes and supporting a plethora of *Lobarion* species.
- **Abundance:** 20 + thalli of *Pannaria conoplea* on two willow stems.
- **Thallus health / viability:** Thalli were in good health and viable, with this species recorded occasionally throughout the upper woodland of the scarp.
- **Associated species: Lichens:** *Cladonia* sp., *Graphis scripta* s. lat., *Megalaria pulverea, Normandina pulchella, Pannaria rubiginosa, Parmotrema perlatum, Ramalina farinacea, Sticta fuliginosa* s. lat., *Sticta sylvatica* and *Thelotrema lepadinum.*
- **Comments:** This is a steep ash-hazel-willow woodland, on the east facing scarp of Belmore Mountain. This site has a dense understory, reflective of insufficient levels of grazing.



Figure 100: Area of willow at H 15153 42037 supporting 20+ thalli of *Pannaria conoplea* on the trunks, with John pointing to thalli in the background. Photo taken facing north, on the edge of a gladed area.



Figure 101: Area of willow at H 15153 42037 supporting 20+ thalli of *Pannaria conoplea* on the trunks. Photo taken facing north, on the edge of a gladed area. This species was recorded new to the ASSI in 2023.



Figure 102: Area of willow at H 15153 42037 supporting 20+ thalli of *Pannaria conoplea* on the trunks. Photo taken facing north, on the edge of a gladed area. This species was recorded new to the ASSI in 2023.



Figure 103: A large and impressive thallus of *Pannaria conoplea* occupying the willow trunk at H 15153 42037. This species was recorded new to the woodland in 2023, where there is a reasonable population on the large willows on the upper slopes of the wood.

DMP 14 – *Pyrenula occidentalis*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Pyrenula occidentalis	LC	-	-	-	IR

- **Substrate:** *Sorbus aucuparia* (rowan)
- **GPS (grid reference):** H 15160 42020 [4 m +/-] **Altitude:** 265 m
- **Habitat:** A rowan on the edge of an area of willow carr supporting *Pyrenula occidentalis.*
- **Abundance:** A single thallus of this species was recorded on a rowan.
- **Thallus health / viability:** This species was recorded from one rowan in 2023 and a hazel in 2010. It is likely this species is more widespread (due to availability of suitable habitat).
- **Associated species: Lichens:** Not recorded.
- **Comments:** In 2010, Neil Sanderson commented, "*Pyrenula occidentalis:* a very scarce oceanic species. A single thallus was recorded on a Hazel at H1472 4271 (Sanderson, 2010)".



Figure 104: A rowan at H 15160 42020 supporting a thallus of *Pyrenula occidentalis* on the smooth bark at the trunk. This species and is a notable find for Northern Ireland. Willow carr supports *Lobarion pulmonariae* community.



Figure 105: Example of the sheltered willow twigs at H15160 42020 supporting *Leptogium lichenoides, Normandina pulchella, Pannaria conoplea, P. rubiginosa, Peltigera collina, Scytinium lichenoides* and *Sticta sylvatica.*

DMP 15 – *Peltigera collina*

Survey Information

- **Site Name:** Woodland east of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Friday 11th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Peltigera collina	LC	-	-	-	IR

- **Substrate:** *Salix* sp. (willow)
- **GPS (grid reference):** H 15183 41935 [4 m +/-] **Altitude:** 265 m
- **Habitat:** A huge willow on the east side of the forestry track.
- **Abundance:** There was an inordinate abundance of *Peltigera collina* growing on the mossy, horizontal boughs of the willow. This species was also recorded fertile, which is an infrequent encounter.
- **Thallus health / viability:** All thalli are in good health and are considered viable.
- **Associated species: Lichens:** *Lepraria finkii, Normandina pulchella, Pannaria conoplea, Pannaria rubiginosa, Peltigera collina, Peltigera praetextata, Phyllopsora rosei* and *Sticta sylvatica.*
- **Comments:** These large, open-grown willows are of great importance for their lichens. It is necessary that this area remains grazed, to ensure they remain well-lit.



Figure 106: A large leaning willow to the east of the main forestry track at H 15183 41935 supporting various *Lobarion* species, including a monumental population of fertile *Peltigera collina* on the mossy boughs. Photo taken facing south.



