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Front cover, small photographs from top row:

A deep water fly trap anemone *Phelliactis* sp., Yvonne Leahy; **Common Newt** *Lissotriton vulgaris*, Brian Nelson; **Limestone pavement**, Bricklieve Mountains, Co. Sligo, Andy Bleasdale; **Garden Tiger** *Arctia caja*, Brian Nelson; **Violet Crystalwort** *Riccia huebeneriana*, Robert Thompson; **Coastal heath**, Howth Head, Co. Dublin, Maurice Eakin; **Meadow Saffron** *Colchicum autumnale*, Lorcan Scott

Bottom photograph: **Calaminarian grassland**, Knockmahon Village, Co. Waterford, Des Callaghan



The state of Calaminarian grassland in Ireland, 2023

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Executive Summary

The EU Annex I habitat ‘Calaminarian grasslands of the *Violetalia calaminariae*’ (Natura code 6130) is confined to areas which are rich in heavy metals, particularly phytotoxic levels of copper and/or lead, and is characterised by species that have evolved a tolerance of such conditions. In Ireland, the habitat is entirely confined to the vicinity of old metal mines. A thorough survey of the habitat was undertaken in 2008 (Holyoak, 2008), followed by a baseline monitoring assessment of 29 sites in 2017–2018 (Hodd & Hodgetts, 2019). This report describes the results from the re-monitoring, in October 2023, of 20 sites which were assessed as in Unfavourable Conservation Status in the previous Article 17 reporting period, and a national assessment of the conservation status of the habitat in Ireland. Although a decline of some kind will have almost certainly taken place at the remaining nine sites that were assessed as being of Favourable Conservation Status during the previous Article 17 reporting period, as the pressures acting on these sites are at a lower intensity, this decline may be slower than at the other 20 sites, and the habitat there is not thought to be immediately threatened.

The condition of the habitat at all 20 sites is judged to be unfavourable, mostly Unfavourable – Inadequate ($n = 14$; 70%) but also Unfavourable – Bad ($n = 6$; 30%), which is very similar to the baseline assessment. The area of Calaminarian grassland across the 20 sites presently totals just 1.64 ha, a decline of 0.12 ha from the baseline. The decline equates to an annual rate of loss of roughly 1%, which is consistent with observations that the habitat is generally undergoing a widespread and slow decline, notwithstanding occasional rapid losses at individual sites. The results of the present survey reaffirm the complete loss of Calaminarian grassland from Lackamore, as was noted during the baseline assessment, and for the first time, documents its complete loss from Ballyhickey and Tankardstown. It is virtually extinct at Keeldrum and Tigroney West, though tiny patches persist. At the remaining 15 sites, the habitat is present in small quantity, the largest amounts occurring at Shallee (0.45 ha; 27%), Knockmahon Village (0.32 ha; 20%) and Dooneen (0.19 ha; 12%).

The results of this survey show that indicator species of Calaminarian grassland, which are also included on the IUCN Red List of bryophytes in Ireland (Lockhart *et al.*, 2012), continue to survive at 13 sites. Of the seven Red Listed species recorded during the present survey, Knockmahon Village supports the highest number (four species), followed by Bunmahon, Cappagh and Dooneen (three species each). *Cephaloziella stellulifera* is the most frequent across sites, being found within eleven locations. The rarest is *Ditrichum plumbicola*, surviving in tiny amounts at a single location, Ballycorus. Recent extinctions of Red Listed species within sites have been frequent, including losses of *Cephaloziella massalongoi* (at least one site), *Cephaloziella nicholsonii* (at least one site), *Cephaloziella stellulifera* (at least five sites), *Ditrichum plumbicola* (one site), *Pohlia andalusica* (one site), and *Scopelophila cataractae* (one site).

The main threat acting upon Calaminarian grassland in Ireland is the long-term abandonment of mining activity, which was originally responsible for the destruction of any natural habitat that occurred and was subsequently responsible for the widespread creation of new habitat. That factor aside, various other negative pressures and threats are causing continued loss of habitat. Much the most troublesome is vegetation succession, a low intensity pressure that is causing a slow but widespread and continual decline of the habitat, and since the baseline survey, is responsible for the complete loss of the habitat at Ballyhickey and Tankardstown. Only two positive pressures were found to be acting upon Calaminarian grassland at any of the sites, including the use of farm tracks for agricultural purposes, causing low intensity disturbance that maintains fragments of Calaminarian grassland at two sites, and extensive grazing by livestock, which is helping to slow the rate of vegetation succession at five sites.

Eight of the 20 sites are considered to be of high conservation value, due to the presence of significant populations of Red Listed species. By far the most frequent conservation measures required relate to combating vegetation succession, including the removal of vegetation and

plant litter to re-expose bare metalliferous substrates, coupled with the maintenance or reinstatement of extensive livestock grazing regimes to help slow future vegetation succession. Nationally, the conservation status of Calaminarian grassland is assessed as Unfavourable – Inadequate and declining.

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1 Introduction

1.1 Calaminarian grassland

Calaminarian grassland of *Violetalia calaminariae* (EU Habitat code 6130) has a very restricted distribution in Ireland, occurring only on artificial spoil heaps around old mine workings that are contaminated with the heavy metals Copper (Cu), Lead (Pb) and Zinc (Zn). This habitat is unknown from natural situations in Ireland, but occurs elsewhere in Europe on natural rock outcrops and river gravels. It is characterised primarily by the presence of metallophyte bryophytes that are tolerant of high concentrations of heavy metals. These species include *Cephaloziella nicholsonii*, *C. integerrima*, *C. massalongoi*, *Ditrichum cornubicum*, *D. plumbicola*, *Scopelophila cataractae* and *Pohlia andalusica*, all of which are rare and threatened in Ireland and Europe. In Ireland, this habitat has very low cover of vascular plants, often being dominated by bare ground, and has few vascular plant indicators. Exceptions include *Minuartia verna* as well as *Armeria maritima* and *Silene uniflora*, when found in inland, lowland sites.

Calaminarian grassland is undergoing a slow, ongoing decline across most sites in Ireland, as the heavy metals are leaching out of the soil over time and vegetation succession is occurring. The habitat is also vulnerable to reclamation and damage from recreational and other activities, as it is often viewed as waste ground.

1.2 Project rationale

As Calaminarian grassland is listed on Annex I of the EU Habitats Directive (92/43/EEC), Ireland is obliged to undertake surveillance of the habitat across its range under Article 11 of the Directive and report on its conservation status within the country under Article 17. Information is required on the parameters of Range, Area covered by the habitat, Structure and functions, and Future prospects (DG Environment, 2023a), with field surveys necessary to assess the last three parameters. Reports under Article 17 of the Directive are produced on a six-year cycle, with the current reporting period running from 2019 to 2024. This is the third cycle in which the conservation status of Calaminarian grassland has been reported. Thorough overviews of Calaminarian grassland in Ireland are provided by Holyoak & Lockhart (2011) and Hodd & Hodgetts (2019). The first extensive survey of the habitat was undertaken in 2008 (Holyoak, 2008). Subsequently, a baseline assessment for future monitoring purposes was undertaken across 29 sites (Table 1) in 2017–2018 (Hodd & Hodgetts, 2019), upon which the National Conservation Assessment for the period 2013 to 2018 was based. For the previous reporting period, the conservation status of Calaminarian grassland in Ireland was assessed as Unfavourable-Inadequate on all parameters (NPWS, 2019) and was assigned a deteriorating trend.

The survey detailed in this report was commissioned by the National Parks and Wildlife Service (NPWS) to survey a subset of 20 sites that were assessed as having Unfavourable conservation status by the monitoring survey of Hodd & Hodgetts (2019). Although a decline of some kind will have almost certainly taken place at the remaining nine sites that were assessed as being of Favourable Conservation Status during the previous Article 17 reporting period, as the pressures acting on these sites are at a lower intensity, this decline may be slower than at the other 20 sites, and the habitat there is not thought to be immediately threatened. These sites were not visited in 2023. Informed by the results of the 2023 survey, the project also aims to create a National Conservation Status Assessment (NCA) for Calaminarian grassland in Ireland, to fulfil reporting obligations under Article 17 of the EU Habitats Directive.

Table 1 Details of each of the 29 Calaminarian grassland sites in Ireland and the county, SAC in which they occur, grid reference (in Irish National Grid) and year of most recent survey.

Site no.	Site name	County	SAC code and name	Grid ref	Last survey
02	Ballycorus	Dublin	-	O225208	2023
04	Nr. Connary Hall	Wicklow	-	T211838	2018
05	Glendasan	Wicklow	IE0002122 Wicklow Mountains	T098981	2018
06	Foxrock Mine	Wicklow	IE0002122 Wicklow Mountains	T104982	2018
07	Ballymurtagh	Wicklow	-	T192815	2023
08	Tigroney West	Wicklow	-	T199822	2023
09	Ballinafunshoge	Wicklow	-	T082925	2023
10	Vale of Glendasan	Wicklow	-	T108977	2018
11	Brockagh	Wicklow	-	T093992	2023
12	E. of L. Nahanagan	Wicklow	IE0002122 Wicklow Mountains	T092988	2018
13	Bunmahon	Waterford	-	X444986	2023
14	Tankardstown	Waterford	-	X451986	2023
15	Knockmahon village	Waterford	-	X438990	2023
18	Muckross Lake	Kerry	IE0000365 Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment	V948859	2023
19	Ross Island	Kerry	IE0000365 Killarney National Park, Macgillicuddy's Reeks and Caragh River Catchment	V945880	2023
20	Allihies (Mountain)	Cork	IE0002158 Kenmare River	V590458	2018
21	N. of Caminches	Cork	-	V594455	2023
22	NE. of Caminches	Cork	-	V597455	2018
23	Dooneen	Cork	-	V577459	2023
24	Cappagh	Cork	-	V990324	2023
25	Brow Head	Cork	IE0001040 Barley Cove to Ballyrisode Point	V771235	2023
26	Polleenateada	Cork	-	V780306	2018
27	Lackamore	Tipperary	-	R788602	2023
28	Shallee	Tipperary	IE0002258 Silvermines Mountains West	R806712	2023
29	Garryard West	Tipperary	-	R826710	2023
30	Ballyhickey	Clare	-	R417768	2023
31	Sheshodonnell East	Clare	IE0001926 East Burren Complex	R268969	2023
34	Keeldrum	Donegal	-	B903262	2023
35	Caim Ballyhighland	Wexford	-	S885409	2018

2 Methodology

2.1 Taxonomy

Taxonomy follows Blockeel *et al.* (2021) for bryophytes and Stace (2019) for vascular plants.

2.2 Site coverage

Locations of the 20 sites included in the 2023 survey are shown in Figure 1. Site numbers and names within this report follow Hodd & Hodgetts (2019).

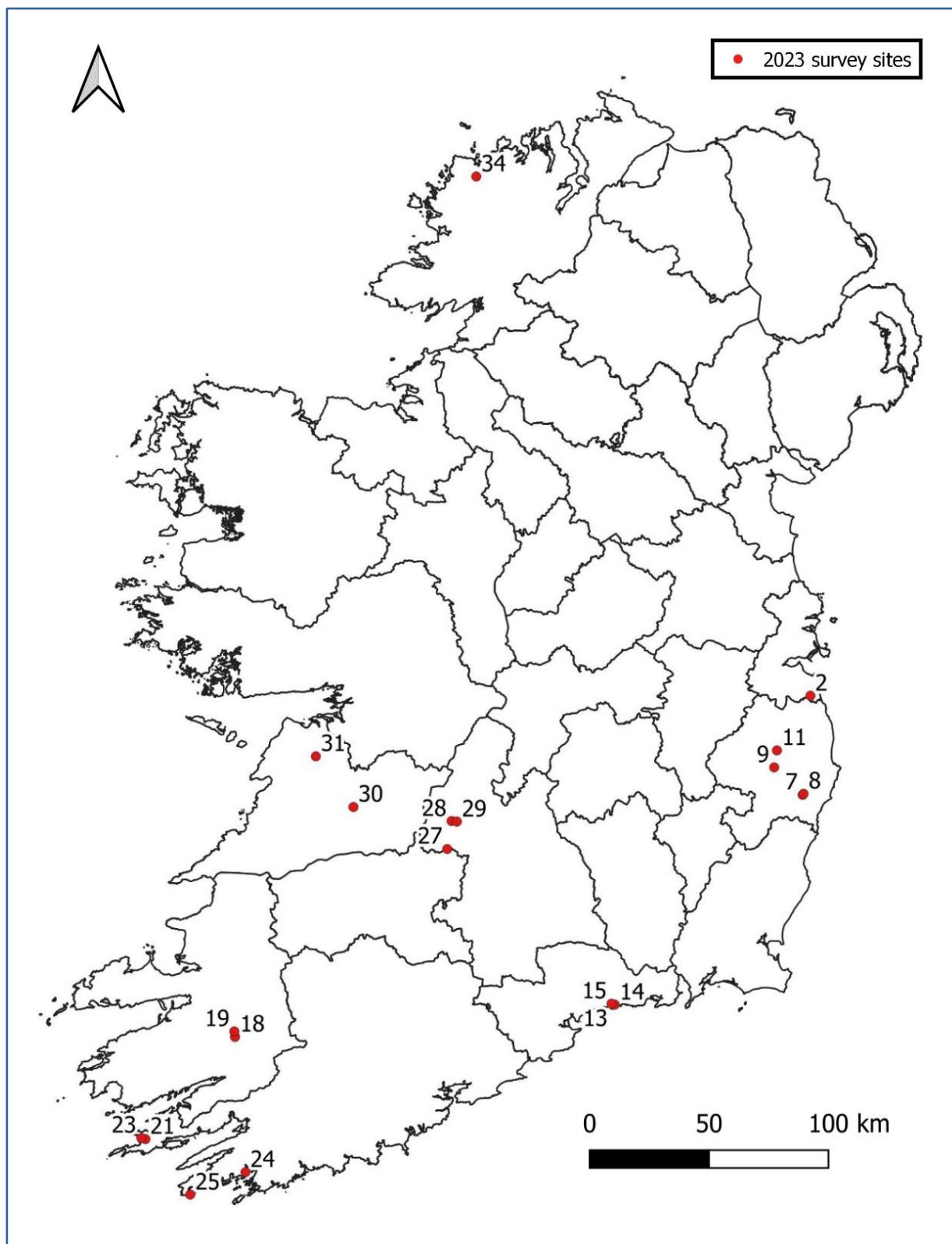


Figure 1 Locations of sites covered by the 2023 survey, indicated by red dots. See Table 1 for site details.

