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Marsh Fritillary North Swansea landscape assessment 2019

Butterfly Conservation

NRW Evidence Report No. 445

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Report series: NRW Evidence Report
Report number: 445
Publication date: April 2020
Contract number:
Contractor: Butterfly Conservation Wales
Contract manager: Mike Howe
Title: **Marsh Fritillary North Swansea Landscape Assessment 2019**
Author(s): Butterfly Conservation Wales
Restrictions: None

Distribution list (core)

NRW Library, Bangor	2
National Library of Wales	1
British Library	1
Welsh Government Library	1
Scottish Natural Heritage Library	1
Natural England Library (Electronic Only)	1

Distribution list (others)

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Recommended citation for this volume:

Butterfly Conservation Wales. 2020. Marsh Fritillary North Swansea Landscape Assessment 2019. NRW Evidence Report No: **445**, 20pp. Natural Resources Wales, Bangor.

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1. Crynodeb gweithredol

Mae britheg y gors *Euphydryas aurinia* yn Rhywogaeth a Warchodir gan Ewrop a restrir yn Atodiad II o Gyfarwyddeb Cynefinoedd a Rhywogaethau'r UE. Yng Nghymru, mae 153 o boblogaethau ar hyn o bryd, ac mae'r mwyafrif ohonynt yn ne a de-ddwyrain Cymru. Y cadarnle presennol yng Nghymru yw Sir Gaerfyrddin (lle mae brithegion y gors yn byw mewn 98 o sgwariau grid un cilomedr) a Morgannwg sy'n cynnal 75 o sgwariau grid un cilomedr. Mae angen i fetaboblogaethau o frithegion y gors gael rhwydwaith o safleoedd sydd â chysylltiadau da ac sy'n cynnal ardaloedd helaeth o gynefin addas o ansawdd uchel er mwyn sicrhau eu goroesiad i'r hirdymor. Mae gofyn am gynnal asesiadau cyfoes o'r tirweddau lle mae brithegion y gors yn byw er mwyn canfod faint o gynefin *Da* ac mewn *Cyflwr Addas* sy'n bodoli ymhob tirwedd, pa mor dda yw'r cysylltiadau rhwng y darnau hyn o dir, a lle y dylid gwneud ymdrech i wella ansawdd y cynefin er mwyn adeiladu metaboblogaethau cadarn. Bydd hyn yn helpu o safbwynt blaenoriaethu tirweddau ar gyfer gweithrediadau cadwraeth.

Cafodd yr arolwg hwn ei gomisiynu er mwyn mapio cyflwr cynefin brithegion y gors ar gyfer metaboblogaeth gogledd Abertawe a'i rhwydwaith o gynefinoedd cynhaliol o fewn y dirwedd graidd. Cafodd yr arolwg ei gynnal rhwng diwedd mis Medi a diwedd mis Tachwedd 2019. Cafodd addasrwydd y cynefin ei gategoreiddio a'i fapio gan ddilyn dulliau safonol Cyfoeth Naturiol Cymru. Cafodd tir ei ddosbarthu'n chwe chategori yn ôl presenoldeb/helaethrwydd y planhigyn tamaid y cythraul *Succisa pratensis*, y mae'r larfau yn bwydo arno, a glaswellt y gweunydd *Molinia caerulea* (neu laswellt arall sy'n ffurio twmpathau), yn ogystal ag uchder a strwythur llystyfiant. Cafodd dull asesu cyflym (RAM) ei ddilyn lle gwrthodwyd caniatâd, lle nad oedd manylion tirfeddiant ar gael neu lle'r oedd yn amhosib cael mynediad i dir.