Figure 107: An example of one of the mossy willow stems at H 15183 41935 supporting a luxuriance of macro-*Lobarion* lichens. These trees are subject to high light levels, reflective of the suitable grazing / browsing in this area.



Figure 108: *Peltigera collina* growing among the mosses, characterised by a large leafy thallus with soredia (powder) developed along the margins of the lichen. Here, this population was abundantly fertile, which is a rare encounter for this *Peltigera.*



Figure 109: *Peltigera collina* growing among the mosses, characterised by a large leafy thallus with soredia (powder) developed along the margins of the lichen. Here, this population was abundantly fertile, which is a rare encounter for this *Peltigera.*



Figure 110: *Peltigera collina* growing among the mosses, characterised by a large leafy thallus with soredia (powder) developed along the margins of the lichen. Here, this population was abundantly fertile, which is a rare encounter for this *Peltigera.*



Figure 111: Example of the mossy willow bough at H 15183 41935 supporting a large abundance of *Sticta sylvatica* on the shadier, northern side of the trunk. Photo taken facing c. south.

Woodland & Limestone South of Scarp



Figure 112: Photo taken at H 15394 41006 facing south west of John traversing the bramble thicket. This area of woodland is part of the ASSI and is considered unfavourable condition due to the density of the understory. This woodland is surrounded by a fence line.



Figure 113: Hazel regeneration into the gladed area. This woodland south of the scarp is continuous and dense, where open features should be retained where possible. Thinning would be required, followed by reinstating grazing / browsing.



Figure 114: The upper limits of the woodland that is hazel dominated, at the base of the cliff. This small area was accessed via a deer track at H 15350 41051 (photo facing east). This was the only open area of woodland that could be accessed, due to dense thickets elsewhere.



Figure 115: Hazel at H 15315 41060 with stems supporting a strong population of *Mycomicrothelia confusa.* This species was found on a couple of hazels in this area at the base of the cliff. View direction facing north east.



Figure 116: An example of one of the hazel stems, here, with a mosaic of *Mycomicrothelia confusa* and *Pyrenula macrospora.* The latter, proving the dominant species on the hazels in the woodland.



Figure 117: *Mycomicrothelia confusa,* a scarce oceanic species of old, shaded and humid woodlands. This lichen is recognisable by the perithecia, where older and larger fruits develop a basal fringe, as seen within the centre of this photograph.



Figure 118: Old ivy stems growing up the limestone cliff face at H 15313 41057, with the damp, decorticating and loose bark supporting the western *Micarea adnata.* This species is Nationally Scarce and a noteworthy lichen in this woodland.



Figure 119: The green and scurfy thallus of the Nationally Scarce *Micarea adnata* (as seen in fig 118), with pale to reddish brown apothecia. There are only thirteen records for this lichen across Ireland, as listed on the Irish National Database.



Figure 120: A dense wall of ivy on the limestone cliffs near H 15315 41060, which proves unfavourable for lichens that require continuously well-lit substrata. This ivy is old, due to the wide diameter stems, but is important that levels are managed accordingly to the sites interest.



Figure 121: Photo facing south west towards Cuilcagh Mountain showcasing the hazeldominated woodland at the base of the limestone cliff. Levels of hawthorn, blackthorn and bramble were extremely high, making the majority of the woodland completely inaccessible.

DMP 16 – *Acarospora cervina* & possible *Placynthium hungaricum*

Survey Information

- **Site Name:** Glade – woodland south of scarp (Belmore Mountain ASSI).
- **Surveyors:** John Douglass & April Windle.
- **Date:** Tuesday 7th August 2023.
- **Weather:** Sun all day.

