Sands of LIFE: Bryophyte Survey

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SoLIFE: LIFE 17 NAT/UK/000023
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Contents

List of Figures

List of Tables

Crynodeb Gweithredol

Mae Twyni Byw (Sands of LIFE; SoLIFE LIFE17 NAT / UK / 000023) yn brosiect cadwraeth mawr i adfywio twyni tywod ar draws Cymru. Mae'r adroddiad hwn yn asesu effeithiau posibl y prosiect ar rywogaethau bryoffyt prin ac wedi'u gwarchod mewn ardaloedd ymyrraeth llac twyni.

Aseswyd ardaloedd ymyrraeth mewn chwe safle, sef Tywyn Aberffraw, Niwbwrch, Morfa Harlech, Twyni Tywod Pen-bre, Cynffig a Merthyr Mawr.

Cofnodwyd tair rhywogaeth bryoffyt nodedig mewn ardaloedd ymyrraeth arfaethedig:

- *Abietinella abietina* a *Petalophyllum ralfsii* yn Tywyn Aberffraw; a
- *Drepanocladus sendtneri* yn Cynffig.

Rhoddir cyngor ar fesurau osgoi mewn ardaloedd lle mae'r rhywogaethau hyn i'w gael.

Cyflwynir rhestr lawn o rywogaethau bryoffyt a gofnodwyd ym mhob un o'r meysydd ymyrraeth.

Executive Summary

Sands of LIFE (SoLIFE LIFE17 NAT/UK/000023) is a major conservation project to rejuvenate sand dunes across Wales. This report assesses potential impacts of the project on rare and protected bryophyte species in dune slack intervention areas.

Intervention areas at six sites were assessed, namely Tywyn Aberffraw, Newborough, Morfa Harlech, Pembrey Burrows, Kenfig and Merthyr Mawr.

Three notable bryophyte species were recorded in proposed intervention areas:

- *Abietinella abietina* and *Petalophyllum ralfsii* at Tywyn Aberffraw; and
- *Drepanocladus sendtneri* at Kenfig.

Advice is given on avoidance measures in areas where these species occur.

A full list of bryophyte species recorded in each of the intervention areas is presented.

Introduction

Sands of LIFE Project

Sands of LIFE is a major conservation project to rejuvenate 2,400 hectares of sand dunes across Wales. The project aims to recreate movement in the dunes and revitalise habitats which are home to some of Europe's rarest wildlife. Sands of LIFE will encourage movement of sand by reprofiling the dunes and creating bare sand. The project will also lower the surface of dried-out dune slacks to recreate pools and wet habitat, promote sustainable grazing by livestock and rabbits and remove scrub and invasive non-native species.

The project covers 10 sites across four Special Areas of Conservation. These are: Tywyn Aberffraw; Newborough; Morfa Dinlle; Morfa Harlech; Morfa Dyffryn; Laugharne-Pendine Burrows; Pembrey Burrows; Whiteford Burrows; Kenfig and Merthyr Mawr.

Work instruction

The author was requested to undertake bryophyte surveys of areas identified for dune rejuvenation and restoration as part of the SoLIFE project, in order to determine occurrence of any species of conservation interest which may conflict with the proposed management interventions.

Taxonomy

Taxonomy follows Blockeel *et al*. (2014), unless otherwise noted.

Method

Survey sites

Survey locations (*n*=23; Table 1) are located within six dune systems, Tywyn Aberffraw, Newborough, Morfa Harlech, Pembrey Burrows, Kenfig and Merthyr Mawr (Appendix 1).

Survey locations relate to locations of SoLIFE planned dune slack scrape interventions. At least one control plot per project site was also included.