2.3 Site assessment criteria

Following the framework developed for the baseline assessment (Hodd & Hodgetts, 2019), the condition of Calaminarian grassland within each site is here assessed according to Area, Structure and functions, and Future prospects (Table 2). An exception is that when assessing structure and functions, ‘scrub encroachment’ (*sensu* Hodd & Hodgetts, 2019) is here replaced with the broader category of ‘vegetation encroachment’, largely to accommodate the successional stage of coarse acidic grassland, which is usually the vegetation that directly excludes Calaminarian grassland, before woody species colonise. The indicator species of Calaminarian grassland used by Hodd & Hodgetts (2019) were those identified by Holyoak (2008). The same list has been used here (Table 3; Figure 2), but with the addition of *Microbryum starckeanum*, a facultative metallophyte that was thought to be extinct in Ireland until it was rediscovered during the present fieldwork. Both *Cephaloziella massalongoi* and *C. nicholsonii* have generally been regarded as obligate metallophytes, although recent cultivation experiments have shown they may be facultative, and can grow on non-metalliferous substrates in culture (Campbell 2013; Campbell *et al.*, 2023).

Table 2 Site assessment criteria. For further details, see Hodd & Hodgetts (2019).

Parameter	Criterion	Result	Assessment
Habitat area	Annual change in area	Nil or minor decrease (<2%)	Favourable
		Moderate decrease (2–15%)	Unfavourable – Inadequate
		Major decrease (>15%) or complete loss	Unfavourable – Bad
Structure and functions	No. indicator species	≥1	Pass
	Vegetation encroachment	≤20% of habitat area	Pass
	Negative human impact	≤20% of habitat area	Pass
	No. of criteria passed	3 – Favourable 1–2 – Unfavourable – Inadequate 0 – Unfavourable – Bad	
Future prospects			Favourable
			Unfavourable – Inadequate
			Unfavourable – Bad
Overall Assessment		All Favourable	Favourable
		One or more Unfavourable – Inadequate	Unfavourable – Inadequate
		One or more Unfavourable - Bad	Unfavourable – Bad

Table 3 Indicator species of Calaminarian grassland in Ireland.

Group	Species
Obligate metallophytes	<i>Cephaloziella massalongoi</i>
	<i>Cephaloziella nicholsonii</i>
	<i>Ditrichum cornubicum</i>
	<i>Ditrichum plumbicola</i>
	<i>Scopelophila cataractae</i>
Other bryophytes	<i>Bryum pallescens</i>
	<i>Cephaloziella integerrima</i>
	<i>Cephaloziella stellulifera</i>
	<i>Ditrichum lineare</i>
	<i>Gymnocolea inflata</i>
	<i>Microbryum starckeanum</i>
	<i>Pohlia andalusica</i>
	<i>Scapania compacta</i>
	<i>Solenostoma gracillimum</i>
	<i>Weissia controversa</i> var. <i>densiflora</i>
Vascular plants	<i>Minuartia verna</i>
	<i>Armeria maritima</i> ^a
	<i>Plantago maritima</i> ^a
	<i>Silene uniflora</i> ^a

^a Presence relevant only at inland, lowland sites



Figure 2 *Pohlia andalusica* at Knockmahon Village (Waterford), an indicator species of Calaminarian grassland that is also included on the Red List of bryophytes in Ireland (Lockhart *et al.*, 2012).

2.4 Field survey

All fieldwork was undertaken by the first author and sites were surveyed in October 2023. A search of each site was undertaken for Calaminarian grassland and its indicator species. The condition of the habitat was assessed with reference to the baseline assessment and associated photographs (Hodd & Hodgetts, 2019). The area occupied by Calaminarian grassland within each site was amended from that mapped by Hodd & Hodgetts (2019), as necessary. Point locations of the uncommon indicator species were recorded with a hand-held GPS unit (Garmin GPSMAP 64s, Garmin Ltd, Olathe, USA), which consistently reported accuracy of <10 m. Small samples of critical species were collected for determination by microscopy. Photographs were taken to illustrate the locations of particularly notable species and to illustrate the condition of Calaminarian grassland. Land use and other physical impacts on the site were noted and pressures acting on the site were recorded. Any conservation measures needed for the Calaminarian grassland habitat and metallophyte species at each site were also noted. No substantial survey constraints were encountered.

2.5 National Conservation Assessment

The National Conservation Assessment was carried out using the assessment data collected in 2023, for sites that were included in this survey, and from 2016–18 for sites that were not resurveyed in this round of monitoring. The conservation status was assessed based on the Range, Area covered by the habitat, Structure and functions, and Future prospects on a national level (DG Environment, 2023a).

The Range was calculated on a 10 km grid basis in TM75 Irish Grid projection, based on the national distribution. A distribution map was derived from the habitat polygons created during the present survey for those sites surveyed in 2023 and from the survey of Hodd & Hodgetts (2019) for the nine sites not surveyed in 2023. The Range was calculated based on these distribution data using ArcToolBox Range Tool and was refined using expert judgement. The Favourable Reference Range was taken as the Range reported for the period 2008–2013.

The Area covered by the habitat was calculated as the total area of 6130 habitat recorded across all sites recorded by the 2023 survey and, for the nine sites not visited in 2023, by the survey of Hodd & Hodgetts (2019). The Favourable Reference Area was set as the area reported for the 2013–2018 period, plus a small area that was thought to have been overlooked during the previous survey.

The Structure and functions of the habitat were assessed based on the individual assessments for the sites surveyed in 2023, plus the results of the 2018 survey for those sites not surveyed in 2023, to enable an overall assessment of the habitat across all sites where it is known to occur. Area of habitat in good condition was calculated based on the percentage of Calaminarian grassland habitat at each site assessed as being in good or bad condition by the survey of Hodd & Hodgetts (2019), as these areas were not recalculated during the 2023 survey.

Informed by the current survey, current pressures and future threats (DG Environment, 2023b), active at a national scale, and conservation measures (DG Environment, 2023c), both in progress and required, were reported on. These then informed the Future Prospects assessment. Both long-term and short-term trends were also reported for each parameter. The assessment results for each of the four parameters were combined to give an overall assessment of conservation status on a national level (Table 4).

Table 4 Evaluation matrix for the assessment of Conservation Status of Annex I habitats (adapted from DG Environment, 2023a).

Parameter	Conservation Status			
	Favourable ('green')	Unfavourable – Inadequate ('amber')	Unfavourable – Bad ('red')	Unknown
Range	Stable or increasing AND not smaller than the 'favourable reference range'	Any other combination	>1% decline in range per year over specified period OR More than 10% below 'favourable reference range'	No or insufficient reliable information available
Area	Stable or increasing AND not smaller than the 'favourable reference area' AND without significant changes in distribution pattern within range (if data available)	Any other combination	>1% decline in area per year over specified period OR With major losses in distribution pattern within range OR More than 10% below 'favourable reference area'	No or insufficient reliable information available
Structure & functions	Structure and functions in good condition and no significant deteriorations / pressures	Any other combination	> 25% of the area is unfavourable as regards its specific structures and functions	No or insufficient reliable information available
Future prospects	The habitat's prospects for its future are excellent / good, no significant impact from threats expected; long-term viability assured	Any other combination	The habitat's prospects are bad, severe impact from threats expected; long-term viability not assured.	No or insufficient reliable information available
Overall assessment of CS	All 'green' OR three 'green' and one 'unknown'	One or more 'amber' but no 'red'	One or more 'red'	Two or more 'unknown' combined with green or all 'unknown'

3 Results and discussion

3.1 Site reports

Appendix 1 provides a set of reports that covers each of the 20 sites that were visited in 2023 individually.

3.2 Habitat condition assessment

Table 5 shows the current condition of Calaminarian grassland at the 20 sites surveyed and their condition during the baseline assessment (Hodd & Hodgetts, 2019). The condition of the habitat at all sites is here judged to be Unfavourable, mostly Unfavourable – Inadequate ($n = 14$; 70%) but also Unfavourable – Bad ($n = 6$; 30%), which is very similar to the baseline assessment. An anomaly is North of Caminches, a site that was categorised as Favourable in 2018, but is here judged to be Unfavourable – Inadequate due to loss of habitat from vegetation succession and recent groundworks.

Table 5 Condition of Calaminarian grassland across 20 sites in Ireland in 2018 and 2023.

Site code	Site name	Condition assessment	
		2018	2023
2	Ballycorus	Unfavourable - Inadequate	Unfavourable - Inadequate
7	Ballymurtagh	Unfavourable - Inadequate	Unfavourable - Inadequate
8	Tigroney West	Unfavourable - Inadequate	Unfavourable - Bad
9	Ballinafunshoge	Unfavourable - Inadequate	Unfavourable - Inadequate
11	Brockagh	Unfavourable - Bad	Unfavourable - Inadequate
13	Bunmahon	Unfavourable - Inadequate	Unfavourable - Inadequate
14	Tankardstown	Unfavourable - Bad	Unfavourable - Bad
15	Knockmahon Village	Unfavourable - Inadequate	Unfavourable - Inadequate
18	Muckcross Lake	Unfavourable - Inadequate	Unfavourable - Inadequate
19	Ross Island	Unfavourable - Inadequate	Unfavourable - Inadequate
21	North of Caminches	Favourable	Unfavourable - Inadequate
23	Dooneen	Unfavourable - Inadequate	Unfavourable - Inadequate
24	Cappagh	Unfavourable - Inadequate	Unfavourable - Inadequate
25	Brow Head	Unfavourable - Inadequate	Unfavourable - Inadequate
27	Lackamore	Unfavourable - Bad	Unfavourable - Bad
28	Shallee	Unfavourable - Bad	Unfavourable - Inadequate
29	Garryard West	Unfavourable - Bad	Unfavourable - Inadequate
30	Ballyhickey	Unfavourable - Bad	Unfavourable - Bad
31	Sheshodonnell East	Unfavourable - Inadequate	Unfavourable - Bad
34	Keeldrum	Unfavourable - Bad	Unfavourable - Bad

3.3 Habitat area

Across the 20 sites included within the present survey, the baseline survey of 2018 estimated that the area of Calaminarian grassland totalled 1.64 ha (Table 6). However, an estimated 0.12 ha of habitat were omitted from the baseline and the total should have been 1.76 ha. Coincidentally, the change in area of Calaminarian grassland between the baseline and the present assessment has been a reduction of 0.12 ha (6.8%), so that it now totals 1.64 ha. The decline equates to an annual rate of loss of roughly 1%, which is consistent with observations that the habitat is generally undergoing a widespread and slow decline, notwithstanding occasional rapid losses at individual sites. The results of the present survey reaffirm the complete loss of Calaminarian grassland from Lackamore, as was noted during the baseline assessment, and for the first time this survey documents its complete loss from Ballyhickey and Tankardstown. At the remaining 17 sites, the habitat is present in small quantities, the largest amounts occurring at Shallee (0.45 ha; 27%), Knockmahon Village (0.32 ha; 20%) and Dooneen (0.19 ha; 12%) (Figure 3).

Table 6 Area of Calaminarian grassland across 20 sites in Ireland in 2018 and 2023

Site code	Site name	Calaminarian grassland area (ha)		Genuine change in area (ha) ^a
		2018	2023	
2	Ballycorus	0.11	0.1	-0.01
7	Ballymurtagh	0.004	0.0038	-0.0002
8	Tigroney West	0.003	0.0002	-0.0028
9	Ballinafunshoge	0.13	0.14	-0.004
11	Brockagh	0.11	0.1	-0.01
13	Bunmahon	0.06	0.07	-0.0035
14	Tankardstown	0.006	0	-0.006
15	Knockmahon Village	0.28	0.32	-0.016
18	Muckross Lake	0.027	0.05	-0.0025
19	Ross Island	0.055	0.06	-0.006
21	North of Caminches	0.026	0.037	-0.007
23	Dooneen	0.22	0.19	-0.01
24	Cappagh	0.06	0.057	-0.003
25	Brow Head	0.007	0.01	-0.001
27	Lackamore	0	0	0
28	Shallee	0.47	0.45	-0.02
29	Garryard West	0.04	0.038	-0.002
30	Ballyhickey	0.011	0	-0.011
31	Sheshodonnell East	0.009	0.008	-0.001
34	Keeldrum	0.013	0.01	-0.003
Total		1.64	1.64	-0.12

^a Change in area of Calaminarian grassland between 2018 and 2023 accounting for areas of habitat omitted from the 2018 baseline survey

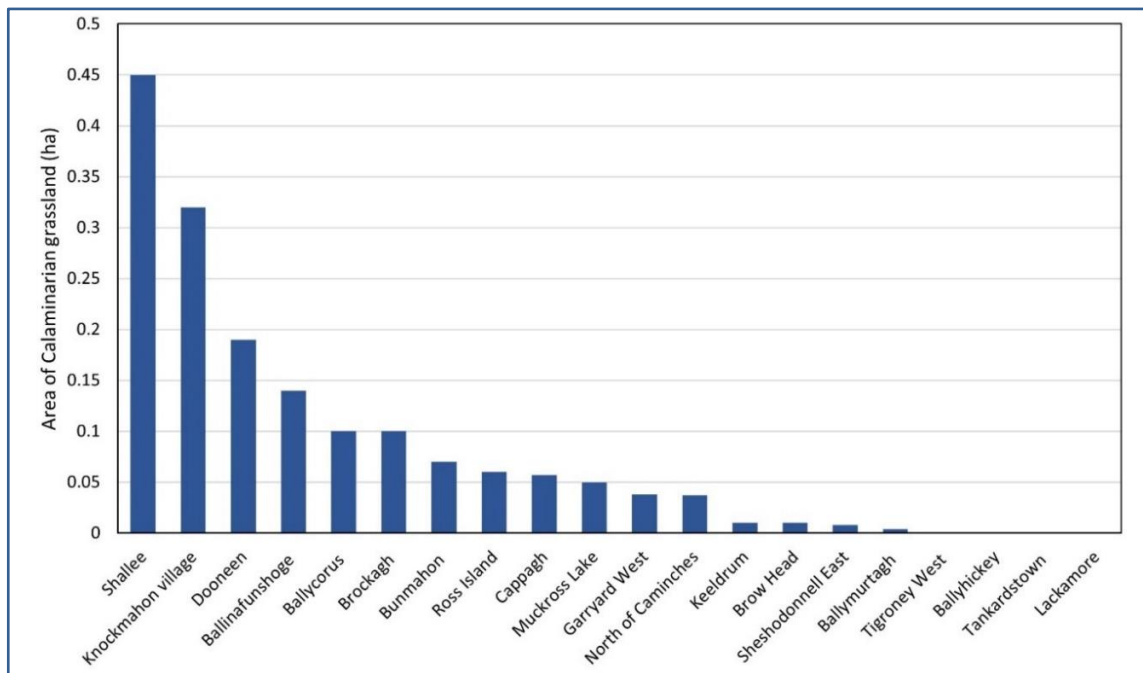


Figure 3 Area of Calaminarian grassland across 20 sites in Ireland in 2023.