O fewn tirwedd ddiffiniedig gogledd Abertawe sydd ag arwynebedd o 2458 hectar, cafodd 403.21 hectar mewn 80 parsel o dir ei arolygu gan gynnwys 8.07 hectar gan ddefnyddio'r dull asesu cyflym. Cafwyd cyfanswm o 33.00 hectar o gynefin *Addas* mewn 43 parsel o dir, gan gynnwys 9.62 hectar o gynefin mewn *Cyflwr Da*. Roedd llawer o'r cynefin *Addas* a oedd yn weddill yn gynefin *Addas* (*Wedi'i Orbori*) (16.17 hectar), ac roedd 2.07 hectar o gynefin â *Photensial (Bras)*, gan roi cyfanswm o 35.07 hectar o gynefin *Addas* ac â *Photensial (Bras)*. Roedd 67.98% o'r holl gynefin *Addas* i'w gael yn SoDdGA Nant y Crimp (59.36%) a SoDdGA Dolydd Penplas (8.62%), sy'n amlygu pwysigrwydd y safleoedd hyn i'r dirwedd. Roedd cyfanswm o wyth hectar ar draws pedwar parsel o dir a allai gael eu hadfer. Mae cyfran uchel iawn (27.43%) o gyfanswm y darnau addas o dir a welwyd yn ystod yr arolwg hwn mewn *Cyflwr Da*. Mae hyn yn bennaf oherwydd y gyfran uchel (8.05 hectar) o fewn SoDdGA Nant y Crimp lle gwelwyd 49 gwe larfaol ym mis Awst 2019.

Er bod cyfanswm (35.07 hectar) y cynefinoedd *Addas* ac â *Photensial (Bras)* ymhell o dan y trothwy o 50 hectar, nid yw ardal y dirwedd wedi'i gwerthuso'n llawn eto. Gwrthodwyd mynediad i 25 hectar o dir a dylid ei fapio ar fyrder. Efallai y bydd ymweliadau pellach yn ystod y cyfnod hedfan neu'r cyfnod gwe larfaol yn canfod safleoedd ychwanegol lle mae brithegion y gors yn byw yn union y tu allan i'r dirwedd glustogi bresennol, gan arwain at dirwedd graidd ehangach (clustog o 1km) neu dirwedd weithiol (clustog o 2km) gyda chynefin *Addas* ychwanegol. Ceir pedwar lleoliad lle mae swm a chyflwr y darnau o gynefin yn awgrymu bod tebygrwydd uchel iddynt gynnal y glöyn byw, ond lle nad oes cofnodion ar gyfer y degawd diwethaf, a dylid eu harolygu er mwyn gweld a yw'n bresennol.

Mae tablau Systemau Gwybodaeth Ddaearyddol wedi'u creu er mwyn dangos lleoliadau'r caeau a gafodd eu harolygu a chategori'r addasrwydd ar gyfer brithegion y gors ar lefel cae cyfan. Lle bo hynny'n bosibl, mae darnau addas o dir hefyd wedi'u mapio ar Systemau Gwybodaeth Ddaearyddol, a darperir nodiadau targed i gyd-fynd â hyn.