Table 1: Survey areas

Location code	Site	Type	Grid Reference
AC01	Tywyn Aberffraw	Control	SH3677769333
AI01	Tywyn Aberffraw	Intervention	SH3677569358
AI02	Tywyn Aberffraw	Intervention	SH3676969234
AI03	Tywyn Aberffraw	Intervention	SH3643969299
AI04	Tywyn Aberffraw	Intervention	SH3573568419
AI05	Tywyn Aberffraw	Intervention	SH3588868445
AI06	Tywyn Aberffraw	Intervention	SH3592968377
HC01	Morfa Harlech	Control	SH5736831061
HI01	Morfa Harlech	Intervention	SH5743431172
KC01	Kenfig	Control	SS7915582796
KI01	Kenfig	Intervention	SS7918382780
KI02	Kenfig	Intervention	SS7950682377
MC01	Merthyr Mawr	Control	SS8637976654
MI01	Merthyr Mawr	Intervention	SS8618976616
MI02	Merthyr Mawr	Intervention	SS8626476613
NC01	Newborough	Control	SH3888464787
NC02	Newborough	Control	SH4167462921
NI01	Newborough	Intervention	SH3889464678
NI02	Newborough	Intervention	SH4139766438
NI03	Newborough	Intervention	SH4181362529
PC01	Pembrey Burrows	Control	SS4223499186
PI01	Pembrey Burrows	Intervention	SS4136899354
PI02	Pembrey Burrows	Intervention	SS4236999220

Desktop review

Previous bryophyte records from the survey areas were reviewed, accessed from the national recording database of the British Bryological Society, held by the Biological Records Centre (Wallingford). Previous bryophyte survey reports covering the study sites were also reviewed.

Field survey

Surveys were undertaken during 21 October to 9 November 2019. An inventory of all species found within the survey areas was compiled and abundance of each species measured using the DAFOR scale. Locations of species of conservation concern were logged with a hand-held GPS unit (Garmin GPSMAP 64s, Garmin Ltd, Olathe, USA), which generally reported an accuracy of ≤4 m.

Results and Discussion

Survey coverage

All areas were visited, and good survey coverage achieved. All survey locations are shown in Appendix 1.

Species inventory

A total of 61 taxa were found (Appendix 2). Bryophyte communities were generally species-poor and included only common species typical of dune habitat in Wales. However, species of conservation concern were found in five of the proposed intervention areas, at Tywyn Aberffraw and Kenfig, as detailed below. Proposed works can proceed in plots that do not contain species of conservation concern, and for plots that do, recommendations are provided below. The full set of species records will be submitted to the national bryophyte recording scheme of The British Bryological Society and the NBN Gateway, ensuring that they will be safely archived and publicly accessible.

Species of conservation concern

Abietinella abietina

Abietinella abietina is now very rare in Wales and will be included on the forthcoming Red List of bryophytes in Britain as 'Near-threatened' due to a national decline. It is frequent in the turf of area AI01 (Tywyn Aberffraw). This location should be abandoned as an intervention area and works shifted to adjacent slack habitat (Figure 1).

Figure 1: Location of AI01 (A) and suggested alternative area (B) for proposed works. SH3675369355.

Drepanocladus sendtneri

Drepanocladus sendtneri is scattered within KI01 and KI02 at Kenfig (Figure 2). It is a component of the Site of Special Scientific Interest Dune Bryophyte Assemblage feature of Kenfig, a qualifying feature of the SSSI (NRW ISIS database). Works should avoid all colonies of this species, plus a 5 m buffer.

Figure 2. GPS location of *Drepanocladus sendtneri*. Note: further locations of colonies are likely.

Petalophyllum ralfsii

Petalophyllum ralfsii is strictly protected under Schedule 8 of The Wildlife and Countryside Act. It is scattered within the region of AI05 and AI06 at Tywyn Aberffraw (Figure 3). Works in these areas should avoid suitable habitat for *P. ralfsii* and if, as planned, small-scale interventions are to be completed with hand tools then the areas should be surveyed by an experienced bryologist in advance of the works and locations altered to avoid loss of any individuals of *P. ralfsii*. Suitable habitat for the species comprises areas of bare sand or thin turf within slacks, or short turf along paths through slacks.

Figure 3. GPS locations of *Petalophyllum ralfsii.* Note: further locations of colonies are likely

Acknowledgements

Many thanks to Sam Bosanquet and the SoLIFE team (Natural Resources Wales) for various help and support, plus Steven Heathcote and Kristian Evans (JBA Consulting).

References

Blockeel TL, Bosanquet SDS, Preston C. 2014. Atlas of British and Irish Bryophytes. Reading: Pisces Publications.