Species & Habitat Information

Target Species	GB Red Data Book	Scarcity	BAP Species	Section 41 (NERC Act)	International Responsibility
Acarospora cervina	LC	NS	-	-	
Possible Placynthium hungaricum	DD	NR	-	-	-

- **Substrate:** Low limestone outcrops.
- **GPS (grid reference):** H 15392 41031 [3 m +/-] **Altitude:** ?? m
- **Habitat:** a series of low-lying limestone outcrops in a gladed area within the woodland to the south of the scarp.
- **Abundance:** Several scattered squamules of *Acarospora cervina* and several thalli of the possible *Placynthium hungaricum.*
- **Thallus health / viability:** Thalli were in good health at present, however, with the absence / lack of grazing, it is likely this area is going to develop into a dense bramble thicket.
- **Associated species: Lichens:** *Opegrapha rupestris, Placynthium subradiatum, Protoblastenia lilacina, Verrucaria pinguicula* and *Staurothele guestphalica.*
- **Comments:** Low limestone outcrops supporting a number of limestone species including: *Opegrapha rupestris* (NS), *Placynthium subradiatum* (NS, 2nd record for Fermanagh) found fertile here, *Protoblastenia lilacina* (NR, new to Fermanagh and 3rd record for Ireland and *Verrucaria pinguicula* (NS, 3rd record for Fermanagh). In addition, the lower outcrop supports *Staurothele guestphalica* (new for Ireland); the upper outcrop (red arrow) supports *Acarospora cervina* (DD, NR, New for Northern Ireland). The lower section of outcrop (at yellow arrow) supports a grey pruinose *Placynthium* which may be *P. hungaricum* but molecular work is required to try and elucidate. Ivy and other overshading vascular vegetation is a problem here.



Figure 122: Low limestone outcrops supporting the upper outcrop supports *Acarospora cervina* (red arrow). The lower section of outcrop (at yellow arrow) supports a grey pruinose *Placynthium* which may be *P. hungaricum.* Photo facing north west.



Figure 123: Photo taken facing south east, with John studying the boulder at H 15392 41031 (indicated by the yellow arrow above). These low-lying limestone exposures supported a rich lichen diversity but are threatened from overshading vegetation.



Figure 124: Position of grey pruinose *Placynthium* sp. possibly *P. hungaricum* on (two patches upper and lower centre, both sterile). This species was recorded on the low-lying limestone outcrops at H 15392 41031.



Figure 125: Lower patch of grey pruinose *Placynthium* sp. possibly *P. hungaricum* on outcrop in photos above. Molecular work is required on the specimens found at Belmore Mountain ASSI to try to elucidate the species.



Figure 126: Upper section of limestone supporting *Acarospora cervina* (new to NI and 2nd record for Ireland). Here, ivy is growing on this low-lying exposure and threatens the lichens that are growing on the rock.



Figure 127: Upper section of limestone supporting scattered squamules and localised colonies of *Acarospora cervina*. Note the ivy beginning to grow over this limestone. The ivy should be removed.



Figure 128: The Natioanlly Scarce *Acarospora cervina*, with its small and scattered squamules, where the young lobes have a dense covering of pruina which is lost as the lichen matures and confined to the margins in the older squamules.



Figure 129: The squamulose thallus of *Romjularia lurida* most frequently growing in the damp and sheltered crevices of the limestone. The small black isidiate thallus is the common limestone species *Placynthium nigrum.*

Outside of ASSI – Forestry Track towards Summit



Figure 130: Multi-stemmed willow to the south of the forestry track at H 12171 43057 supporting a population of *Lobaria pulmonaria* (circled orange) and a suite of other species associated with the *Lobarion pulmonariae* alliance. View direction south east.



Figure 131: A large thallus of *Lobaria pulmonaria* growing on the willow (fig. 130). This was the only time this species was recorded during the 2023 survey outside of the ASSI. This highlights the importance of these willow woods that border the coniferous plantations.



Figure 132: A large thallus of *Lobaria pulmonaria* growing on the willow along a forestry track outside of the ASSI. This species was not recorded within the ASSI and was the only time this species was recorded during the 2023 survey.



Figure 133: *Nephroma laevigatum* and *Pannaria rubiginosa* growing on the willow in fig. 130. Other species include *Normandina pulchella, Protopannaria pezizoides, Sticta ciliata, S. fuliginosa, S. sylvatica* and *Thelotrema lepadinum,* alongside the *Lobaria pulmonaria* above.