Camau gweithredu allweddol sydd eu hangen

1. Sicrhau bod pob SoDdGA sy'n cynnal brithegion y gors, gan gynnwys Nant y Crimp, yn cael ei reoli mewn ffordd ffafriol. Cynnal deialog dda rhwng perchnogion a Cyfoeth Naturiol Cymru. Sicrhau bod monitro'n cael ei gwblhau ac y darperir adborth, cyngor a chymorth.
2. Deialog bellach â thirfeddianwyr er mwyn trefnu mynediad a gwaith asesu'r 50 hectar o dir na chafwyd mynediad iddo yn ystod terfyn amser y prosiect, e.e. Llys Nini a safleoedd 48 a 49. Bydd hyn yn galluogi gwerthusiad mwy cyflawn o'r dirwedd.
3. Ymgymryd ag asesiadau cynefin ar safleoedd a oedd yn cynnal *Molinia* ond a gafodd eu harolygu'n rhy hwyr yn y tymor i asesu presenoldeb *Succisa*, e.e. safle chwech y nodwyd y categori *Potensia* iddo gan ddefnyddio'r dull asesu cyflym.
4. Argymhellir arolygon pellach ar bedwar safle er mwyn cadarnhau presenoldeb oedolion neu weoedd larfaol (a nodwyd yn nata'r Systemau Gwybodaeth Ddaearyddol).
5. Comin Mynydd Lliw – darparu cyngor am bori i'r Commoners' Association (trwy Butterfly Conservation a PONT).
6. Safle 15 Rhos Cadle – lefelau isel o reolaeth y mae'r warchodfa natur leol wedi'i derbyn dros y blynnyddoedd diweddgar, ond mae'n parhau i gynnal clytwraith o gynefin *Addas*. Mae cynefin *Potensia* (*Bras*) angen rheolaeth sy'n fwy dwys
7. Safle 29 – cysylltu â'r tirfeddiannwr er mwyn sicrhau pori â da byw priodol, ac ar ddwysedd priodol. Ar hyn o bryd, mae'r tir yn cael ei bori gan ferlod, a cheir dros 1 hectar o dir sydd *Wedi'i Orbori* yn ddifrifol ac ardaloedd llai o dir sy'n *Addas* (*Wedi'i Danbori*) a *Chyflwr Da*.
8. Safle 64 – mae angen pori'r safle hwn ar fylder er mwyn atal ei golli yn ei gyfarwydd i brysgwydd a choetir eilaidd. Mae angen cysylltu â'r tirfeddiannwr er mwyn cyflawni trefniadau rheoli sy'n fwy ystyriol.

2. Executive summary

The Marsh Fritillary *Euphydryas aurinia* is a European protected species, listed on Annex II of the EU Habitat and Species Directive. In Wales, there are currently 153 populations the majority of which are in south and south-east Wales. The Welsh stronghold county is currently Carmarthenshire (98 occupied 1km grid squares) with Glamorgan supporting 75 1km squares. Marsh Fritillary metapopulations need a network of well-connected sites supporting extensive areas of suitable habitat of good quality to ensure their long-term survival. Contemporary assessments of landscapes occupied by Marsh Fritillary are required urgently to determine how much *Good* and *Suitable Condition* habitat exists within each landscape, how connected these patches are and where efforts should be made to improve habitat quality in order to build robust metapopulations. This will help prioritise landscapes for conservation action.

This survey was commissioned to map Marsh Fritillary habitat condition for the North Swansea metapopulation and its supporting habitat network within the core landscape. The survey was carried out between late September and late November 2019. The suitability of the habitat was categorised and mapped following standard NRW methods. Land was classed into six categories according to the presence/amount of both the larval foodplant Devil's-bit Scabious *Succisa pratensis* and Purple Moor-grass *Molinia caerulea* (or other tussock-forming grasses) as well as vegetation height and structure. A Rapid Assessment Method was used where permission was refused, land ownership details unattainable or land physically impossible to access.

Within the defined 2458ha landscape of North Swansea, 403.21ha in 80 land parcels were surveyed including 8.07ha by the Rapid Assessment Method. A total of 33.00ha of *Suitable* habitat were found in 43 land parcels, including 9.62ha of *Good Condition* habitat. Much of the remaining *Suitable* habitat was *Suitable Overgrazed* (16.17ha), and there was 2.07ha of *Potential Rank* habitat, giving an overall *Suitable* and *Potential Rank* habitat of 35.07ha. 67.98% of all *Suitable* habitat was found on Nant y Crimp SSSI (59.36%) and Penplas Grasslands SSSI (8.62%), highlighting the importance of these sites to the landscape. Four land parcels totalling 8ha were potentially restorable. A very high proportion (27.43%) of total suitable habitat patches found during this survey are in *Good Condition*. This is largely due to the high proportion (8.05ha) within Nant y Crimp SSSI where 49 larval webs had been found in August 2019.

Although the total of *Suitable* and *Potential Rank* (35.07ha) falls well below the 50ha threshold value, the landscape area has yet to be fully evaluated. Access was refused on 25ha of land and these should be mapped as a matter of urgency. Further visits during the flight or larval web periods may find additional sites occupied by Marsh Fritillary just outside the current landscape buffer, resulting in either a wider core landscape (1km buffer) or functional landscape (2km buffer) with additional *Suitable* habitat. There are four localities where the amount and condition of habitat patches suggest a strong likelihood of supporting the butterfly but where no records exist within last decade and these should be surveyed to determine presence.