Appendix 1 – Location of Survey Areas

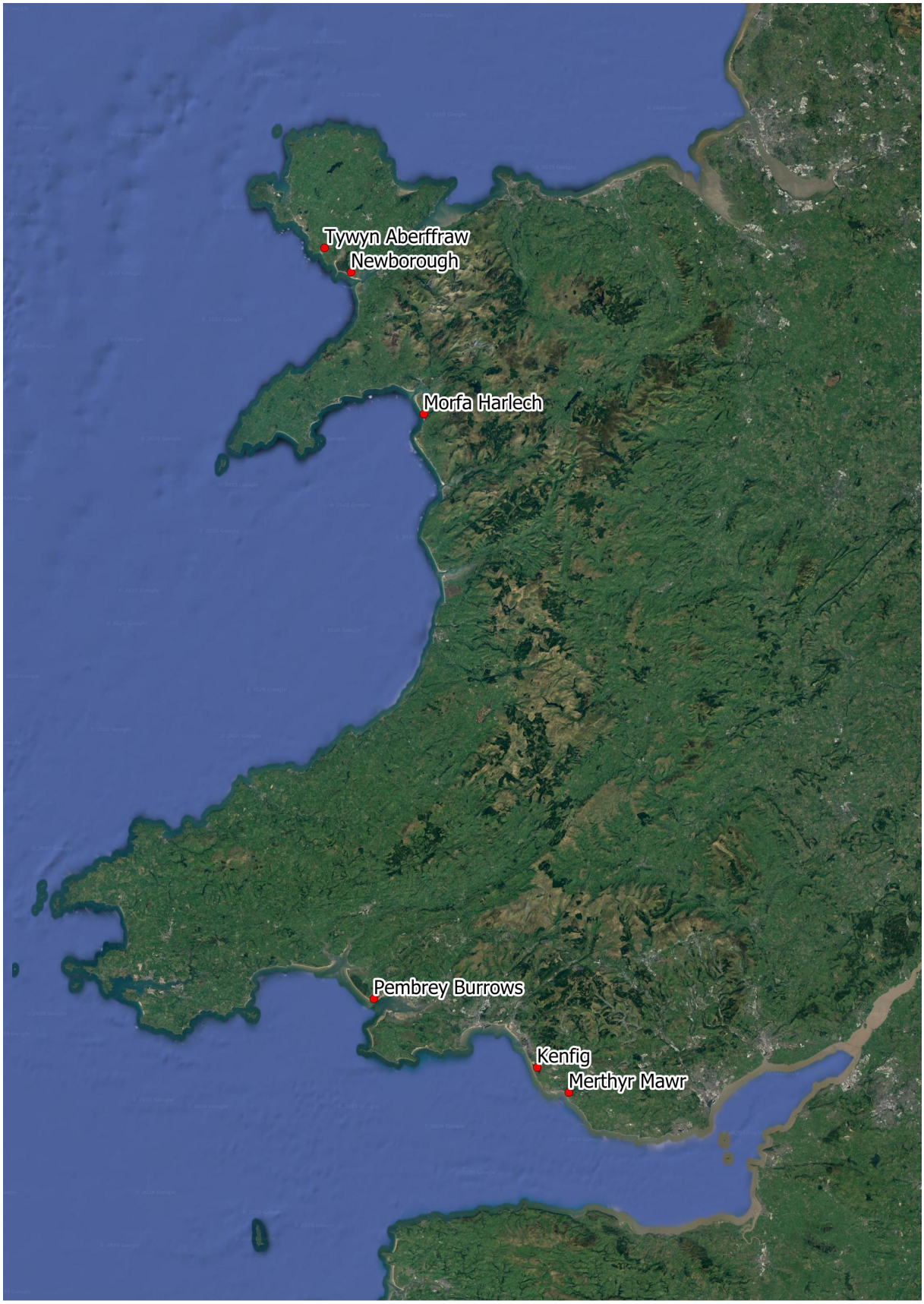

Figure 4. Location of survey sites