3.4 Indicator species

Across the 20 sites included in the present survey, Table 7 shows the occurrence of indicator species of Calaminarian grassland that are also included on the IUCN Red List of bryophytes in Ireland (Lockhart *et al.*, 2012). This survey confirms the survival of at least some of these species at 13 sites. Knockmahon Village supports the highest number of extant species (four species), followed by Bunmahon, Cappagh and Dooneen (three species each). *Cephaloziella stellulifera* is the most frequent across the sites, being extant within at least eleven locations. The rarest is *Ditrichum plumbicola*, surviving in tiny amounts at a single location, Ballycorus. Since the relatively recent survey of Holyoak (2008), extinctions of species within sites have been frequent, including losses of *Cephaloziella massalongoi* (at least one site), *Cephaloziella nicholsonii* (at least one site), *Cephaloziella stellulifera* (at least five sites), *Ditrichum plumbicola* (one site), *Pohlia andalusica* (one site), and *Scopelophila cataractae* (one site).

Table 7 Occurrence of indicator species of Calaminarian grassland that are also included on the IUCN Red List of bryophytes in Ireland (Lockhart *et al.*, 2012) across 20 sites^a.

Site code	Site name	<i>Cephaloziella integerrima</i> (VU)	<i>Cephaloziella massalongoi</i> (VU)	<i>Cephaloziella nicholsonii</i> (VU)	<i>Cephaloziella stellulifera</i> (NT)	<i>Ditrichum plumbicola</i> (EN)	<i>Microbryum starckeianum</i> (RE)	<i>Pohlia andalusica</i> (EN)	<i>Scopelophila cataractae</i> (VU)	Total extant species	Total extinct species
2	Ballycorus		x			✓				1	1
7	Ballymurtagh				x					0	1
8	Tigroney West			✓						1	0
9	Ballinafunshoge				✓					1	0
11	Brockagh				x					0	1
13	Bunmahon		✓		✓			✓		3	0
14	Tankardstown				x					0	1
15	Knockmahon Village	✓	??	✓	✓			✓		4	0–1
18	Muckcross Lake			??	✓					1	0–1
19	Ross Island		✓		✓					2	0
21	North of Caminches			✓	✓			x		2	1
23	Dooneen		✓	✓	✓					3	0
24	Cappagh		??	✓	✓			✓	x	3	1–2
25	Brow Head				✓					1	0
27	Lackamore				x					0	1
28	Shallee			x	✓	x				1	2
29	Garryard West				?					0–1	0–1
31	Sheshodonnell East				✓		✓			2	0
34	Keeldrum				x					0	1
Total extant sites		1	3	5	11–12	1	1	3	0		
Total extinct sites		0	1–3	1–2	5–6	1	0	1	1		

^a Occurrence at sites is based upon the results of the present survey and previous surveys (Callaghan 2013, 2017; Holyoak 2008; Hodd & Hodgetts 2019). x = extinct; ✓ = extant; ? = continued presence uncertain; ?? = historic presence uncertain due to possible misidentification.

3.5 Pressures and threats

The main threat acting upon Calaminarian grassland in Ireland is the long-term abandonment of mining activity, which was originally responsible for the destruction of any natural habitat that occurred and was subsequently responsible for the widespread creation of new habitat. That factor aside, Table 8 shows the negative pressures and threats acting upon the habitat across the 20 sites included within the present survey, and the percentage of habitat affected at each site. Conversion into agricultural land ('PA01') has caused the complete loss of Calaminarian grassland at Lackamore, but has not affected any of the other sites. Likewise,

the capping of mine waste to reduce the pollution of watercourses ('PF02') has almost caused the complete loss of Calaminarian grassland at Tigroney West, but this threat has not affected any other site since the baseline assessment. Sports, tourism and leisure activities ('PF05') is affecting Calaminarian grassland at four sites, but only substantially at Ballinafunshoge where heavy use by off-road recreational vehicles is having a major impact across about 60% of the site. Invasive alien species ('PI02') are generally a minor threat to Calaminarian grassland, but pine trees and their persistent leaf litter are having a significant negative impact at Ballycorus and Ross Island. By far the most troublesome threat facing Calaminarian grassland in Ireland is vegetation succession ('PM07'), a low intensity pressure that is causing a slow but widespread and continual decline of the habitat, and is responsible for the complete loss of habitat at Ballyhickey and Tankardstown since the baseline survey. At some sites, PM07 also includes the natural erosion of sea cliffs, which is causing a slow but continual loss of habitat at Brow Head, Bunmahon and Dooneen.

Table 9 shows the few positive pressures acting upon Calaminarian grassland across the 20 sites, and the percentage of habitat affected at each site. The use of farm tracks for agricultural purposes ('PA25') causes low intensity disturbance that maintains fragments of Calaminarian grassland at two sites, North of Caminches and Cappagh. Extensive grazing by livestock ('PA08') provides a positive impact at five sites by slowing the rate of vegetation succession.

Table 8 Negative pressures and threats acting upon Calaminarian grassland across 20 sites in Ireland and the percentage of habitat affected at each site.

Site code	Site name	Negative pressures and threats (<i>sensu</i> DG Environment, 2023b) and % of habitat affected ^a						
		PA01	PA07	PA25	PF02	PF05	PI02	PM07
2	Ballycorus					10	50	90
7	Ballymurtagh						5	100
8	Tigroney West				99			100
9	Ballinafunshoge					60		40
11	Brockagh							100
13	Bunmahon							100
14	Tankardstown							100
15	Knockmahon Village							100
18	Muckcross Lake						10	100
19	Ross Island					10	20	70
21	North of Caminches			10				80
23	Dooneen					5		95
24	Cappagh							40
25	Brow Head							100
27	Lackamore	100						
28	Shallee							100
29	Garryard West							100
30	Ballyhickey		100					100
31	Sheshodonnell East							100
34	Keeldrum							100

^a PA01 – Conversion into agricultural land (excluding drainage and burning); PA07 – Intensive grazing or overgrazing by livestock; PA25 – Agriculture activities not referred to above; PF02 – Construction or modification in existing built-up areas; PF05 – Sports, tourism and leisure activities; PI02 – Other invasive alien species (other than species of Union concern); PM07 – Natural processes without direct or indirect influence from human activities or climate change (DG Environment, 2023b).

Table 9 Positive pressures acting upon Calaminarian grassland across 20 sites in Ireland and the percentage of habitat affected at each site in 2023.

Site code	Site name	Positive pressures (<i>sensu</i> DG Environment, 2023b) and % of habitat affected ^a	
		PA08	PA25
11	Brockagh	100	
21	North of Caminches		10
23	Dooneen	100	
24	Cappagh	60	60
25	Brow Head	100	
31	Sheshodonnell East	100	

^a PA08 – Extensive grazing or undergrazing by livestock; PA25 – Agriculture activities not referred to above (DG Environment, 2023b).

3.6 Conservation measures

Table 10 shows the conservation value of each site, and the conservation measures required for Calaminarian grassland and their priority for implementation. Eight of the sites are considered to be of high conservation value, due to the presence of significant populations of species included on the IUCN Red List of bryophytes in Ireland (Lockhart *et al.*, 2012). The following conservation measures were regarded as being required at one or more sites: MA03 Maintain existing extensive agricultural practices and agricultural landscape features; MA04 Reinstatement appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures; MA06 Stop mowing, grazing and other equivalent agricultural activities e.g. burning (incl. restore or improve habitats); MF03 Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats); MH03 Reduce impact of other specific human activities; MI03 Management, control or eradication of other invasive alien species; MM01 Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change (DG Environment, 2023c). By far the most frequent conservation measures required relate to combating vegetation succession, including the removal of vegetation and plant litter to re-expose metalliferous spoil ('MM01'), coupled with the maintenance ('MA03') or reinstatement ('MA04') of extensive livestock grazing regimes to help slow future vegetation succession.

Table 10 Conservation value of sites and the conservation measures required for Calaminarian grassland across the 20 sites surveyed during 2023, and their priority (H – High, M – Medium, L – Low) for implementation. See above paragraph for descriptions of conservation measures required, corresponding to codes below.

Site code	Site name	Value	Conservation measures required and their priority for implementation						
			MA03	MA04	MA06	MF03	MH03	MI03	MM01
2	Ballycorus	H						H	H
7	Ballymurtagh	L						L	L
8	Tigroney West	L						L	L
9	Ballinafunshoge	M				M			M
11	Brockagh	L	L						L
13	Bunmahon	M							M
14	Tankardstown	L							L
15	Knockmahon Village	H		H					H
18	Muckross Lake	M						M	M
19	Ross Island	H						H	H
21	North of Caminches	H		H					H
23	Dooneen	H	H			H	H		H
24	Cappagh	H	H						H
25	Brow Head	L	L						L
27	Lackamore	L							L
28	Shallee	H							H
29	Garryard West	L							L
30	Ballyhickey	L			L				L
31	Sheshodonnell East	H	H						H
34	Keeldrum	L		L					L

3.7 National Conservation Assessment

The conservation status of Calaminarian grassland at a national level was considered to be unchanged from the previous two reporting periods and was assessed as Unfavourable-Inadequate on all parameters, with an overall status of Unfavourable-Inadequate and a deteriorating trend (Table 11).

Table 11 Summary of the conservation status assessment of Calaminarian grassland for the period 2019–2025.

Parameter	Conservation Status	Trend	Future prospects
Range	Unfavourable-Inadequate	Decreasing	Poor
Area	Unfavourable-Inadequate	Decreasing	Poor
Structure and functions	Unfavourable-Inadequate	Stable	Poor
Future Prospects	Unfavourable-Inadequate		
Overall National Conservation Assessment	Unfavourable-Inadequate	Deteriorating	

3.7.1 Range

The Range (Figure 4) comprises 18 10 km grid cells, consisting of 15 currently occupied grid cells and a further three grid cells that could potentially support the habitat. One grid cell identified by the Range Tool, V63, was removed from the range using expert judgement, as it is not suitable for Calaminarian grassland habitat. Both short-term and long-term trends were assessed as declining. Since the previous reporting period, one isolated site, Ballyhickey, has lost all area of Calaminarian Grassland, resulting in the loss of one 10 km grid cell. Another site, Tankardstown, has also lost all area of Calaminarian Grassland since the previous reporting period, but as there are two other extant sites within the same 10 km grid cell, this does not impact the range. Between the initial survey of Holyoak (2008) and the survey of Hodd & Hodgetts (2019), a further site, Lackamore, was also lost due to land reclamation.

The Favourable Reference Range (FRR) was derived from the survey of Holyoak (2008), which is considered to be the baseline survey of Calaminarian Grassland in Ireland. The current range calculated indicates a contraction from 20 10 km grid cells to 18 10 km grid cells. This is due to the loss of the abovementioned two geographically isolated sites, which were both small in area and of low conservation importance. Therefore, there is a 5.5% decrease in range since the last reporting period and a 10% decrease from the FRR, indicating a decreasing trend. The Range is assessed as Unfavourable – Inadequate.

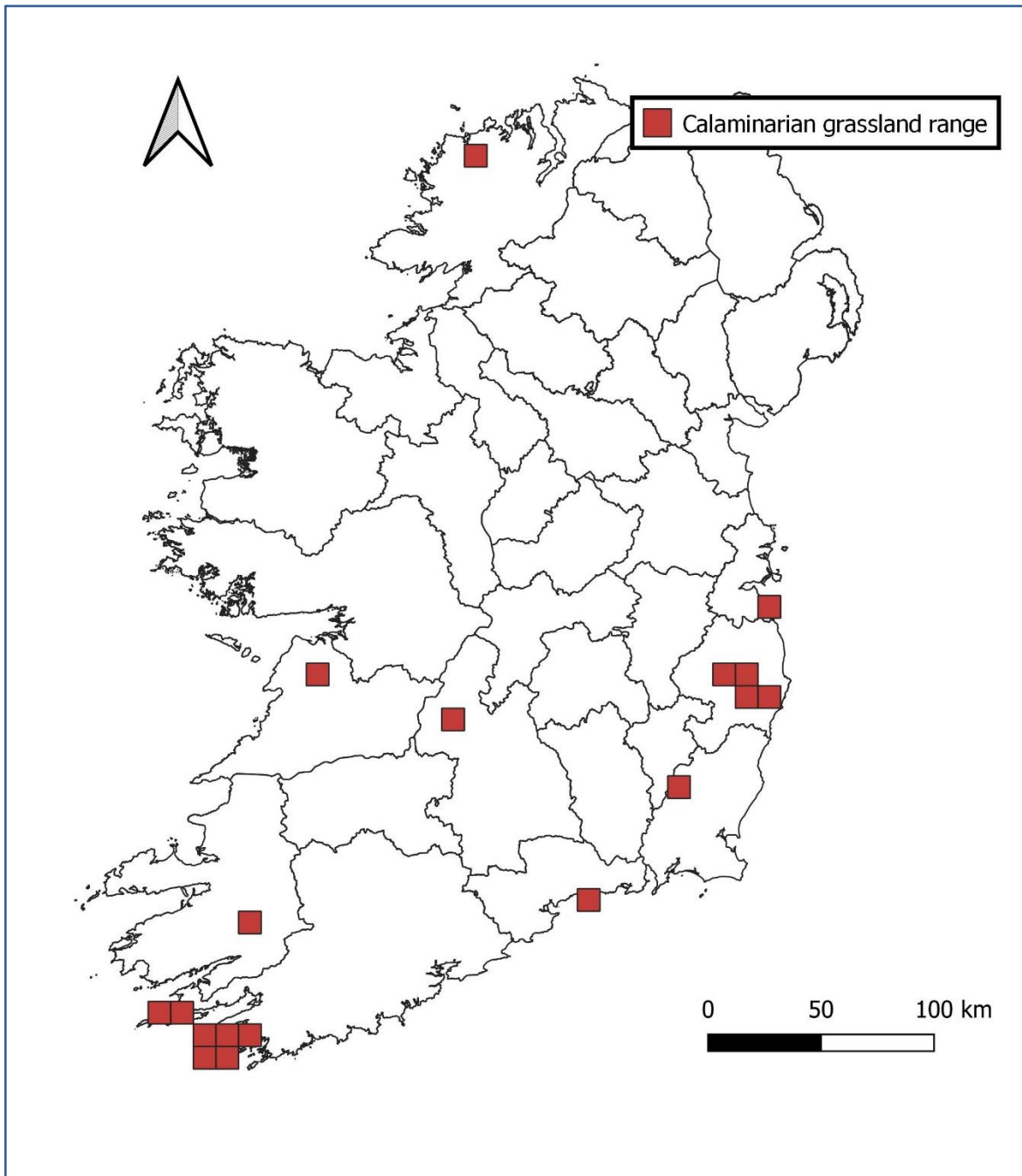


Figure 4 Map showing the Range of Calaminarian grassland in Ireland (red squares), calculated in 2024.