GIS tables have been produced to show the locations of fields surveyed and the category of suitability for Marsh Fritillary at the whole field level. Where possible, suitable habitat patches have also been mapped onto GIS, with target notes provided.

Key actions required

1. Ensure all SSSI land supporting Marsh Fritillary, including Nant y Crimp, is in favourable management. Maintain good dialogue between owners and NRW; ensure monitoring is undertaken and feedback, advice and support is provided.
2. Further liaison with landowners to arrange access and assessment of the 50 hectares of land which was not accessed during the project timescale e.g. Llys Nini and Sites 48 and 49. This will allow a fuller evaluation of the Landscape.
3. Undertake full Habitat Assessments on sites which supported *Molinia* but were surveyed too late in the season to assess presence of *Succisa* e.g. Site 6, which was identified as having *Potential* using the Rapid Assessment Method.
4. Further surveys are recommended on four sites to confirm presence of adults or larval webs (identified in GIS data).
5. Mynydd Lliw Common – provision of grazing advice to Commoners' Association (through Butterfly Conservation and PONT).
6. Site 15 Cadle Heath – the LNR has received only low levels of management in recent years but still supports a mosaic of *Suitable* habitat. PR habitat requires more intensive management.
7. Site 29 – liaison with landowner to secure grazing with appropriate stock at a suitable density. The land is currently pony-grazed with over 1ha of severely overgrazed land and smaller areas of SU and GC.
8. Site 64 – this site needs urgent grazing to prevent its loss altogether to scrub and secondary woodland. Liaison with the landowner is necessary to achieve a more sympathetic management regime.

3. Introduction

The Marsh Fritillary *Euphydryas aurinia* is classed as Vulnerable in the UK, is included on Annex II of the EU Habitats and Species Directive and is a feature of thirteen Special Areas of Conservation (SAC) in Wales and 37 SSSIs. In the UK, the butterfly has declined by 79% in its distribution between 1976 and 2014 and by 25% in abundance between 1976 and 2016. In Wales, there are currently 153 populations (based on records from the most recent 5-year period, 2014-2018) the majority of which are in south and south-east Wales. The Welsh stronghold county is currently Carmarthenshire (98 occupied 1km grid squares since 2005) with Glamorgan supporting slightly less (75 occupied 1km grid squares since 2005). Brecknockshire has only 8 occupied 1km grid squares since 2005 and Monmouthshire has just two recent sites, both in Caerphilly. Data shows that historically the situation was much better in Glamorgan, with losses in last decade in Bridgend, Cardiff, southern Neath Port Talbot (NPT), Rhondda Cynon Taf (RCT) and the Vale of Glamorgan.

Metapopulation modelling suggests that the Marsh Fritillary requires between 76 and 104ha of suitable habitat within a defined landscape for its long-term survival (Bulman *et al.*, 2007) although the current Natural Resources Wales (NRW) Marsh Fritillary landscape model (Fowles, 2004, 2005) regards 50ha of *Good* and *Suitable Condition* habitat, of which 10ha is in *Good Condition*, within a 2km radius as an appropriate target for achieving Favourable Condition. Bulman *et al.* (2007) suggest that whatever the suitable habitat target area (say 100 hectares), it needs to be at a **minimum density of 6.25% in its landscape area** (100ha within the 1,600ha landscape area cited in that research) for its long-term survival.

Contemporary assessments of landscapes occupied by Marsh Fritillary are required urgently to determine how much *Good* and *Suitable Condition* habitat exists within each landscape, how connected these patches are and where efforts should be made to improve habitat quality and build robust metapopulations. This will help prioritise landscapes for conservation action.