Figure 134: Willow to the north of the forestry track at H 12093 43029 supporting an abundance of the Near Threatened and Nationally Scarce *Phlyctis agelaea* on multiple willow stems. *Caloplaca ferruginea* was also growing in abundance. View direction north west.



Figure 135: The white thallus of *Phlyctis agelaea* growing in abundance on the willow at H 12093 43029. This species is characterised by fruits with a dense covering of pruina on the surface, with a striking K+ blood red reaction.



Figure 136: Willow to the south of the track at H 12132 42041 [310m] with *Pectenia* (*Degelia*) *cyanoloma* (orange) and *Heterodermia obscurata* (blue). Growing with *Nephroma laevigatum, Pannaria rubiginosa* and *Sticta fuliginosa* s. lat. View direction facing east.



Figure 137: Example of the algal gunge (*Klebsormidium*) growing on the willow stems. This gunge is possibly related to elevated levels of nitrogen pollution. However, this is a complex, poorly understood interaction and should be investigated further.



Figure 138: A sterile thallus of *Pectenia* (*Degelia*) *cyanoloma* growing on a willow at H 12132 42041 (fig. 136), with small squamules of *Normandina pulchella.* This is the only record for *Pectenia* during the 2023 survey. There was a lot of algal gunge on the willows here.



Figure 139: The Near Threatened *Heterodermia obscurata* growing on a willow at H 12132 42041 (fig. 136). This species has a foliose thallus with soredia upturning the apices of the lobes. The underside is white, with small rhizines and ochraceous patches.



Figure 140: Willow at H 12375 42047 with a huge population of *Peltigera collina,* growing alongside *Pannaria rubiginosa* and *Nephroma laevigatum.* The *Lobarion* species here were looking necrotic and algal gunge was also present. View direction facing south east.



Figure 141: The willow stems H 12375 42047 supporting an abundance of *Peltigera collina.* This can be seen on the stem as the grey-purple macro-lichen. This is a scarcer member of the *Lobarion pulmonariae* alliance.



Figure 142: Large willow (left) supporting and *Pannaria rubiginosa*, *Sticta ciliata, S. fuliginoides*, *Sticta fuliginosa* s. str. *Scytinium lichenoides*, edge of the forestry track (outside the ASSI). The willows along this section of forestry track support a relatively wide diversity of *Lobarion* species including *Lobaria pulmonaria*, *Nephroma laevigatum, Pannaria rubiginosa, Pectenia cyanoloma, Peltigera collina, Sticta* spp. *Thelotrema lepadinum* etc. and other rare/scarce species including *Caloplaca ferruginea*, *Lecanora alboflavida, L. jamesii, Heterodermia obscurata, Hypotrachyna sinuosa, Phlyctis aglaea* and *Vezdae stipitata*, the latter being a second record for Northern Ireland (first record found at Big Dog in Feb 2023).

Consideration should be given to the management of these important deciduous corridors, allowing them more room to expand or even attempting to include them into the ASSI to allow for greater management. Photo taken 7th August 2023. H 11935 42985. View direction NNE.



Figure 143: *Sticta fuliginoides* with *Scytinium lichenoides*, *Sticta fuliginosa* s.str. and *Pannaria rubiginosa* on willow along the forestry track (outside the ASSI) in photo above. 7th August 2023. Recorded on willow H 11935 42985.



Figure 144: Fertile *Sticta ciliata* on willow in photo above. 7th August 2023. Recorded on willow H 11935 42985. Stictas are characterised by a tomentose (felt-like) underside, with breathing pores (cyphellae) and have a pungent smell of fish when wet.



Figure 145: *Vezdae stipitata* (which is the second record for Northern Ireland) growing on willow along the forestry track (outside ASSI). Recorded at H 12114 43025 and collected on the 7th August 2023.



Figure 146: Algal gel/gunge growing on willow next to *Pannaria rubiginosa*. This algal gunge/gel was occasional to frequent throughout the woodland here and likely indicates elevated levels of N. deposition. At H 12088 42028 on the 7th August 2023.

Appendix 2: Indirect Monitoring Attribute & Target Tables

This section includes indirect monitoring attribute and target tables for Woodland lichens (Special Habitat 28) and Upland Cliffs and block scree (Special Habitat 34). These are habitats highlighted within the JNCC CSM guidance (Appendix 2), as habitat requiring special guidance for monitoring their lichen interest features.