3.7.2 Area

The figure calculated for total area nationally is 0.06166 km². Although a loss in area of 0.12 ha was recorded at the sites surveyed in 2023, the total area calculated is only 0.0001% smaller than that calculated during the previous reporting period. This is due to additional areas being recorded at multiple sites, that were not recorded during the previous survey. Therefore, the actual area present during the previous reporting period is considered to be the area reported in 2019 plus the additional areas recorded in 2023, which indicates a minimum decline of 1.9%. The actual loss in area recorded at the sites surveyed in 2023 is 6.8%, which can be taken as the estimated maximum decline over the reporting period. It is not known whether this rate of loss can be applied also to the sites that were not surveyed in 2023, particularly as those sites were not selected for survey as they were considered to be in good condition during the previous monitoring survey, so would be expected to show a slower rate of loss. However, all evidence available indicates that a gradual loss of area is occurring across all sites, due primarily to vegetation succession as heavy metals are leached from the substrate. This includes the loss of the entire area of habitat at two small sites (14 Tankardstown and 30 Ballyhickey), with a third site (27 Lackamore) lost during the previous monitoring period. A further 12 sites exhibit a loss in area of varying magnitudes since 2018. Therefore, it can be said with a high level of confidence that the trend in area of Calaminarian Grassland in Ireland is decreasing, with the rate of decrease likely to be between 1.9% and 6.8%. There may be up to 2 ha of additional unsurveyed Calaminarian grassland in Counties Wicklow and Cork, but this has not been confirmed, so is not included in the area reported.

Favourable Reference Area was taken to be the total area reported in the previous reporting period plus the additional areas recorded in 2023, which would have been present when the Directive came into force and were overlooked during the 2018 survey. The current area reported here is 1.9% less than the FRA and is not considered sufficient to enable the long-term survival of the habitat. The conservation status is assessed as Unfavourable-Inadequate on the Area parameter and shows decreasing trends both long-term and short-term.

3.7.3 Structure and functions

Of the 19 sites assessed in 2023 (the Structure and functions of site 26 Lackamore were not assessed, as the habitat is now non-existent), the Structure and functions of 14 sites were assessed as Favourable, four as Unfavourable-Inadequate and one as Unfavourable-Bad (see Appendix 1). In the previous reporting period, the Structure and functions of 15 sites were assessed as Unfavourable-Inadequate, with the remainder assessed as Favourable. This increase in the number of sites assessed as having Favourable Structure and functions may reflect some genuine minor improvements in habitat quality, such as lack of dumping of rubbish at sites where dumping was previously recorded, but may also reflect differences in approach by surveyors between the survey periods.

Area in good condition was calculated based on the percentage of Calaminarian Grassland habitat at each site assessed as being in good or bad condition by the survey of Hodd & Hodgetts (2019), as these areas were not recalculated during the 2023 survey. Although the overall area of Calaminarian Grassland habitat has decreased since the 2013–2018 period, the value for area of habitat in good condition (0.0472 km², with 0.0145 km² assessed as being in poor condition) has increased slightly due to additional areas of Calaminarian grassland being recorded at sites that were assessed as being in mostly good condition. However, this is likely an artefact of methodological differences, rather than reflecting a genuine change of habitat from poor to good condition. A total of 76.5% of the area is assessed as being in good condition and 23.5% is assessed as being in poor condition. Based on the data available, the trend in area of habitat in good condition is assessed as stable, although the Structure and functions overall are assessed as being of Unfavourable-Inadequate Conservation Status.

3.7.4 Future prospects

Aside from the threats and pressures noted in Section 3.5, PM07 Natural processes without direct or indirect influence from human activities or climate change is almost certainly currently both a threat and pressure at most sites that were last surveyed in 2018, although no up-to-date data exist for the current reporting period. Vegetation succession is slowly taking place and scrub and grassland is encroaching upon the habitat across its range. Natural erosion of the habitat, which was listed under a separate pressure code to vegetation succession during the previous reporting period, is also included within this category, and is also ongoing at the majority of sites.

To date, the only conservation measure taken, targeting this habitat, is MM01 Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change, which applies to only a very small area (c. 0.05 ha) of site 20 Allihies (Mountain mine), within the Kenmare River SAC. This is in the form of targeted habitat restoration at the only location in Ireland where the globally rare moss *Ditrichum cornubicum* occurs. The small-scale works consist of scraping back and removing the top layer of vegetation and spoil, where vegetation succession and leaching out of heavy metals has occurred, in the vicinity of the known locations of *D. cornubicum*. This work is ongoing and requires further monitoring of its impact, but early indications are that the population of *D. cornubicum* is expanding at this location, at least partially due to the conservation measure taken. This measure is the key measure that is required across most sites containing Calaminarian grassland in Ireland, particularly those containing populations of rare bryophytes, in order to reverse the gradual reduction in range, area and quality of this habitat resulting from natural succession. Further conservation measures required, identified during this survey, are listed in Section 3.6 above. As Future prospects are poor across all parameters, and the trend for two out of the three parameters assessed is declining, Future prospects are assessed as Unfavourable-Inadequate.

3.8 Populations within and outside the SAC network

As areas of Annex I habitat within SACs, for which the habitat is listed as a Qualifying Interest (QI) have a greater level of protection than those outside SACs or within SACs for which they are not listed as QIs, it is important to report on the proportion of the national area within SACs for which the habitat is listed as a QI. Calaminarian grassland occurs within six SACs (Table 1), of which it is a QI for five, only a small area of low conservation value habitat occurring within the SAC for which it is not a QI (SAC 001040 Barley Cove to Ballyrisode Point SAC). An estimated 55.9% (0.0344 km²) of the national area of Calaminarian grassland is located within the SAC network. The area of habitat within the SAC network is assessed as stable, with a very small, non-significant, increase in area reported, due to the recording of additional small areas of Calaminarian grassland at sites within SACs. However, in reality, at least a small decrease in the actual area has occurred. Within SACs, 82% of Calaminarian grassland is inferred to be in good condition and the short-term trend in habitat area in good condition within the network is assessed as stable, as no change is apparent since the previous reporting period.

4 Conclusions and recommendations

Based on the results of this survey and assessment, a number of recommendations can be made to improve the conservation status of Calaminarian grassland in Ireland and ensure its long-term survival. At most sites, measures are required to stop succession to closed vegetation and scrub. These measures should be focused on sites that host important populations of rare metallophyte bryophytes, such as Shalee in County Tipperary, where *Ditrichum plumbicola* has not been recorded since 2008 and Knockmahon Village, which supports important populations of four metallophyte species. Future monitoring should focus on sites that are important for bryophytes, whilst sites where rare bryophytes were never recorded, and the habitat has now disappeared, could be excluded from future monitoring surveys. Other areas where it is likely that Calaminarian grassland may occur, in counties Wicklow and Cork, but that have never been surveyed, should be visited and their conservation importance and status should be evaluated. In particular, old mine workings at Glendalough should be surveyed fully, as *Ditrichum plumbicola* was found there in 2012 (Denyer, 2013), so it is without doubt an important site for Calaminarian grassland. Although all of the specialist species of this habitat are threatened in Ireland, *D. plumbicola* is possibly at the highest risk of imminent extinction, as during the surveys of 2018 and 2023 it was found only at one site in Co. Dublin, at Ballycorus, where two small patches occur.

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6 Appendix 1 Site reports

Site 02 – Ballycorus

Site details

Parameter	Value
Site code	02
Site name	Ballycorus
Grid reference	O22562088
County	Dublin
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.17	0.17	0
Calaminarian grassland area (ha)	0.11	0.1	-0.01

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>	X	?	
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>	X	X	X
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>			
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>		X	X
<i>Weissia controversa</i> var. <i>densiflora</i>				
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		2	2	2

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PF05	Sports, tourism and leisure activities	Inside	Negative	Low	10
PI02	Other invasive alien species (other than species of Union concern)	Inside	Negative	High	50
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	90

Conservation measures

Code	Name	Priority
MI03	Management, control or eradication of other invasive alien species	High
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	2	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	10%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable - Inadequate
Overall Assessment				Unfavourable - Inadequate

Summary

There appears to have been no substantial change at this site since the baseline year of 2018. Calaminarian grassland, dominated by *Solenostoma gracillimum*, continues to occur in scattered patches amongst bare spoil. This is the only site in Ireland where the globally threatened *Ditrichum plumbicola* is known to survive. Two tiny colonies were found during the present survey and its future survival at this site is precarious. *Cephaloziella massalongoi*, which was reported in 2008, was not found, only scattered amounts of *C. divaricata*. Vegetation succession continues to cause a slow but continual decline in the Calaminarian grassland habitat. Recreational pressure from walkers, pony-trekking and mountain bikers occurs, but it is low intensity and affects a minor area of habitat. The deposition of pine needles from adjacent mature trees (*Pinus sylvestris*) is a particular problem, especially in the lower part of the site. Growth of algae, which was highlighted as a threat in 2018, was not an evident problem during the present survey, it being mostly limited to the vicinity of rabbit latrines. The presence of rabbits is likely to be beneficial, overall, as their grazing is slowing the rate of vegetation succession. The site is assessed as Unfavourable - Inadequate because vegetation succession and the deposition of pine needles will continue to cause a decline in the area of Calaminarian grassland. Given this threatens the future survival of *Ditrichum plumbicola* in Ireland, it is considered a high priority to address these problems. Vegetation succession can

be reversed by the removal of vegetation, including scrub, grassland turf and litter, to re-expose metalliferous spoil, for example using a mini-digger. The deposition of pine needles can be addressed by the removal of any mature pine trees located within 20 m of the habitat. Such measures should be taken under the supervision of an ecological clerk of works.

Figures

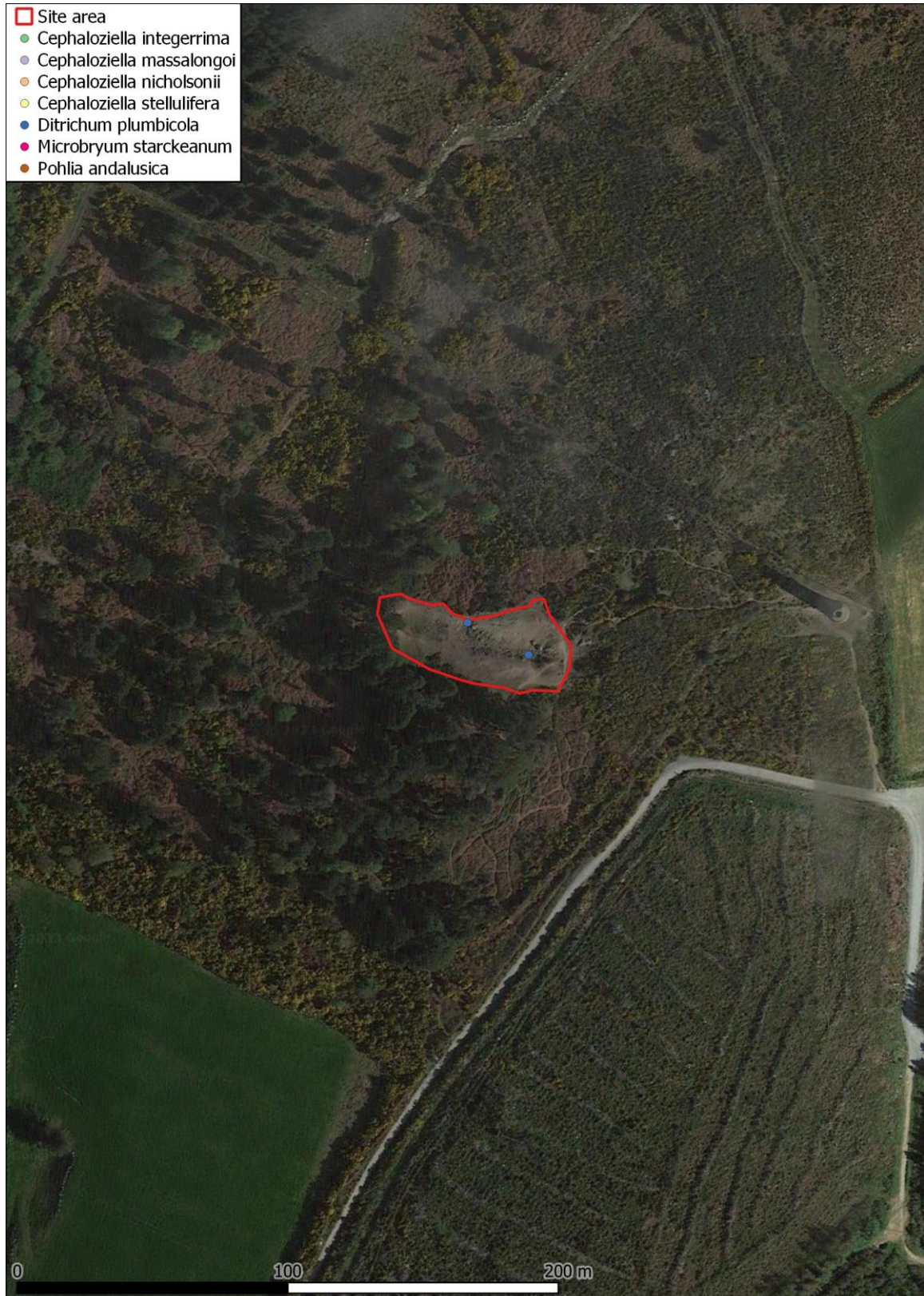


Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Location of a very small colony (3 cm²) of *Ditrichum plumbicola*.