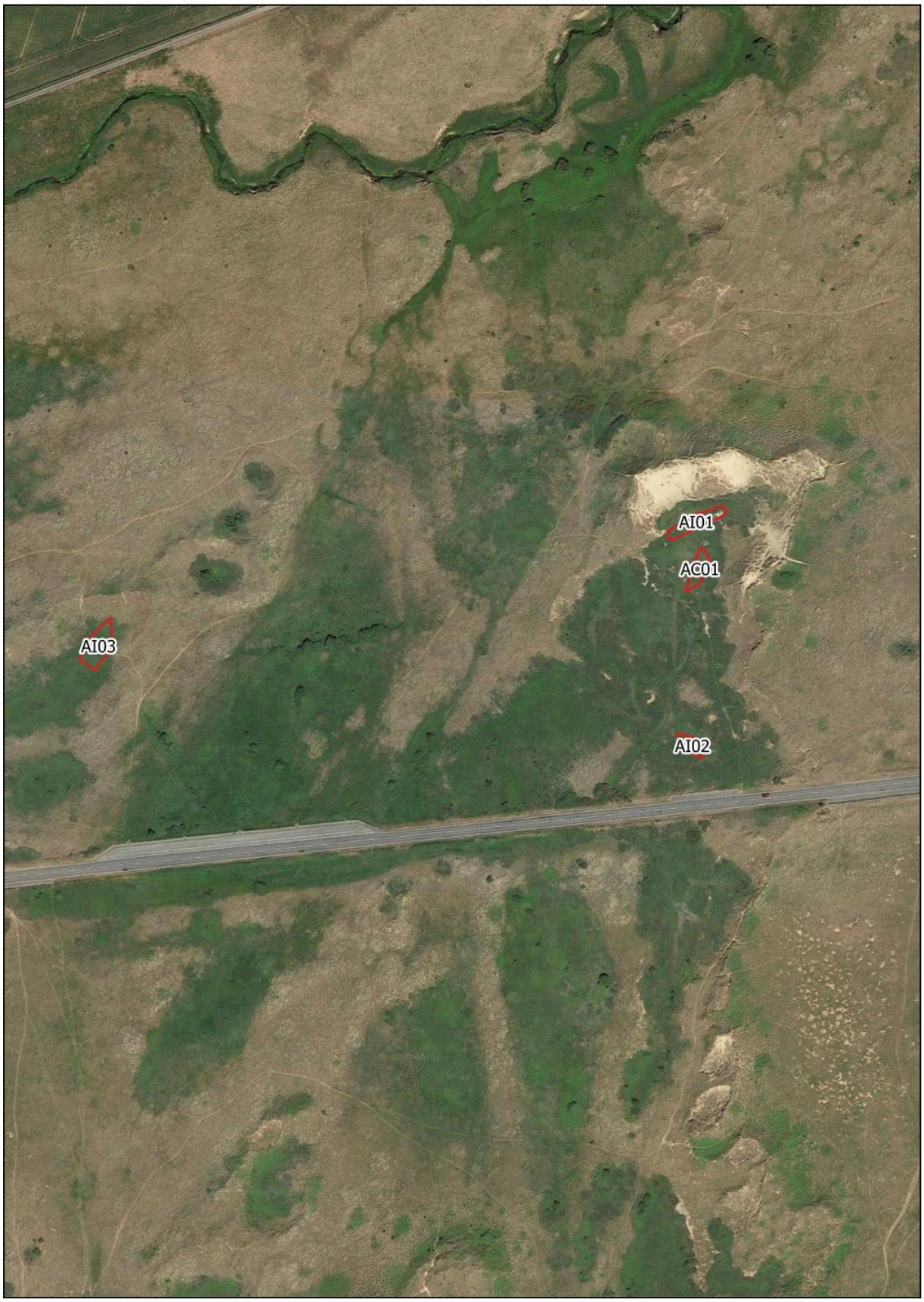

Figure 5. Tywyn Aberffraw (A)

Figure 6. Tywyn Aberffraw (B)