Interest feature: Woodland lichens (Special habitat 28)

Extracted from "UK Guidance on Conservation Objectives for Monitoring Designated Sites", which states the following…

There are a large range of woodland types which have subtle but significant differences in the conditions required for lichens. Most of the targets below should be interpreted locally, including information from the site dossier and expert opinion.

Woodlands and areas of scrub which are rich in lichens tend to be oceanic oak woodlands, willow carr, gorge woodlands, Atlantic hazel woodlands in Scotland, scrub woodlands on coastal cliffs and lastly those with old growth stands which are often former wood pasture. Classic coppice with standards woodland is generally of less importance. Old growth stands (veteran trees) provide a substrate for the more-slow growing species which are often indicators of continuity, but in optimum conditions as in the west of Scotland relatively young growths can be colonised.

Air quality needs to be good with low levels of SO_2 and nitrogen compounds, such as might originate from livestock units, or nearby applications of fertiliser and slurry, as well as from long distance transport. Generally, there should be a good age range of trees to provide continuity of substrate.

Assessment of attributes could be undertaken at any time. If any attribute fails, the feature is not in a favourable condition.

Attributes	Targets (as set by Natural England)	Method of assessment	Comments	Condition Assessment
Niche availability	No loss of area of woodland.	Historic OS maps Aerial photography Visual assessment	Interestingly, the scarp woodlands do not feature on the 1834 maps, but support a suite of old-woodland lichen indicators and old trees to suggest that this is an ancient site. After speaking to a local landowner, he mentioned that the development of the woodland on the southern scarp is recent and established when that area of the ASSI was fenced. Therefore, over recent years, there has been an increase in woodland cover over time.	Favourable

Attributes	Targets (as set by Natural England)	Method of assessment	Comments	Condition Assessment
			Overtime, it is likely there will be a drastic alteration to the ashdominated treescape, in the light of ash dieback. Here, it is important to ensure mitigation is implemented to ensure significant areas of woodland are not lost (see Sanderson & Lamacraft, 2022).	

Stand structure	Percentage canopy cover appropriate for the wood, as an absolute minimum to be greater than 20%.	Visual assessment Aerial photography	Overall, the area of woodland at Belmore exceeds JNCCs target of >20% canopy cover. However, for the development of lichen-rich woodlands it is recommended that a canopy of a typical woodland stand should cover 30-70%, where 30% of the stand (as a minimum) should consist of gladed habitats (Coppins & Coppins, 2002). In general, this woodland canopy is open in character (due to the steep slopes and large rock outcrops/boulders, However, at the subcanopy level, the woodland structure is far too dense, and assessing levels of grazing / browsing is important to increase light levels in the ASSI. The feasibility of such regimes is questionable considering the precipitous nature of the site, especially as the woodland is fenced on both the upper and lower slopes. Appropriate grazing, in combination with mechanical clearance would prove favourable here.	Favourable
	Age-range present amongst trees and shrubs.	Visual assessment	At Belmore, there is a good tree age profile across the site. Older willows on the upper slopes are of great importance for the *Lobarion pulmonariae* community. It is also important to ensure hazel stands have a good diversity of small diameter (smooth) and large diameter (rough) stems, where the smooth stems support the *Graphidion* community.	Favourable Favourable

Attributes	**Targets (as set by Natural England)**	**Method of assessment**	**Comments**	**Condition Assessment**