Figure 3 Location of a very small colony, thinly scattered over 10 x 10 cm, of *Ditrichum plumbicola*.



Figure 4 General view from top of site, with locations of *Ditrichum plumbicola* indicated.



Figure 5 General view from bottom of site, with locations of *Ditrichum plumbicola* indicated and showing abundant needle litter from adjacent *Pinus sylvestris*.

Site 07 – Ballymurtagh

Site details

Parameter	Value
Site code	07
Site name	Ballymurtagh
Grid reference	T192815
County	Wicklow
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	4.3	4.3	0
Calaminarian grassland area (ha)	0.004	0.0038	-0.0002

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X		
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>		X	X
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	1	1

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PI02	Other invasive alien species (other than species of Union concern)	Inside	Negative	Low	5
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MI03	Management, control or eradication of other invasive alien species	Low
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	1	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable - Inadequate
Overall Assessment				Unfavourable - Inadequate

Summary

There has been no substantial change at this site since the baseline year of 2018. There is no evidence of any recent excavation of spoil, which was noted as a threat in 2018. Calaminarian grassland remains widely scattered in small amounts, dominated by *Gymnocolea inflata*. As in 2018, *Cephaloziella stellulifera* was not refound, despite a careful search around its grid reference from 2008, where only *C. divaricata* was found. No severe threats are apparent, but vegetation succession, including invasion by pines, is causing a slow but continuous loss of Calaminarian grassland. This could be reversed by the clearance of pines and other vegetation to re-expose metalliferous spoil, but it would be a low priority for the conservation of Calaminarian grassland because the site is of low value for this habitat. This site is assessed as Unfavourable – Inadequate.

Figures



Figure 1 Location of site. Satellite image © Google, DigitalGlobe.



Figure 2 Overview of Ballymurtagh mine, where Calaminarian grassland is scattered in small amounts, often at the edge of stands of *Calluna*.

Site 08 – Tigroney West

Site details

Parameter	Value
Site code	08
Site name	Tigroney West
Grid reference	T199822
County	Wicklow
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.9	0.9	0
Calaminarian grassland area (ha)	0.003	0.0002	-0.0028

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>	X		X
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>			
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			X
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>		X	
	<i>Solenostoma gracillimum</i>		X	X
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	2	3

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100
PF02	Construction or modification (e.g. of housing and settlements) in existing built-up areas	Inside	Negative	High	99%

Conservation measures

Code	Name	Priority
MI03	Management, control or eradication of other invasive alien species	Low
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Major decrease		Unfavourable – Bad
Structure and functions	No. indicator spp.	3	Pass	
	Vegetation encroachment	99%	Fail	
	Negative human impact	99%	Fail	
	No. of criteria passed		1	Unfavourable – Bad
Future prospects				Unfavourable – Bad
Overall Assessment				Unfavourable – Bad

Summary

The purposeful destruction of Calaminarian grassland by the capping of metalliferous ground with inert spoil began at this site sometime before 2018, in an effort to improve water quality in the Avoca River. Since 2018, further capping has occurred and the Calaminarian grassland is virtually extinct, being confined to some tiny fragments, totalling ca. 2 m², located between a small cluster of large boulders on the bank of the Avoca River. These fragments are in decline due to vegetation succession and erosion, the latter likely to be a particular problem during spate flows of the river. *Cephaloziella nicholsonii* continues to survive, but in extremely small quantity. The habitat will likely be lost completely in the near future. Conservation measures could be undertaken to restore the Calaminarian grassland, but seem inappropriate given its purposeful recent destruction. The site is assessed as Unfavourable – Bad.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Railway bank that supported Calaminarian grassland in 2018, but has since been lost due to its capping with inert soil.



Figure 3 View across central part of site, where no Calaminarian grassland survives following its capping with inert soil.



Figure 4 The only part of the site that continues to support a tiny amount of Calaminarian grassland, totalling ca. 2 m² and located between large boulders along the bank of the Avoca River. The vegetation is dominated by *Solenostoma gracillima*, with extremely small amounts of *Cephaloziella nicholsonii*.

Site 09 – Ballinafunshoge

Site details

Parameter	Value
Site code	09
Site name	Ballinafunshoge
Grid reference	T082925
County	Wicklow
Conservation value	Medium

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	1.9	2.1	0
Calaminarian grassland area (ha)	0.13	0.14	-0.004

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>		X	X
<i>Weissia controversa</i> var. <i>densiflora</i>			X	
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	2	4

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PF05	Sports, tourism and leisure activities	Inside	Negative	High	60
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	40

Conservation measures

Code	Name	Priority
MF03	Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats)	Medium
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Medium

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	4	Pass	
	Vegetation encroachment	3%	Pass	
	Negative human impact	60%	Fail	
	No. of criteria passed		2	Unfavourable – Inadequate
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been enlarged slightly to include areas of Calaminarian grassland excluded from the 2018 boundary. The true extent of Calaminarian grassland continues to decline slowly. *Solenostoma gracillimum* remains frequent on wetter ground, and the spoil heaps beside the road continue to support a good population of *Cephaloziella stellulifera*. The value of the site continues to be severely limited due to heavy use by recreational off-road vehicles. The site could be fenced to prevent their access and to allow the vegetation to re-establish. The Calaminarian grassland within the areas not impacted by vehicles is generally in good condition, though vegetation succession is causing a slow but continual decline. There is no evidence of any recent excavation or removal of spoil, which was noted as a threat in 2018. The site is assessed as Unfavourable – Inadequate.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Roadside spoil heap in foreground supporting strong colonies of *Cephaloziella stellulifera*, contrasting with bare spoil heaps in the background that are heavily impacted by off-road vehicles.



Figure 3 General view across the site showing heavy impact by recreational off-road vehicles.

Site 11 – Brockagh

Site details

Parameter	Value
Site code	11
Site name	Brockagh
Grid reference	T093992
County	Wicklow
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.8	0.8	0
Calaminarian grassland area (ha)	0.11	0.1	-0.01

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>		X	
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>		X	X
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
Vascular plants	<i>Solenostoma gracillimum</i>		X	X
	<i>Weissia controversa</i> var. <i>densiflora</i>		X	X
	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		0	4	4

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA08	Extensive grazing or undergrazing by livestock	Inside	Positive	Low	100
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low
MA03	Maintain existing extensive agricultural practices and agricultural landscape features	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	4	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The livestock feeding station that occurred within the centre of the site in 2018 and was resulting in poaching and over-grazing, has been removed and the habitat appears to have recovered. The site continues to be grazed by sheep at low intensity which, on balance, is likely to be beneficial by slowing vegetation succession. Calaminarian grassland continues to be scattered in small patches, mostly dominated by *Weissia controversa*, but with frequent *Bryum pallescens* and smaller amounts of *Gymnocolea inflata* and *Solenostoma gracillimum*. *Cephaloziella stellulifera*, which was noted in 2018, was not found despite a careful search; only very small amounts of *C. divaricata* was seen. No species of conservation concern appear to occur. The only threat presently evident is vegetation succession, which is causing a slow but continuous loss of Calaminarian grassland and will eventually cause its complete loss. Thus, the site is assessed as Unfavourable – Inadequate. Clearance of vegetation to re-expose metalliferous spoil could be undertaken to reverse succession, but conservation measures at this site for Calaminarian grassland are low priority because the value of the site for this habitat is low.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 View across the mine site at Brockagh, with areas of spoil interspersed with dry heath and acid grassland.



Figure 3 Area of wet Calaminarian grassland vegetation, dominated by *Weissia controversa* and with frequent *Bryum pallescens* and occasional *Solenostoma gracillimum*.

Site 13 – Bunmahon

Site details

Parameter	Value
Site code	13
Site name	Bunmahon
Grid reference	X444986
County	Waterford
Conservation value	Medium

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.31	0.39	0
Calaminarian grassland area (ha)	0.06	0.07	-0.0035

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>	X	X	X
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>	X	X	X
	<i>Scapania compacta</i>		X	
	<i>Solenostoma gracillimum</i>		X	
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		3	5	3

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Medium

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	3	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been enlarged slightly to include areas of Calaminarian grassland excluded from the 2018 boundary. Small patches of Calaminarian grassland remain at this site, but they are being lost to vegetation succession on this ungrazed site, which is increasingly dominated by very coarse grassland. Erosion of the cliffs is also contributing to the loss of habitat. In 2018, *Cephaloziella massalongoi* was reported from two mine adits at the base of the cliffs, locally abundant at each over 2 x 2 m. It was refound in one adit during the present survey, frequent over 1 x 1 m, which appears to represent a decline, though the habitat appears to be stable. The site was classified as high conservation value in 2018, but is here considered to be of medium value because the extent of Calaminarian grassland is very small and the extent of *C. massalongoi* is very limited. Threats associated with algal growth, recreational pressure and the tipping of rubbish, which were highlighted during the 2018 assessment, were not evident during the present survey. The site is assessed as Unfavourable – Inadequate because the Calaminarian grassland continues to decline because of vegetation succession and erosion. The habitat could be restored by the removal of vegetation and dead plant litter to re-expose metalliferous spoil, which is considered to be a medium priority because the site is of medium conservation value.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 View across the western side of the site showing patches of Calaminarian grassland with *Cephaloziella stellulifera*, gradually being lost to vegetation succession.



Figure 3 Location of *Cephaloziella massalongoi*, on the wall of an old mine adit, with scattered colonies over 1 x 1 m.



Figure 4 View across the eastern side of the site showing scattered patches of Calaminarian grassland.



Figure 5 Location of *Pohlia andalusica*.

Site 14 – Tankardstown

Site details

Parameter	Value
Site code	14
Site name	Tankardstown
Grid reference	X451986
County	Waterford
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.32	0.32	0
Calaminarian grassland area (ha)	0.006	0	-0.006

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	1	0

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Major decrease		Unfavourable – Bad
Structure and functions	No. indicator spp.	0	Fail	
	Vegetation encroachment	100%	Fail	
	Negative human impact	0%	Pass	
	No. of criteria passed		1	Unfavourable – Inadequate
Future prospects				Unfavourable – Bad
Overall Assessment				Unfavourable – Bad

Summary

The tiny patches of Calaminarian grassland that remained at this site 2018 have now been lost due to vegetation succession. A couple of small areas of bare ground remain, but no indicator species of Calaminarian grassland occur and they are dominated by non-metalliferous species, such as *Campylopus introflexus*, *Cladonia* spp., *Hypnum cupressiforme* var. *lacunosum* and *Trichostomum littorale*. The lack of grazing at this site has hastened the habitat loss, with the mine spoil now dominated to very coarse grassland. Erosion of the cliffs has also contributed to the loss of the habitat. The site is assessed as Unfavourable – Bad because the Calaminarian grassland has become extinct. It could be restored by the removal of vegetation and dead plant litter to re-expose metalliferous spoil, but this is considered to be a low priority for the conservation of Calaminarian grassland because the site is of low value for this habitat.

Figures



Figure 1 Location of site. Satellite image © Google, DigitalGlobe.



Figure 2 View across the western half of the site, in the foreground showing the only tiny patch of Calaminarian grassland that remained in 2018, since lost to vegetation succession and now containing no indicator species of Calaminarian grassland.

Site 15 – Knockmahon Village

Site details

Parameter	Value
Site code	15
Site name	Knockmahon Village
Grid reference	X438990
County	Waterford
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.62	0.8	0
Calaminarian grassland area (ha)	0.28	0.32	-0.016

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>		X	
	<i>Cephaloziella nicholsonii</i>	X	X	X
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	
	<i>Cephaloziella integerrima</i>	X	X	X
	<i>Cephaloziella stellulifera</i>		X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocola inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>	X	X	X
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>		X	
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		3	6	4

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High
MA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	4	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been enlarged to include areas of Calaminarian grassland excluded from the 2018 assessment, including the lower approach track. The site overall continues to support large populations of *Cephaloziella integerrima*, *C. nicholsonii*, *C. stellulifera* and *Pohlia andalusica*, and as such is of high conservation importance. The condition of the site is not as unfavourable as it appeared to be in 2018. *Cephaloziella integerrima* and *C. nicholsonii* were only found 'in very small amounts' in 2018; they have either expanded considerably since or were over-looked. Pollution, algal growth and the dumping of rubbish were all highlighted as negative pressures in 2018, but none of these were evident during the present survey. The only current threat appears to be vegetation succession, which is causing a slow but continuous loss of Calaminarian grassland, and will eventually cause its complete loss. Thus, the site is assessed as Unfavourable – Inadequate. Clearance of vegetation to re-expose metalliferous spoil should be undertaken to reverse succession and low density livestock grazing should be introduced (the only current grazing is by rabbits). These measures are a high priority because the site is of high conservation value.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Lower approach track, which supports Calaminarian grassland along its length, including frequent *Cephaloziella stellulifera* and *Pohlia andalusica*, gradually being lost to vegetation succession.



Figure 3 View across lower part of site, showing an example location of *Cephaloziella integerrima* and encroachment by scrub.



Figure 4 View across lower part of site, showing example an location of *Cephaloziella nicholsonii* and encroachment by scrub.



Figure 5 View across upper part of site, where flushed spoil supports large colonies of *Cephaloziella integerrima*, *C. nicholsonii* and *C. stellulifera*.

Site 18 – Muckross Lake

Site details

Parameter	Value
Site code	18
Site name	Muckross Lake
Grid reference	V94878594
County	Kerry
Conservation value	Medium

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.04	0.1	0
Calaminarian grassland area (ha)	0.027	0.05	-0.0025

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>	X		
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a		X	X
Total		2	2	3

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PI02	Other invasive alien species (other than species of Union concern)	Inside	Negative	Low	10
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Medium	100

Conservation measures

Code	Name	Priority
MI03	Management, control or eradication of other invasive alien species	Medium
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Medium

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	3	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been enlarged slightly to include areas of Calaminarian grassland excluded from the 2018 boundary. This small area of Calaminarian grassland continues to support a good population of *Cephaloziella stellulifera* and with frequent *Silene uniflora*. As in 2018, the mine shaft wall where *Cephaloziella massalongoi* was reported from in 2008 was found to support only *C. stellulifera*. The site is assessed as Unfavourable – Inadequate because the Calaminarian grassland is undergoing a continuing decline due to erosion along the lake shore and due to vegetation succession elsewhere, including invasion by pines. Nothing can be done about the former, but succession can be reversed by the removal of scrub and dead plant litter to re-expose metalliferous spoil, which is considered to be a medium priority because the site is of medium conservation value.