There are currently 38 occupied landscapes in Wales, 14 of which have never been assessed. Some have been assessed only in part and require completion whilst others were surveyed between 2002 and 2009 and should be repeated. This survey was commissioned to map Marsh Fritillary habitat condition for the North Swansea metapopulation (covering 22 1km grid squares, of which 8 were occupied since 2005) which is situated between the huge Mynydd Mawr/Amman Valley and the almost as large Gower Commons metapopulation. From discoveries made in 2018 and 2019, the Mynydd Mawr/Amman Valley is now known to be one combined metapopulation covering 142 1km grid squares, of which 68 were occupied since 2005. The Gower Commons metapopulations covers 40 1km grid squares, of which 19 were occupied since 2005. Both of these easily achieved in excess of the 100ha of *Suitable* habitat each when last assessed during the last decade (Bulman *et al.*, 2007).

This survey was commissioned to map Marsh Fritillary habitat condition for the North Swansea landscape. The area is dissected by the M4 motorway corridor and is under significant pressure from development.

A desk study was carried out to determine the 1km combined radius (of post-1990 records) polygons for the landscape area (22 1km grid squares). Phase 1 habitat

mapping and aerial photographs were then used to identify land parcels believed to support vegetation communities with the potential to support the Marsh Fritillary. Although not directly connected, the polygon around Port Mead/Cadle Heath is included, as it sits between the larger polygon and Gower and is convenient to include in this study and covers a further 4 1km grid squares. The magenta-edged land parcels, shown on map appended to the desk study, are those recommended for field survey and total roughly 350ha.

This report assesses the current condition and management of the North Swansea landscape for Marsh Fritillary and also identifies opportunities to improve the landscape for the butterfly with more sympathetic management.