	Signs of natural regeneration. Deadwood present (both fallen and standing).	Visual assessment Visual assessment	There is lots of natural regeneration across the site, but this is mainly in the form of dense thicketed areas. Thinning works in some areas would prove beneficial to recruit certain tree species such as ash, birch and willow. Fallen and standing deadwood is occasional across the woodland within the ASSI and can prove an important habitat feature for lichens.	Favourable
Stand composition	Baseline range of tree/shrub species maintained to ensure continuation of habitat and niches for the species-rich lichen flora in mixed native woodlands.	Visual assessment	At a landscape level, there is a good species diversity in both the canopy and sub-canopy, especially in relation to the growing conditons. This ensures a wide range of available niches, resulting from differences in bark chemistry and texture. This is a ash-birch-willow woodland occupying a steep-sided slope, with an understory of holly, hazel and rowan. Retain a diverse tree species composition is important here. Plan mitigation for the loss of ash across the landscape, by recruiting alternative canopy species (see Sanderson & Lamacraft, 2022)..	Favourable
Lichen communities	Targets for communities of lichens should be derived from the site dossier.	Visual assessment Historic surveys	**The main lichen features of this woodland are:** • ***Graphidion Pyrenula laevigata – Pyrenula occidentalis* (smooth bark):** *Arthonia graphidicola* (2010), *Mycomicrothelia confusa, Mycoporum antecellens, Opegrapha thelotrematis* (2010), *Pyrenula acutispora* (recorded new to the site in 2023), *P. laevigata* and *P. occidentalis.*	Favourable

Attributes	Targets (as set by Natural England)	Method of assessment	Comments	Condition Assessment
			• ***Lobarion pulmonariae*** **(base-rich bark):** *Heterodermia obscurata, Leptogium cyanescens* (2010), *L. lichenoides, Mycobilimbia epixanthoides, Nephroma laevigatum, N. parile* (2010), *Normandina pulchella, Pannaria conoplea* (recorded new in 2023), *P. rubiginosa* (widespread), *Parmeliella parvula* (2010), *Pectenia atlantica* (2010), *Peltigera collina, P. horizontalis* (recorded new to the site in 2023) and *Protopannaria pezizoides* was widespread. Various *Stictas* were recorded, including *Sticta ciliata, S. fuliginoides, S. fuliginosa* s. str. *S. limbata* and *S. sylvatica.* In 2023, *Lobaria pulmonaria* and *Pectenia cyanoloma* were recorded on a willow along a forestry track outside of the ASSI. These species should be excluded from the overall list for the ASSI, but are notable and significant nonetheless. • ***Parmelion laevigatae*** **(acid bark):** *Cetrelia cetrarioides* (2010), *C. monachorum* (2010), *C. olivetorum* s. lat., *Heterodermia obscurata, Hypotrachyna sinuosa, Megalaria pulverea* and *Micarea alabastrites* **Target: continued presence and development of species and communities.**	

Negative indicators: non-natives	No Rhododendron or other non-native invasives present	Visual assessment	A few stands of *Rhododendron* were noted in the woodland and these should be eradicated. A walkover survey mapping the entire woodland, in search for non-native invasives is recommended.	Unfavourable

Attributes	Targets (as set by Natural England)	Method of assessment	Comments	Condition Assessment
	in the area of feature.			
Negative indicators: shade	A balance between no grazing and overgrazing. A mosaic of open glades and closed tree canopy to be maintained, retaining diversity of light/shade, humid and well-ventilated conditions around trees and rocks. No more than 10% ivy and/or bramble present or thickets of holly/beech.	Visual assessment	Levels of ivy, bramble and holly were recorded at unacceptable levels in the main woodland along the eastern and south eastern flank and can only be sustainably managed by grazing and browsing within the woodland. At Belmore, the woodland is fenced along both the upper and lower slopes. Those areas that are dense and impenetrable should be opened up. This woodland fails the JNCC target of no more than 10% ivy and/or bramble or thickets of holly .	Unfavourable

Negative indicators: pollution	Where the woodland abuts on to agricultural land; trunks, branches and twigs at the periphery should not be seen to carry 20% cover of green, algal 'gunge' deposits.	Visual assessment	Within the woodland, pollution is not considered an issue at present, as this is likely sheltered by the scarp and buffered by the trees. However, there was evidence along western edge of the woodland, where the *Xanthorion* and *Physcietum* communities had established on the hazel stems (tolerant of nitrogen). Layers of algae (<20%) on trees were also present, but not considered and issue. This was however, only recorded on trees on the periphery and didn't appear to infiltrate into the woodland.	Favourable (woodland only)
Attributes	**Targets (as set by Natural England)**	**Method of assessment**	**Comments**	**Condition Assessment**
	No evidence of air pollution damage. No evidence of acid rain damage.		It is important that the NIEA take a landscape-scale approach to addressing nitrogen pollution in the areas on the periphery of the ASSI. Threats include intensive agriculture where large quantities of fertilisers are used and intensive animal husbandry (see Plantlife 2017).	