Figures

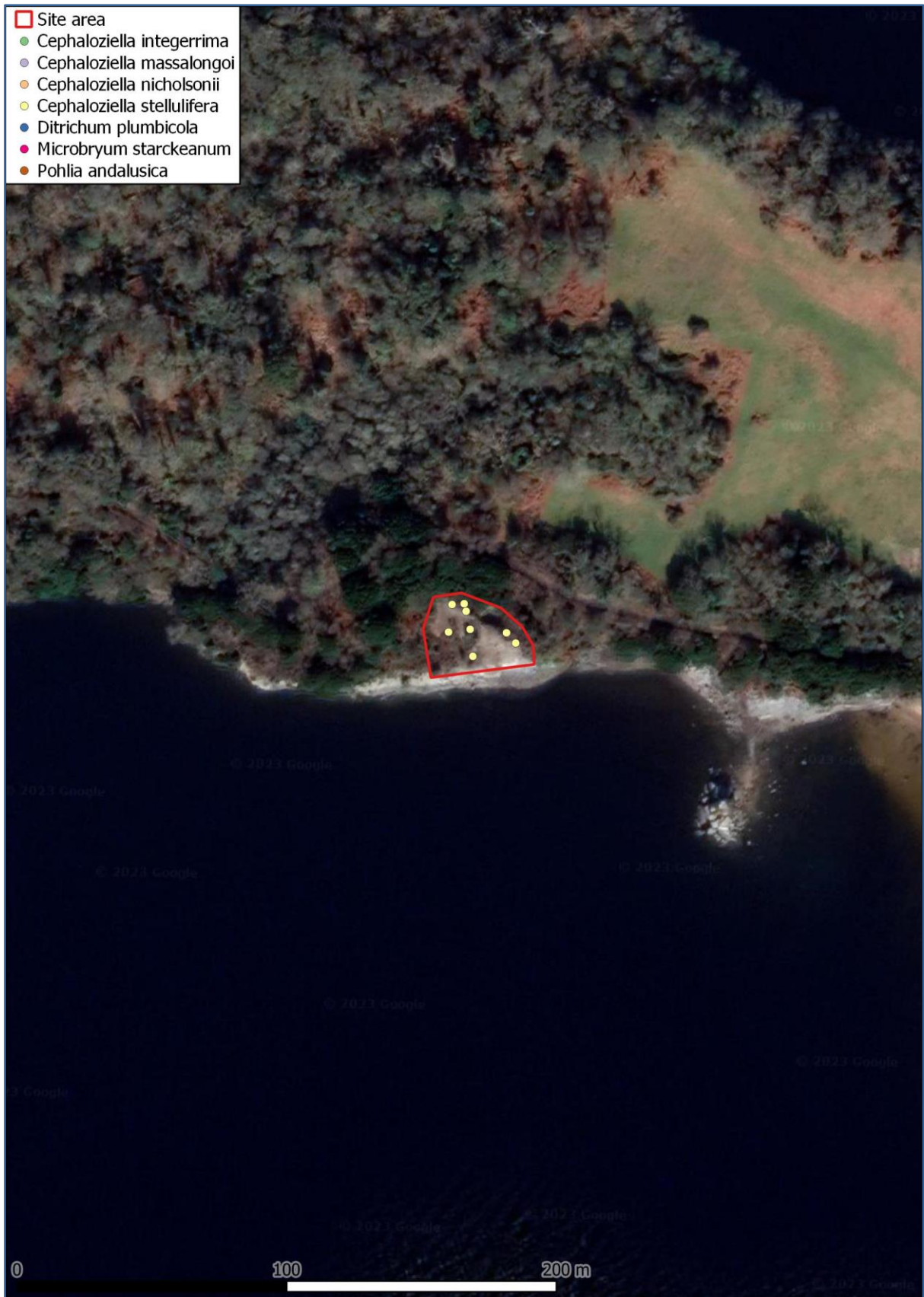


Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 View along the lake shore edge, showing loss of Calaminarian grassland due to erosion.



Figure 3 View across the main area of the site, showing scrub encroachment, including invasion by pines.

Site 19 – Ross Island

Site details

Parameter	Value
Site code	19
Site name	Ross Island
Grid reference	V94588806
County	Kerry
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.14	0.22	0
Calaminarian grassland area (ha)	0.055	0.06	-0.006

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>	X	X	X
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>			X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>		X	X
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a		X	X
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a		X	X
Total		1	4	6

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PF05	Sports, tourism and leisure activities	Inside	Negative	Low	10
PI02	Other invasive alien species (other than species of Union concern)	Inside	Negative	High	20
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Medium	70

Conservation measures

Code	Name	Priority
MI03	Management, control or eradication of other invasive alien species	High
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	6	Pass	
	Vegetation encroachment	0%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been enlarged slightly to include areas of Calaminarian grassland excluded from the 2018 boundary. Calaminarian grassland continues to be limited to a few small patches along the lake shore, some of it inundated during the present survey as the lake level was high. Some further small patches occur around The Blue Hole, providing habitat for *Cephaloziella massalongoi*. Erosion by waves is causing a decline of the lake shore habitat and burial beneath pine needles is causing a decline of The Blue Hole habitat. Trampling by visitors was highlighted as a threat in 2018, and whilst this still occurs it did not seem to be impacting the habitat substantially. At The Blue Hole, *C. massalongoi* has clearly declined since 2018, with only a small amount found at two points during the present survey. The fragments of habitat along the lakeshore are of limited interest, dominated by *Armeria maritima*, *Bryum pallescens* and *Weissia controversa*, together with tiny amounts of *Cephaloziella stellulifera*, but at The Blue Hole the habitat is of high conservation interest as it supports the only colonies at this site of *C. massalongoi*. The site is assessed as Unfavourable - Inadequate because the Calaminarian grassland is undergoing a continuing decline due to erosion along the lake shore and due to the accumulation of pine needle litter around The Blue Hole. It appears that nothing can be done to prevent the former, but the removal of pine trees and

accumulated needle litter is considered a high priority at The Blue Hole, due to the importance of the habitat for *C. massalongoi* (see Figure 2).

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.

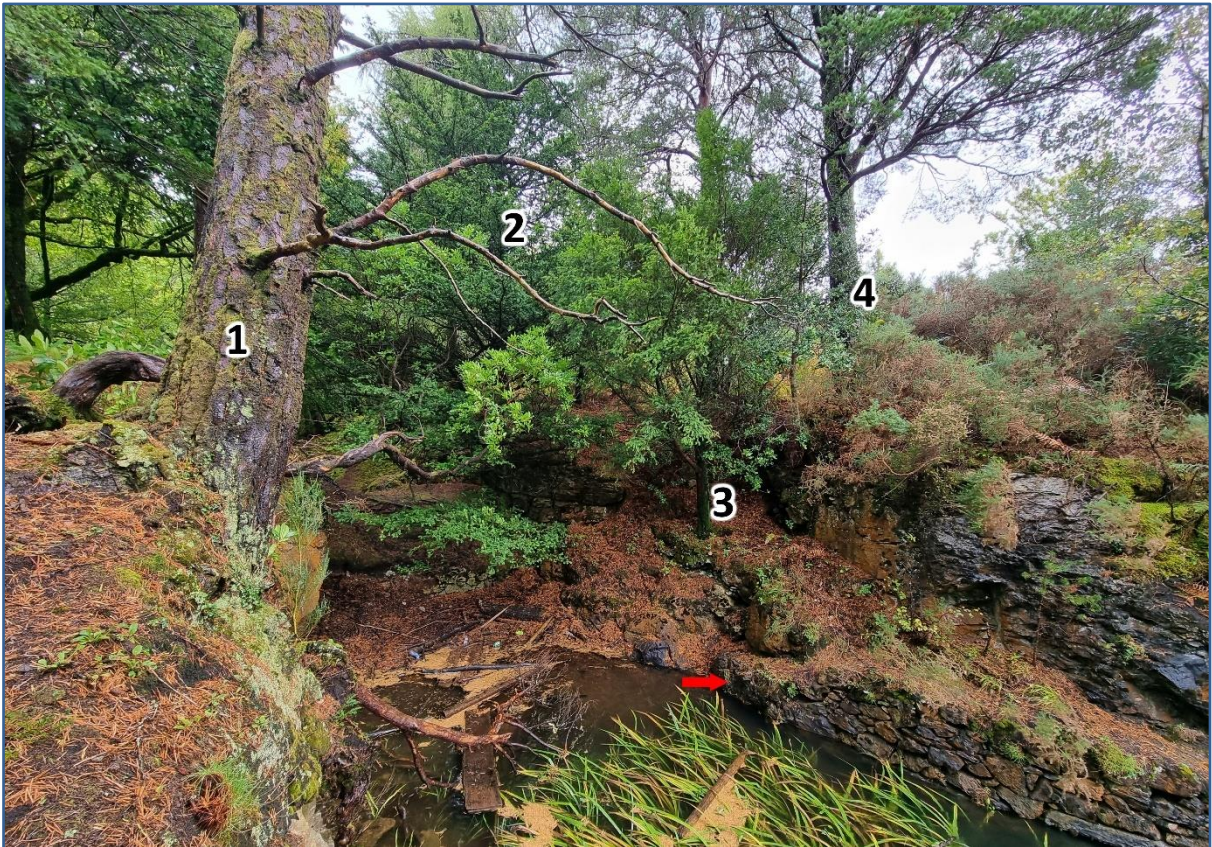


Figure 2 View across the back of The Blue Hole, showing the location (red arrow) of *Cephaloziella massalongoi*, where it is thinly scattered over 30 x 30 cm of rockface. The four numbered pines and their needle litter should be removed, as they are causing loss of habitat for *C. massalongoi*.



Figure 3 View across the front of The Blue Hole, showing the location (red arrow) of *Cephaloziella massalongoi*, thinly scattered over 20 x 10 cm.



Figure 4 Fragments of Calaminarian grassland on the lake shore, showing erosion due to wave action.



Figure 5 Fragments of Calaminarian grassland on the lake shore, showing erosion due to wave action.

Site 21 – North of Caminches

Site details

Parameter	Value
Site code	21
Site name	North of Caminches
Grid reference	V59464559
County	Cork
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.26	0.44	0
Calaminarian grassland area (ha)	0.026	0.037	-0.007

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			X
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>	X		
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		2	1	2

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA25	Agriculture activities not referred to above	Inside	Positive	Low	10
PA25	Agriculture activities not referred to above	Inside	Negative	High	10
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	80

Conservation measures

Code	Name	Priority
MA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	High
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Moderate decrease		Unfavourable – Inadequate
Structure and functions	No. indicator spp.	3	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	14%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been enlarged slightly to include areas of Calaminarian grassland excluded from the 2018 boundary. The conservation value of the site has also been upgraded from low to high because it contains a strong population of the globally threatened *Cephaloziella nicholsonii*. *Pohlia andalusica* was reported from this site in 2008, but as in 2018 it was not refound during the present survey. Along the farm track that runs through the site, fragments of Calaminarian grassland are maintained by low intensity disturbance caused by farm machinery. Elsewhere, vegetation succession is causing a slow decline in the habitat of this ungrazed site. Also, recent groundwork within the north-east part of the site to install a new fence and gateway, presumably for agricultural reasons, has caused significant loss of Calaminarian grassland. The disused horse lorry that had been dumped on the site in 2018 has now gone. Excavation of spoil and disturbance by off-road vehicles have been identified as threats during previous assessments, but neither was evident during the present survey. The site is assessed as Unfavourable – Inadequate because the Calaminarian grassland is

undergoing a continuing decline due to vegetation succession and areas have recently been lost due to groundworks. Vegetation succession could be managed by the removal of vegetation and plant litter to re-expose metalliferous spoil, coupled with the reinstatement of an extensive livestock grazing regime, which are considered to be a high priority because the site is of high conservation value.

Figures

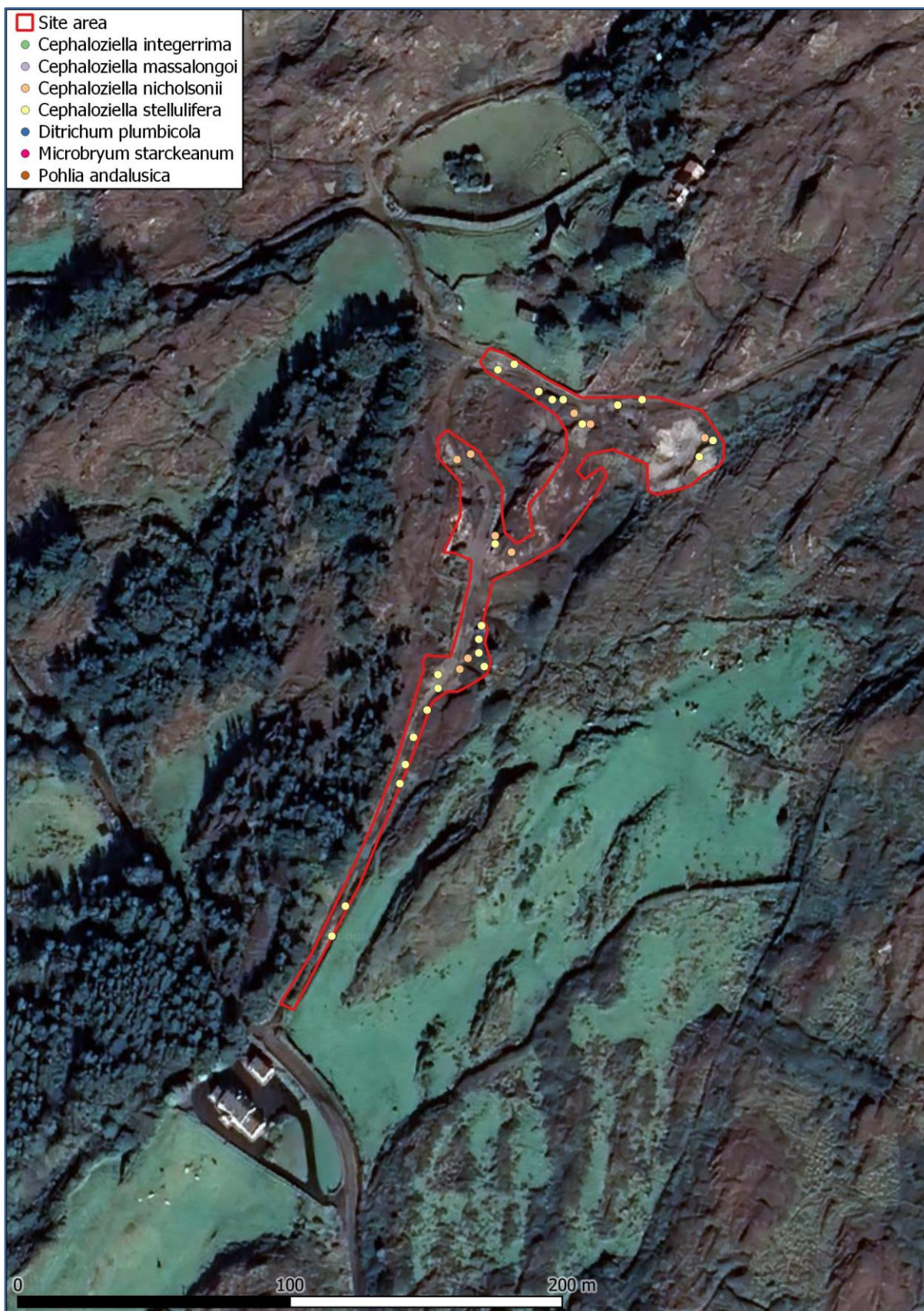


Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Location of *Cephaloziella nicholsonii*, with frequent colonies scattered over 5 x 2 m.