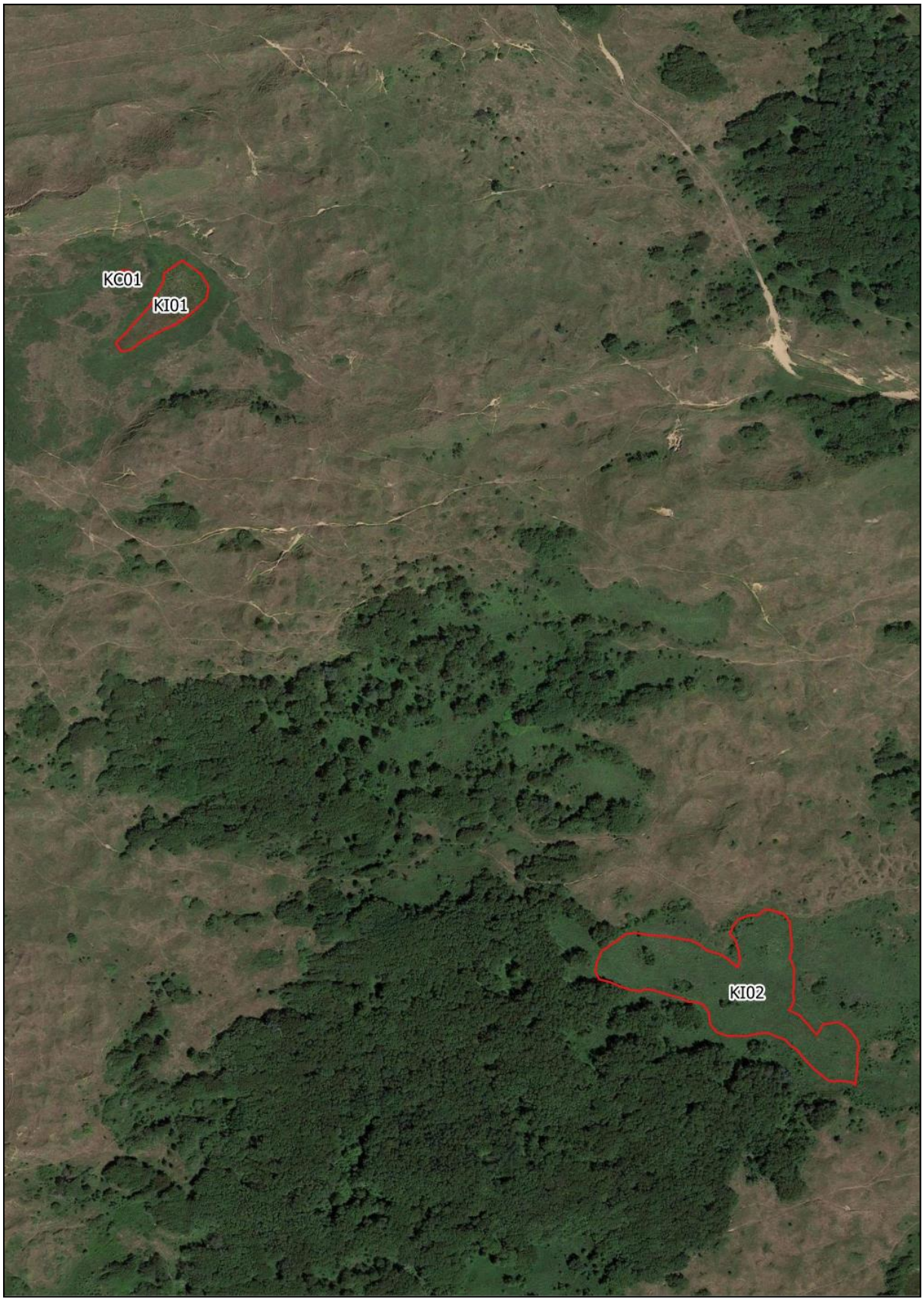

Figure 7. Kenfig

Figure 8. Merthyr Mawr

Figure 9. Morfa Harlech

Figure 10. Newborough (A)

Figure 11. Newborough (B)

Figure 12. Newborough (C)

Figure 13. Pembrey Burrows (A)

Figure 14. Pembrey Burrows (B)

Appendix 2 – Species Inventory

The below provides an inventory of bryophytes recorded during the present survey. Frequency of occurrence is estimated as: 1 – Rare; 2- Occasional; 3 – Frequent; and 4 – Abundant. Species of conservation concern are marked with (SCC).