Interest feature: Upland cliffs and block scree (Special habitat 34)

Extracted from "UK Guidance on Conservation Objectives for Monitoring Designated Sites", which states the following…

Upland cliffs and block screes are in a favourable condition for their lichen interest when lichens are able to grow and complete their life cycle unaffected by anthropogenically engendered factors e.g. disturbance and damage caused by quarrying, moorland fires, intensive rock climbing, recreation, atmospheric pollution or changes in land management. Adverse land management changes by afforestation of light demanding communities, dense stocking of low-nutrient demanding communities or reduction in stocking levels allowing the growth of competing higher plants such as ivy should be avoided. Atmospheric pollution from long range as well as local sources can be significant in determining the health of lichen populations. Moorland fires can be particularly damage lichens on small boulders and low cliffs.

Assessment of attributes could be undertaken at any time. If any attribute fails, the feature is not in a favourable condition.

Attributes	Targets (as set by JNCC)	Method of assessment	Comments	Condition Assessment
Niche availability	No loss of extent of habitat	Mapping, aerial photographs	Loss can occur through developments, e.g. creation of new paths, steps, quarrying or building work. However, this is not considered an issue across the ASSI. The main concerns surround afforestation on the periphery of the ASSI. The reason for this is that Sitka spruce is encroaching the heathland within the protected site. Although this is not directly impacting lichens and associated habitats at present, the issue is	Favourable
			only going to exacerbate and there should be an aim to completely eradicate colonising Sitka spruce form within the ASSI. It is important that limestone rock faces remain open and where vascular vegetation develops, that this is localised. *Cotoneaster* is also developing in some areas and as an evergreen, has the potential to reduce habitat availability.	

Lichen communities	Target to be set according to site dossier	Visual assessment	Look at the range of niches available from open exposed crags to sheltered underhangs and gullies. Also, degrees of nutrient enrichment from occasional water seepage, dust from mineral soil, fragments of animal faeces or bird perch rocks. Belmore Mountain ASSI showcased a great range of rocky microhabitats including escarpments, large rock outcrops, boulders, low-lyign rocks etc., reflected in the lichen diversity encountered here. Lichen communities occupying rocks are listed below: • ***Aspicilion calcareae*** **(limestone):** This community is dominated by *Caloplacas*, *Collemas, Scytiniums* and *Verrucarias* including *Caloplaca cirrochroa, C. dichroa, C. flavescens, C. flavocitrina* and *C. oasis; Collema auriforme, C. crispum* var. *crispum, C. cristatum* var. *cristatum, C. fragile, C. fuscovirens, C. polycarpon* and *C. tenax* var. *tenax. Leptogiums* include *L. gelatinosum, L. plicatile, L. pulvinatum, L. schraderi* and *L. turgidum.* Excellent populations were recorded of the *Leptogium diffractum, a* Near Threatened and Nationally Scarce species. *Verrucaria* species that were recorded include *Verrucaria baldensis, V. caerulea, V. dufourii, V. nigrescens f. nigrescens, V. pinguicula* and *Verrucaria viridula.* There were good populations of the Nationally Scarce *V. parmigerella,*	Favourable

			which was recorded growing on the damp interface between vegetation and exposed rock. On the limestone, in both sheltered and exposed conditions, the On the limestone, in both sheltered and exposed conditions, the following species were recorded: *Acarospora cervina* (Nationally Scarce), *Acrocordia conoidea, A. salweyi, Belonia nidarosiensis, Bilimbia sabuletorum, Botryolepraria lesdainii, Clauzadea immersa, C. monticola, Dermatocarpon miniatum and Placynthium nigrum.* On the limestone cliff an extensive area supported a pruinose and fertile *Placynthium* species. When investigated under the microscope, the material matched the description best of *Placynthium hungaricum* (NR), albeit the spores being slightly too small for this species. However, this is the name that has been attributed to the record, until molecular work is undertaken to reach an accurate species identification. Various *Protoblastenia* species were also recorded, including *P. calva, P. incrustans, P. lilacina* (NR) and *P. rupestris.* The Nationally Rare *Protoblastenia lilacina* is likely locally abundant in this area. Other lichens recorded include *Romjularia lurida, Solorina saccata, Thelidiums* including *T. decipiens, T. incavatum* and *T. papulare* f. *papulare. Toninia aromatica, T. sedifolia* and *Toninia verrucarioides* were also recorded, with the latter parasitising *Placynthium nigrum.* In the woodland along the east scarp, a shaded limestone outcrop was recorded to support *Sclerococcum griseisporodochium* – recorded new for Ireland.	