Figure 3 Spoil heap supporting frequent colonies of *Cephaloziella nicholsonii*, scattered over 10 x 2 m.



Figure 4 North-east portion of site, where recent groundwork, to install a new gateway and fence, have destroyed parts of the Calaminarian grassland.

Site 23 – Dooneen

Site details

Parameter	Value
Site code	23
Site name	Dooneen
Grid reference	V57754598
County	Cork
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.88	0.74	0
Calaminarian grassland area (ha)	0.22	0.19	-0.01

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>	X	?	X
	<i>Cephaloziella nicholsonii</i>			X
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>		X	X
	<i>Solenostoma gracillimum</i>		X	X
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		2	3	5

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA08	Extensive grazing or undergrazing by livestock	Inside	Positive	Low	100
PF05	Sports, tourism and leisure activities	Inside	Negative	High	5
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	95

Conservation measures

Code	Name	Priority
MA03	Maintain existing extensive agricultural practices and agricultural landscape features	High
MF03	Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats)	High
MH03	Reduce impact of other specific human activities	High
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	5	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	5%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been revised slightly to include some areas of Calaminarian grassland excluded from the 2018 boundary. This site was categorised as being of medium conservation value in the 2018 assessment, but is here considered to be of high value because it supports a strong population of the globally threatened *Cephaloziella nicholsonii* plus a smaller population of the European threatened *C. massalongoi*. There has been extensive dumping of inert waste on parts of the site historically, but there are no recent signs of such activity. Low intensity grazing by cattle/ponies occurs across the site, which helps to slow vegetation succession and should be continued. Informal paths are used by visitors to view the coastal cliffs and this causes heavy but very localised impacts on the Calaminarian grassland. The site is assessed as Unfavourable – Inadequate because the Calaminarian

grassland is undergoing a continuing decline due to erosion of the cliffs, vegetation succession and visitor pressure. Nothing can be done about the former, but the latter two factors can be addressed relatively easily by the erection of a low fence along the roadside boundary to deter visitor access and by the removal of vegetation and plant litter to re-expose metalliferous spoil, together with the removal of the large amounts of inert waste that has been dumped here historically. These measures are considered to be a high priority because the site is of high conservation value.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 View across the eastern side of the site, showing Calaminarian grassland in the foreground and large amounts of dumped inert waste in the background.



Figure 3 View across part of the western side of the site, showing heavy but localised visitor pressure along informal paths to the cliff sides, plus piles of dumped inert waste in the background.



Figure 4 View along the cliff sides, showing loss of Calaminarian grassland due to erosion.



Figure 5 Part of the Calaminarian grassland on the western side of the site, with frequent scattered patches of *Cephaloziella nicholsonii* in the area indicated, extending over 6 x 1 m.



Figure 6 Location of one of several colonies of *Cephaloziella massalongoi* within crevices of the old mine wall that borders the southern boundary of the site.



Figure 7 Location of a small colony of *Cephaloziella nicholsonii* on the western side of the site, clearly under threat from vegetation succession.

Site 24 – Cappagh

Site details

Parameter	Value
Site code	24
Site name	Cappagh
Grid reference	V99003245
County	Cork
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.09	0.09	0
Calaminarian grassland area (ha)	0.06	0.057	-0.003

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>		X	
	<i>Cephaloziella nicholsonii</i>	X		X
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>	X		
Other bryophytes	<i>Bryum pallescens</i>		?	
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>	X	X	X
	<i>Scapania compacta</i>		X	X
	<i>Solenostoma gracillimum</i>			X
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		4	4	5

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA08	Extensive grazing or undergrazing by livestock	Inside	Positive	Low	60
PA25	Agriculture activities not referred to above	Inside	Positive	Low	60
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	40

Conservation measures

Code	Name	Priority
MA03	Maintain existing extensive agricultural practices and agricultural landscape features	High
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	5	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The boundary of the site has been modified slightly from the 2018 assessment. A lot of this old mine site has historically been lost to redevelopment, but the fragments of Calaminarian grassland that survive continue to support, in the central and southern portions, a strong population of the globally threatened *Cephaloziella nicholsonii*. Along the farm track that comprises the northern section of the site, fragments of Calaminarian grassland are maintained by low intensity disturbance caused by farm machinery and grazing livestock. Elsewhere, vegetation succession is causing a slow decline in the habitat. Disposal of waste was highlighted as a threat in 2018, but there was no evidence of such during the present survey. The site is assessed as Unfavourable – Inadequate due to the ongoing decline of the Calaminarian grassland. The habitat could be maintained by the periodic removal of vegetation and litter to re-expose metalliferous spoil using a digger, overseen by an ecological clerk of works, which is considered to be a high priority because the site is of high conservation value.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Location of *Cephaloziella nicholsonii*, at the base of an old roadside retaining wall.



Figure 3 Small patches of Calaminarian grassland in the foreground with *Cephaloziella stellulifera* and *Pohlia andalusica*. An old mine wall in the background supports large patches of *Cephaloziella nicholsonii* (arrowed), which was reported from here in 2008 but was identified as *C. massalongoi* in 2018. This is the area where *Scopelophila cataractae* was reported in 2008, but as in 2018 a search during the present survey was unsuccessful, and it may have been lost due to vegetation succession.



Figure 4 Trackside spoil heaps supporting a large population of *Cephaloziella nicholsonii*. *Cephaloziella stellulifera* occurs along the centre of the track.



Figure 5 Track supporting frequent colonies of *Cephaloziella stellulifera* and occasional *Pohlia andalusica*.

Site 25 – Brow Head

Site details

Parameter	Value
Site code	25
Site name	Brow Head
Grid reference	V77112354
County	Cork
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.2	0.25	0
Calaminarian grassland area (ha)	0.007	0.01	-0.001

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>		X	
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>		X	X
	<i>Solenostoma gracillimum</i>		X	X
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	4	3

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA08	Extensive grazing or undergrazing by livestock	Inside	Positive	Low	100
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MA03	Maintain existing extensive agricultural practices and agricultural landscape features	Low
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Moderate decrease		Unfavourable – Inadequate
Structure and functions	No. indicator spp.	3	Pass	
	Vegetation encroachment	10%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The 2018 boundary of the site has been modified slightly. Small patches of species-poor Calaminarian grassland remain outside the old mine buildings and on the headland, with locally frequent *Cephaloziella stellulifera*. Low intensity grazing by cattle and sheep occurs across the site, which helps to slow vegetation succession and should be continued. However, the habitat remains in decline due to vegetation succession and erosion of the cliffs, and so without intervention the Calaminarian grassland will eventually be lost. The site is therefore assessed as Unfavourable – Inadequate. The habitat could be maintained by the periodic removal of vegetation and litter to re-expose metalliferous spoil using a digger, overseen by an ecological clerk of works, but this is considered to be a low priority because the site is of low conservation value.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Small patches of Calaminarian grassland outside the old mine buildings, supporting frequent *Cephaloziella stellulifera* and *Scapania compacta*, gradually being lost due to vegetation succession.



Figure 3 Spoil heaps on the cliff-tops, showing their gradual loss due to the erosion of the cliffs.



Figure 4 View across the old spoil heaps on the cliff-tops, which are mostly composed of coarse material that supports little Calaminarian grassland.

Site 27 – Lackamore

Site details

Parameter	Value
Site code	27
Site name	Lackamore
Grid reference	R78846027
County	Tipperary
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0	0	0
Calaminarian grassland area (ha)	0	0	0

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X		
	<i>Ditrichum lineare</i>			
	<i>Gymnocola inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			X
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	0	1

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA01	Conversion into agricultural land (excluding drainage and burning)	Inside	Negative	High	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	n/a		n/a
Structure and functions	No. indicator spp.	n/a	n/a	
	Vegetation encroachment	n/a	n/a	
	Negative human impact	n/a	n/a	
	No. of criteria passed		n/a	n/a
Future prospects				Unfavourable – Bad
Overall Assessment				Unfavourable – Bad

Summary

The Calaminarian grassland that once occurred at this site was lost completely between 2008 and 2018 due to conversion to agricultural grassland. Some of the resultant grassland turf has been dislodged by cattle and a small area, about 3 m², has been scraped by farm machinery to reveal a clay subsoil that may be metalliferous, with colonisation by *Solenostoma gracillimum*. Indeterminate *Cephaloziella* was reported in 2018, but no *Cephaloziella* was found during the present survey. The site is assessed as Unfavourable – Bad because the Calaminarian grassland has been lost. It appears the habitat could be restored by the removal of the grassland turf, but this is a low priority because the site is of low conservation value.

Figures

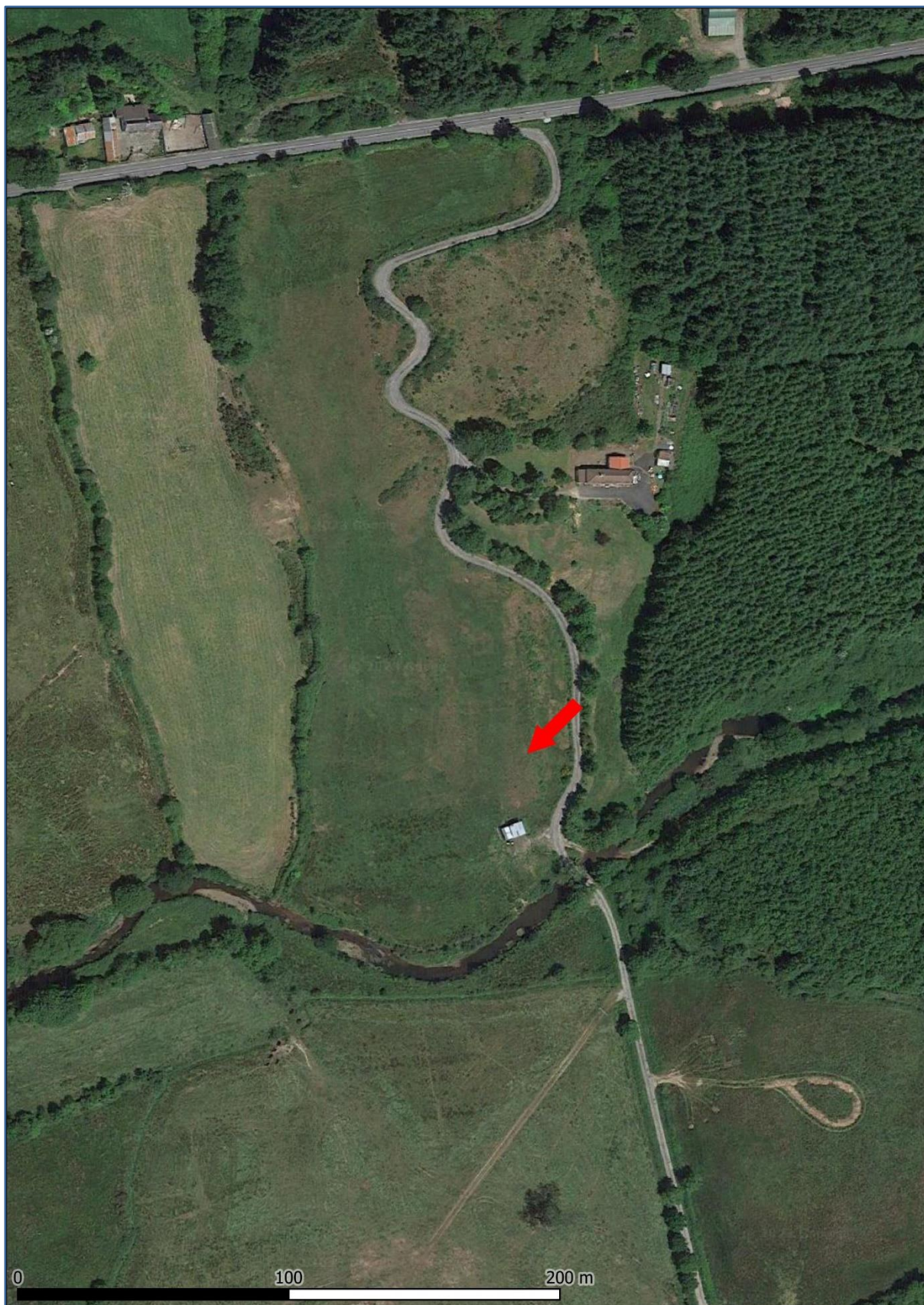


Figure 1 Location of site. Satellite image © Google, DigitalGlobe.



Figure 2 View across site.



Figure 3 Area scraped by farm machinery, to reveal a clay subsoil that may be metalliferous, with colonisation by *Solenostoma gracillimum*.