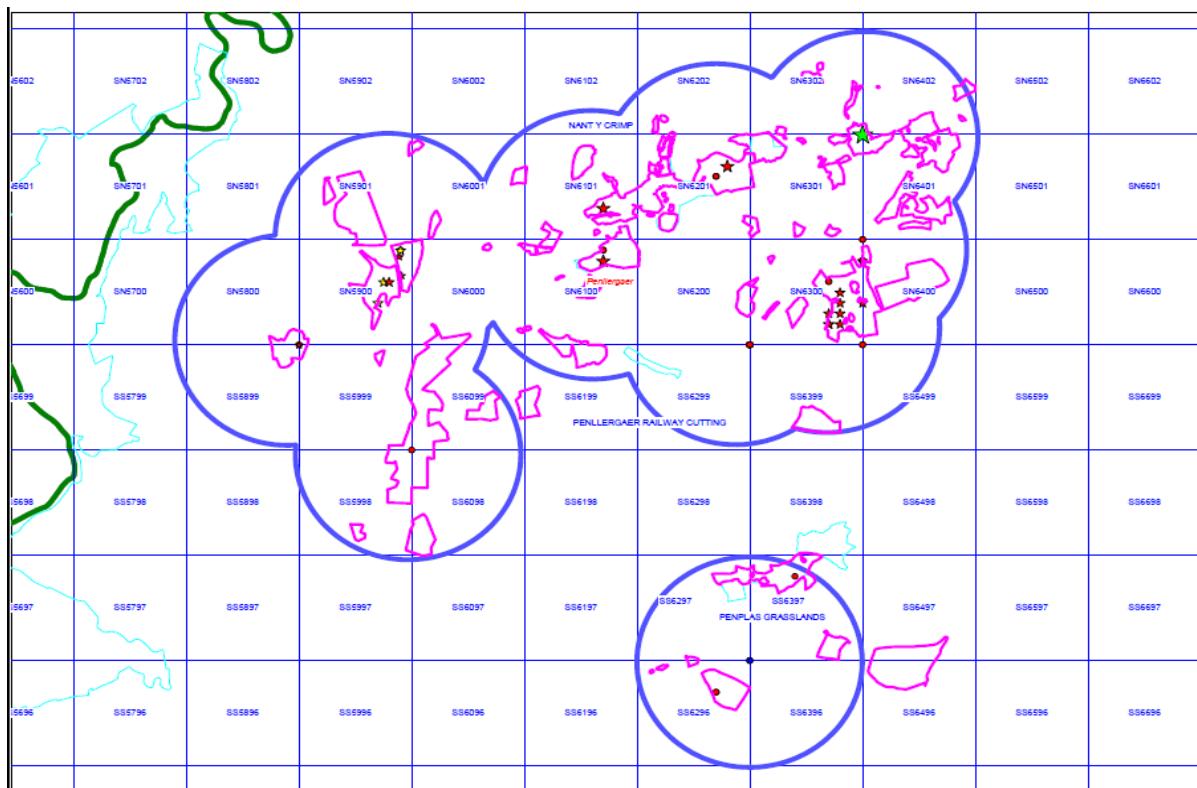


Figure 1. North Swansea landscape area.

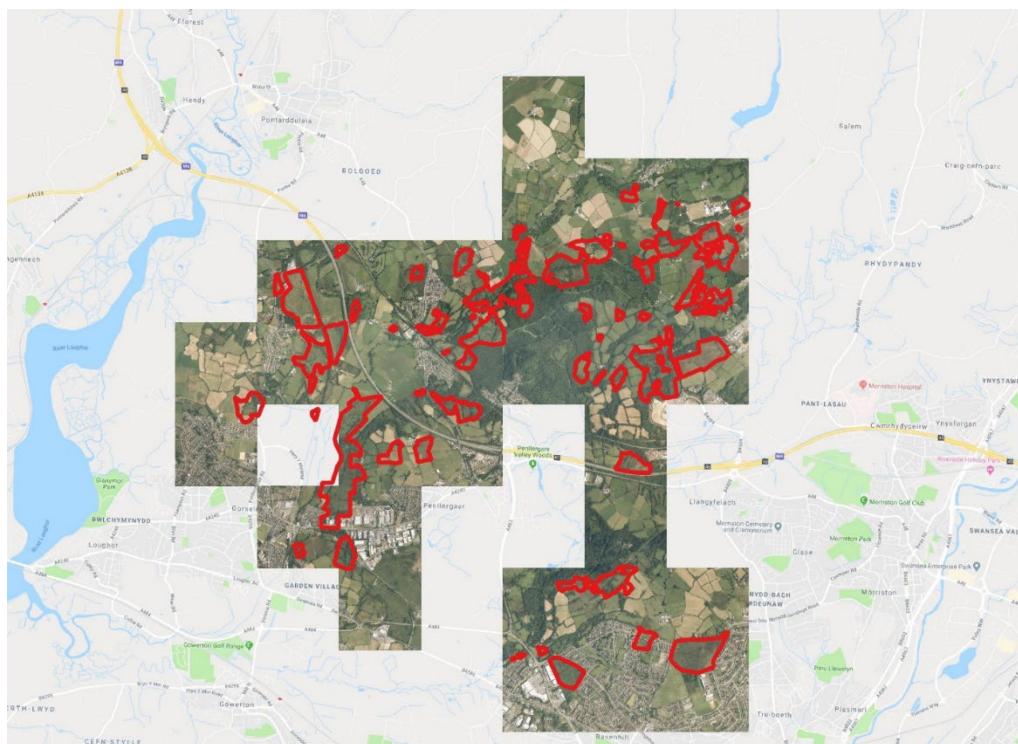


Figure 2. North Swansea landscape area.

4. Methods

NRW supplied Butterfly Conservation with 1:10000 scale OS tiles and aerial mapping (jpeg format) of the target area. These were used to generate field maps and in their subsequent digitisation.

Fieldwork was carried out by Richard Smith and Deborah Sazer between late September and late November 2019. Each land parcel identified for mapping in the desk study was surveyed, if access was consented to and where physically possible. In total, 403.21ha of land was surveyed. This differs from the desk study estimate, as additional land parcels were found on the ground and accessed, but access permission was refused for 21 locations totalling 51.93ha within the parameters and timescale available.

It should be noted that although the specification was essentially based on standard (Fowles, 2005) habitat assessment methodology, the timing of survey period in 2019 precluded the finding of additional Marsh Fritillary populations as the adult flight period and larval visibility season had both already passed.