Key:

Location	Survey codes
Tywyn Aberffraw	AC01, AI01, AI03, AI04, AI05, AI06
Morfa Harlech	HC01, HI01
Kenfig	KC01, KI01, KI02
Merthyr Mawr	MC01, MI01, MI02
Newborough	NC01, NC01, NC02, NI01, NI02, NI03
Pembrey Burrows	PC01, PI01, PI02

Species	AC01	AI01	AI02	AI03	AI04	AI05	AI06	HC01	HI01	KC01	KI01	KI02	MC01	MI01	MI02	NC01	NC02	NI01	NI02	NI03	PC01	PI01	PI02
Abietinella abietina (SCC)	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Amblystegium serpens var. *salinum*	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Amblystegium serpens var. *serpens*	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	0
Aneura pinguis	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Barbula convoluta var. *convoluta*	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	1	2	1
Barbula unguiculata	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	1
Brachythecium albicans	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Brachythecium mildeanum	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Brachythecium rivulare	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Bryoerythrophyllum recurvirostrum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Bryum capillare	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	2	0	0	1	1	0	1
Bryum cf. *algovicum* (non-fruiting)	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	1
Bryum dichotomum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	3	1
Bryum pallens	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Bryum pseudotriquetrum	0	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	2	0	0	0
Bryum rubens	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Calliergonella cuspidata	4	4	0	3	3	3	4	3	2	3	4	4	0	3	3	3	4	2	0	3	0	0	0
Campyliadelphus chrysophyllus	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Campylium stellatum	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cephaloziella divaricata	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ceratodon purpureus	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1
Climacium dendroides	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Dicranella varia	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Didymodon fallax	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0	0	0	0	3	0
Didymodon ferrugineus	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Didymodon tophaceus	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0

Species	AC01	AI01	AI02	AI03	AI04	AI05	AI06	HC01	HI01	KC01	KI01	KI02	MC01	MI01	MI02	NC01	NC02	NI01	NI02	NI03	PC01	PI01	PI02
Didymodon vinealis	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Drepanocladus aduncus	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0
Drepanocladus sendtneri (SCC)	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	0	0	0
Eurhynchium striatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Fissidens adianthoides	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
Fontinalis antipyretica	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Frullania dilatata	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Homalothecium lutescens	0	1	0	0	0	3	0	1	0	0	0	0	3	3	3	1	2	0	0	2	3	4	0
Hylocomium splendens	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	2	2	0	0	0	0	0
Hypnum cupressiforme var. *cupressiforme*	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hypnum cupressiforme var. *lacunosum*	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	4	3	3
Isothecium myosuroides var. *myosuroides*	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Kindbergia praelonga	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0
Leiocolea badensis	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Leptodictyum riparium	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Lophocolea bidentata	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0
Orthotrichum affine	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Oxyrrhynchium speciosum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
Pellia endiviifolia	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Petalophyllum ralfsii (SCC)	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Plagiomnium undulatum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Pseudocrossidium hornschuchianum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Pseudoscleropodium purum	0	0	3	3	0	2	0	4	3	0	0	1	3	3	3	4	2	4	0	2	2	3	2
Rhynchostegium megapolitanum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
Rhytidiadelphus squarrosus	0	0	0	0	0	0	0	3	2	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Rhytidiadelphus triquetrus	0	2	1	2	0	0	0	0	2	0	0	0	0	0	3	0	0	2	0	0	0	0	0
Riccardia chamedryfolia	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Schistidium apocarpum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0
Scorpidium cossonii	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Syntrichia ruralis var. *ruraliformis*	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	2	0	0	2	2	3	0
Thuidium assimile	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Thuidium tamariscinum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0
Tortella flavovirens	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	3	1
Ulota bruchii	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Ulota phyllantha	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Data Archive Appendix

Data outputs associated with this project are archived in Sands of LIFE (SoLIFE) DMS folders (D1 Physical Monitoring) on server–based storage at Natural Resources Wales.

The data archive contains:

[A] The final report in Microsoft Word and Adobe PDF formats.

[B] GIS layer of notable species of bryophytes, which is held on the central geo-spatial data store.

[C] A full set of species records in Excel format, including date, location, species name, etc.

[D] A full set of images/maps produced in JPEG format.

Metadata for this survey is publicly accessible through Natural Resources Wales' Library Catalogue https://libcat.naturalresources.wales (English Version) and https://catllyfr.cyfoethnaturiol.cymru (Welsh Version) by searching 'Dataset Titles'. The metadata is held as record no 124795.

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