Site 28 – Shallee

Site details

Parameter	Value
Site code	28
Site name	Shallee
Grid reference	R806712
County	Tipperary
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	2.3	2.3	0
Calaminarian grassland area (ha)	0.47	0.45	-0.02

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>	X	X	
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>	X		
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>		X	X
<i>Weissia controversa</i> var. <i>densiflora</i>		X	X	
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		3	4	4

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	4	Pass	
	Vegetation encroachment	4%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

The 2018 boundary of the site has been modified slightly. Large-scale dumping of waste has occurred on this site in the past, but there is no evidence of this occurring in recent years. Public access has become strictly forbidden and great efforts have been made to prevent access, with a complex network of tall security fencing and CCTV installed. An abundance of algae, which was noted as a threat in 2018, was not evident during the present survey. The only apparent threat to the Calaminarian grassland is from vegetation succession, which is progressing and causing a continual decline in the habitat, with large areas of the site now comprising dense gorse scrub. *Cephaloziella nicholsonii* was not present at the location where 'a tiny fragment' was found in 2018, and it was not found elsewhere within the site during the present survey. As in 2018, *Ditrichum plumbicola* was not found and may have been lost due to vegetation succession, though potential habitat remains. The scattered patches of Calaminarian grassland that survive support a large population of *Cephaloziella stellulifera*. The site is assessed as Unfavourable - Inadequate because Calaminarian grassland is undergoing a slow but continuous decline due to vegetation succession, which will cause its extinction in the long-term. The habitat could be maintained by the periodic removal of vegetation and litter to re-expose metalliferous spoil using a digger, overseen by an ecological clerk of works, which is considered to be a high priority because the site is, potentially, of high conservation value. Such efforts should begin in areas where *Ditrichum plumbicola* was found in 2008.

Figures



Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 Calaminarian grassland alongside track near to the entrance to the site, supporting frequent *Cephaloziella stellulifera*. *Ditrichum plumbicola* was found in this general vicinity in 2008, but a detailed search did not refind it during the present survey, or in 2018.



Figure 3 View across the northern part of the site, where Calaminarian grassland is scattered amongst gorse scrub and mine ruins.



Figure 4 View across the southern part of the site, where large-scale dumping of waste has occurred, seemingly from the old mine workings, but with no evidence of recent dumping.

Site 29 – Garryard West

Site details

Parameter	Value
Site code	29
Site name	Garryard West
Grid reference	R826710
County	Tipperary
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.13	0.13	0
Calaminarian grassland area (ha)	0.04	0.038	-0.002

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X		
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>		X	
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>		X	X
<i>Weissia controversa</i> var. <i>densiflora</i>			X	
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	2	3

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	3	Pass	
	Vegetation encroachment	5%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Inadequate
Overall Assessment				Unfavourable – Inadequate

Summary

This small gully, which mostly cannot be accessed due to security fencing and steep, unstable slopes, continues to be support a small amount of Calaminarian grassland. As in 2018, the location where *Cephaloziella stellulifera* was recorded in 2008 could not be accessed. No rare metallophytes were found here during the present survey, or during previous surveys. The site is assessed as Unfavourable - Inadequate because vegetation succession is causing a slow but continual decline in the habitat. The habitat could be maintained by the removal of vegetation and litter to re-expose metalliferous spoil, overseen by an ecological clerk of works, but this is a low priority because the site is of low conservation value.

Figures



Figure 1 Location of site. Satellite image © Google, DigitalGlobe.



Figure 2 View across site.

Site 30 – Ballyhickey

Site details

Parameter	Value
Site code	30
Site name	Ballyhickey
Grid reference	R41737687
County	Clare
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.06	0.06	0
Calaminarian grassland area (ha)	0.011	0	-0.011

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>			
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>			
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		0	0	0

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA07	Intensive grazing or overgrazing by livestock	Inside	Negative	High	100
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MA06	Stop mowing, grazing and other equivalent agricultural activities e.g. burning (incl. restore or improve habitats)	Low
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Major decrease		Unfavourable – Bad
Structure and functions	No. indicator spp.	0	Fail	
	Vegetation encroachment	100%	Fail	
	Negative human impact	0%	Pass	
	No. of criteria passed		1	Unfavourable – Inadequate
Future prospects				Unfavourable – Bad
Overall Assessment				Unfavourable – Bad

Summary

The site continues to be used as a pasture for cattle. The tiny amount of Calaminarian grassland that survived in 2018 has been lost due to vegetation succession. Some small patches of exposed spoil occur at the base of the mine ruins, but is dominated by *Bryum dichotomum* and *Dicranella varia*, a flora more influenced by old mortar from the ruin walls than by any metalliferous influence. The site is assessed as Unfavourable - Bad because no Calaminarian grassland remains. The habitat could be restored by the removal of vegetation and litter to re-expose metalliferous spoil using a digger, overseen by an ecological clerk of works, and the area fenced-off from cattle because the ground is wet and liable to poaching. The cattle are also attracted to the mine ruins for shelter, leading to heavy dunging in the vicinity. However, these measures are considered to be low priority because the site is of low conservation value.

Figures



Figure 1 Location of site. Satellite image © Google, DigitalGlobe.



Figure 2 View across the site.



Figure 3 Habitat bordering the pond, which is fenced off from grazing and dominated by rank grassland.

Site 31 – Sheshodonnell East

Site details

Parameter	Value
Site code	31
Site name	Sheshodonnell East
Grid reference	R26869690
County	Clare
Conservation value	High

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.03	0.03	0
Calaminarian grassland area (ha)	0.009	0.008	-0.001

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	X
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	X
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			X
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
Vascular plants	<i>Solenostoma gracillimum</i>			
	<i>Weissia controversa</i> var. <i>densiflora</i>		X	X
	<i>Minuartia verna</i>		X	X
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
	Total		1	3

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PA08	Extensive grazing or undergrazing by livestock	Inside	Positive	Low	100
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	High
MA03	Maintain existing extensive agricultural practices and agricultural landscape features	High

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Minor decrease		Favourable
Structure and functions	No. indicator spp.	4	Pass	
	Vegetation encroachment	11%	Pass	
	Negative human impact	0%	Pass	
	No. of criteria passed		3	Favourable
Future prospects				Unfavourable – Bad
Overall Assessment				Unfavourable – Bad

Summary

Calaminarian grassland continues to be limited to a few small patches that are in decline due to vegetation succession. Low intensity grazing by cattle and rabbits is causing some dunging on the habitat but the grazing pressure reduces the rate of vegetation succession and on balance is likely to be positive. Poaching by cattle, which was highlighted as a threat in 2018, is not a significant issue presently. The main indicator species present are *Bryum pallescens*, *Cephaloziella stellulifera* and *Minuartia verna*, with small amounts of *Weissia controversa* and, on the main spoil heap, some strong colonies of *Microbryum starckeanum*. Whilst the area of habitat is very small, the site is considered to be of high conservation value due to the presence of *M. starckeanum*, its only known location in Ireland. The site is assessed as Unfavourable - Bad because vegetation succession will likely cause the complete loss in the near future of what little Calaminarian grassland remains. This could be reversed by the removal of vegetation and litter to re-expose metalliferous spoil using a mini-digger, overseen by an ecological clerk of works. The low intensity grazing should be maintained to help slow future vegetation succession. These measures are considered to be high priority due to the high conservation value of the site.

Figures

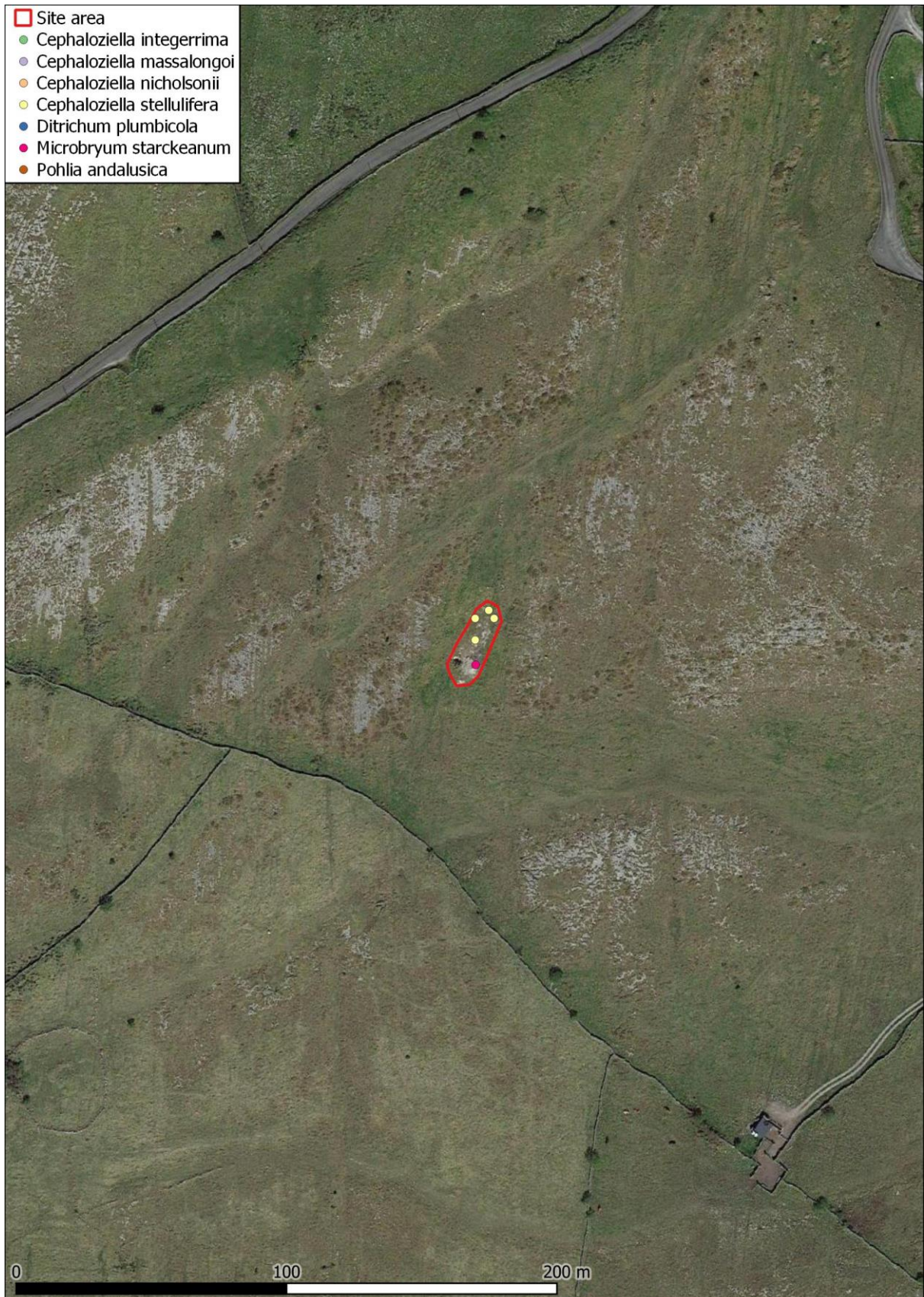


Figure 1 Location of site and notable species found during the present survey. Satellite image © Google, DigitalGlobe.



Figure 2 View across of site, with location of *Microbryum starckeanum* arrowed, where many fruiting colonies are scattered over about 1 m².

Site 34 – Keeldrum

Site details

Parameter	Value
Site code	34
Site name	Keeldrum
Grid reference	B90372624
County	Donegal
Conservation value	Low

Change in area of site and Calaminarian grassland from baseline year

Parameter	2018	2023	Genuine change
Site area (ha)	0.14	0.14	0
Calaminarian grassland area (ha)	0.013	0.01	-0.003

Presence of indicator species of Calaminarian grassland

Group	Species	2008	2018	2023
Obligate metallophytes	<i>Cephaloziella massalongoi</i>			
	<i>Cephaloziella nicholsonii</i>			
	<i>Ditrichum cornubicum</i>			
	<i>Ditrichum plumbicola</i>			
	<i>Scopelophila cataractae</i>			
Other bryophytes	<i>Bryum pallescens</i>		?	?
	<i>Cephaloziella integerrima</i>			
	<i>Cephaloziella stellulifera</i>	X	X	
	<i>Ditrichum lineare</i>			
	<i>Gymnocolea inflata</i>			
	<i>Microbryum starckeanum</i>			
	<i>Pohlia andalusica</i>			
	<i>Scapania compacta</i>			
	<i>Solenostoma gracillimum</i>			X
	<i>Weissia controversa</i> var. <i>densiflora</i>			
Vascular plants	<i>Minuartia verna</i>			
	<i>Armeria maritima</i> ^a			
	<i>Plantago maritima</i> ^a			
	<i>Silene uniflora</i> ^a			
Total		1	1	1

^a Presence relevant only at inland, lowland sites

Pressures and threats

Code	Name	Location	Influence	Intensity	% habitat affected
PM07	Natural processes without direct or indirect influence from human activities or climate change	Inside	Negative	Low	100

Conservation measures

Code	Name	Priority
MM01	Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Low
MA04	Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	Low

Condition assessment

Parameter	Criterion	Result	Pass/fail	Condition assessment
Area	Annual change in area	Moderate decrease		Unfavourable – Inadequate
Structure and functions	No. indicator spp.	1	Pass	
	Vegetation encroachment	23%	Fail	
	Negative human impact	0%	Pass	
	No. of criteria passed		2	Unfavourable – Inadequate
Future prospects				Unfavourable – Bad
Overall Assessment				Unfavourable – Bad

Summary

Calaminarian grassland is limited to a few small, very species-poor patches in the western half of the site, and has clearly declined since 2018 due to vegetation succession. No Calaminarian grassland survives in the eastern half of the site, where the vegetation now comprises gorse scrub and rank acid grassland. The area that supported *Cephaloziella stellulifera* in 2018 has become rank acid grassland. *Cephaloziella divaricata* is frequent on the few patches of exposed mine spoil that survive, where the only Calaminarian grassland indicator species comprise very small amounts of *Solenostoma gracillimum* plus some depauperate specimens of possible *Bryum pallescens*. The dumping of rubble, which was identified as a threat in 2018, was not apparent during the present survey. The site is assessed as Unfavourable - Bad because vegetation succession will likely cause the complete loss of Calaminarian grassland in the near future. This could be reversed by the removal of vegetation and litter to re-expose metalliferous spoil, coupled with low intensity grazing to slow future vegetation succession. Scraping has been practiced at this site previously, but it is a low priority for future action because the site is of low conservation value for this habitat, with no species of conservation concern having been recorded.

Figures



Figure 1 Location of site. Satellite image © Google, DigitalGlobe.



Figure 2 View from top of site. The spoil in the foreground was bare in 2018, having been scraped by machinery, but is reverting to acid grassland.



Figure 3 View from centre of site.

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