The suitability of the habitat categorised and mapped following standard NRW methods outlined in Fowles (2005). Land was classed into six categories (Table 1) according to the presence/amount of both the larval food plant Devil's-bit Scabious *Succisa pratensis* and Purple Moor-grass *Molinia caerulea* (or other tussock-forming grasses) as well as vegetation height and structure.

Table 1. Marsh Fritillary habitat quality mapping codes.

Habitat code	Habitat classification
GC	<i>Good Condition</i>
SU	<i>Suitable Undergrazed</i>
SO	<i>Suitable Overgrazed</i>
SS	<i>Suitable Sparse</i>
PR	<i>Potential Rank</i>
NS	<i>Not Suitable</i>
NA	Not Accessed

In cases where permission was refused, land ownership details unattainable or land physically impossible to access, a Rapid Assessment Method was used. This approach is based on viewing sites from locations where the surveyor has legitimate rights of access e.g. roads, public rights of way or adjoining fields (where access permission has already been obtained). Binoculars are used to identify the suitability of the land parcel for Marsh Fritillary and place the land parcel in a broad suitability category (Table 2). This helps gain an estimate for inaccessible land that is likely to support *Suitable* or *Potential* habitat.

Table 2. Marsh Fritillary Rapid Assessment categories.

Category	Description
Contains suitable (CS)	<i>Succisa</i> present, noted either in flower or vegetative growth. This could include overgrazed fields or scrubby fields.
Potential (P)	Fields which contain significant amounts of <i>Molinia</i> but no obvious <i>Succisa</i> (usually rank & neglected). It also includes recently mown fields.
No Access (NA)	Fields not viewable.
NOT suitable (NS)	Fields obviously grazed regularly by sheep (very short, dung and/or bits of fleece in field, on hedges or fences) or improved or complete scrub.

The mapping results have been supplied with this report as a MapInfo GIS file, and illustrated in Appendix 1. Habitat Condition Mapping. Site descriptions for each surveyed/assessed land parcel are included in Appendix 2.

5. Results

The total area of land parcels surveyed using Fowles (2005; where land was accessed) or by Rapid Assessment Method (where land was not accessed) was 403.21ha in 80 management units. Of these, 43 management units were found to contain *Suitable* and *Potential Rank* habitat. Within the larger management units, 436 individual *Suitable* and *Potential Rank* habitat patches were mapped, totalling 35.07ha. The breakdown is shown in Tables 3 and 4.

Table 3. Habitat found at habitat patch level.

Suitable Habitat patch type	No of patches (separate polygons)	Size in hectares
<i>Good Condition</i> (GC)	135	9.62
<i>Suitable Undergrazed</i> (SU)	65	3.41
<i>Suitable Overgrazed</i> (SO)	111	16.17
<i>Suitable Sparse</i> (SS)	90	2.55
Mosaic (of above)	2	1.25
<i>Potential Rank</i> (PR)	33	2.07
Total Suitable habitat patches	436	35.07

Table 4. Land (ha) surveyed and assessed at management unit level.

Status	No. management units	Hectares
Total identified for survey in desk study	-	c.350.00
Surveyed	80	403.21
Of which by Rapid Assessment only	4	8.07
Potential	4	7.72
No Access (not viewable)	20	50.17

Within the defined landscape polygon of 2458ha, based on 1km radius circles of post 1994 Marsh Fritillary records, 403.21ha were assessed and 35.07ha of *Suitable* or *Potential Rank* habitat was identified. The majority of the *Suitable* habitat was *Suitable Overgrazed* at 16.17 ha (46.11%), but 9.62ha was in *Good Condition* (27.43%), with 5.48ha (15.63%) being *Suitable Undergrazed* or *Potential Rank*. 2.55ha was *Suitable Sparse*, with sward height meeting requirements but Devil's-bit Scabious being scattered.

5.1. Nant y Crimp SSSI

Nant y Crimp SSSI (Sites 31, 35, 36, 38, 39, 54 & 75) contained a significant proportion of the total Suitable habitat found (Table 5).