			Target: Ensure species and communities remain stable and constant.	
Negative indicators: pollution	No visual damage by bleaching, colour change or visible death of significant areas of lichen. No increase in monitored levels of SO2, NOx and NH3 No evidence of hypertrophication (no increase in and no more than 5% - 10% algal cover on rock surfaces)	Visual assessment and check on national and local air pollution records Visual assessment for algal cover, suggesting application of slurry or fertilisers. Inappropriate grazing levels resulting in excessive animal dung can also cause hypereutrophication.	Changes to air quality may be more subtle and only detected by specialist survey. A change in measured pollution levels would indicate need for specialist survey. Low level nutrient enrichment is a requirement of some upland rock communities but excessive nutrient pollution is harmful. Algal cover on the rocks specifically were not considered an issue, this was more pertinent on trees and on the *Calluna* stems. However, it is important that this is monitored and it is likely more detailed information could be obtained from specialist pollution monitoring. There was evidence of *Xanthoria parietina* growing on the limestone, which is suggestive of elevated levels of nitrogen pollution. At present, pollution does not appear to have any direct impacts on the lichen interest, but this needs to be monitored over time.	Favourable
Negative indicators: shade	No spread of woody species or climbing plants likely to significantly alter light levels of the site	Visual assessment	Scrub and climbing vegetation are important for other biodiversity interests of the site, particularly invertebrates and birds. However, inappropriate levels can overshade existing lichen species and communities, but also makes potentially suitable habitats unsuitable. The only long-term and viable means of managing levels of scrub and ivy at a site such as Belmore Mountain, is through suitable	Unfavourable

			levels of grazing and browsing. If dense thicketed areas occur, then mechanical management will be required, but this is only considered necessary, if grazing alone cannot control these levels. In general, rock faces were, exposed, well-lit and ventilated, where there is suitable levels of grazing across the site. Where vascular vegetation had established, this was localised and deemed acceptable. However, the non-native evergreen *Cotoneaster* is starting to develop on site. It is of great importance that there is an aim to totally eradicate this species. This is localised at present, but is likely to impact on the lichen feature in due course. This issue will only exacerbate if left unmanaged.	
Negative indicators: disturbance	No widespread damage from recreational activities (localised tracks and paths, or regularly used sites for rock climbing are acceptable)	Visual assessment – look for scuffing and erosion of rock surfaces spreading out from regularly used paths or rock-climbing stances	Uncontrolled and excessive trampling and erosion has the potential to depauperate the lichen interest on rock faces. This was not considered an issue anywhere across the site. Light disturbance can sometimes prove favourable, where animals result in the sloughing of vascular vegetation.	Favourable
Negative indicators: burning	No evidence of fires in the vicinity of cliffs and scree	Visual assessment	Burning around rock outcrops and scree is detrimental to the lichen interest. This was not deemed an issue, with no evidence of recent fires anywhere across the site. Where controlled burning is necessary for heathland management, it is important that this is conducted away from rocky habitats and	Favourable

			suitable fire breaks are created to avoid potential damage to rock faces.	

Northern Ireland Environment Agency
Gníomhaireacht Comhshaoil Thuaisceart Éireann
Norlin Airlan Environment Agency
www.daera-ni.gov.uk

For further information:

Species Survey Team
Conservation Science
Clare House
303 Airport Rd W
Belfast
BT3 9ED

Tel: 028 9056 9558
Email: BCSGeneral@daera-ni.gov.uk
www.daera-ni.gov.uk

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