Table 5. Categories of *Suitable* habitat (ha) within Nant y Crimp SSSI (NyC).

Category	Southern	Western	Middle	Eastern	Total
GC	6.284	0.309	1.430	0.023	8.046
SU	0.387	0.093	0.159	Nil	0.639
SO	1.344	3.731	0.724	3.506	9.305
SS	0.250	0.418	0.630	0.300	1.598
PR	0.015	0.354	0.038	Nil	0.407
Total Suitable	8.28	4.905	2.981	3.829	19.995
Total SSSI	12.475	27.952	19.089	5.999	-

The Southern section was mostly that grazed by Glan Lliw Uchaf livestock (cattle & ponies) and two thirds of the section supported *Suitable* habitat and half of the section supported *Good Condition* habitat. There were signs that management work had recently been undertaken and 49 Marsh Fritillary larval webs had been found in a separate visit by Natural Resources Wales and Butterfly Conservation surveyors in August 2019.

The Western section was mostly that grazed by Glan Lliw Uchaf livestock (cattle & ponies) and almost a fifth of the section supported *Suitable* habitat, of which 75%

was *Suitable Overgrazed*. There were signs that management work had recently been undertaken. At least half the section is wooded.

The Middle section was mostly that grazed by Gelli Wern Isaf livestock (cattle) and almost a sixth of the section supported *Suitable* habitat, 50% of which was *Good Condition* habitat. About half the section is wooded.

The Eastern section was mostly that farmed/grazed by Gelli Wern Fawr. It wasn't clear what livestock were used as most fields had recently been topped. Almost two thirds of the section supported *Suitable* habitat, but unfortunately over 90% of the suitable was *Suitable Overgrazed* at time of visit, having just been topped. Despite topping, one larval web was found in the rougher margin, having escaped the topping. Topping had been unnecessarily widespread – Soft Rush *Juncus effusus* was present but Purple Moor-grass *Molinia caerulea* seemed more widespread.

5.2. Penplas Grasslands SSSI

Penplas Grasslands SSSI contained *Suitable* habitat but was heavily over-grazed by cattle/ horses. It contained 2.843ha of *Suitable* habitat, of which 2.816ha was *Suitable Overgrazed* and just 0.027ha was *Good Condition* habitat.

Overall, 65% of all the *Suitable* habitat recorded was contained within Nant y Crimp SSSI and Penplas Grasslands SSSI.

Below is a brief summary of other sites with significant areas of *Suitable* habitat.

5.3. Mynydd Lliw Common (part of) – Site 4 in SN5900

This site supports 1.058ha of *Suitable* habitat, with 0.182ha of *Good Condition* habitat and the rest being *Suitable Undergrazed* or *Potential Rank*, due to under-managed nature of the site. Bramble and scrub are seriously invading but the residual *Suitable* habitat is *Molinia*-dominated. Grazing needs to be facilitated and advice from Butterfly Conservation or PONT should be offered to the Commoners' Association, whose chairman seems interested.

5.4. Close to Gelli-organ – Sites 7, 7/1 & 7/2 in SS6099

Within a 300m radius of Gelli-organ Farm, there are two parts of the common and three enclosed fields which contain 0.404ha of *Suitable* habitat, of which 0.266ha is *Good Condition* and 0.138ha mostly *Suitable Overgrazed*. Two of the fields are grazed by cattle and one by ponies. The common is mostly pony-grazed.

5.5. Llys Nini – Site 8/1

This 3ha site consists of three marshy grassland fields, which used to be pony grazed as part of RSPCA Llys Nini when last visited about three years ago. It contained patches of *Suitable* habitat in each field, mostly in the two southernmost fields, the larger field north of the track being more overgrown and dominated by rush and bramble. As permission was not available in time for this current survey, the site is included as "CS" (Contains Suitable) under Rapid Assessment criteria.

5.6. Between Pontlliw and Nant y Crimp SSSI – Site 29 in SN6100 & SN6101

These five fields (6.2ha) of marshy grassland and woodland lie on the edge of Pontlliw. Most of the grassland is severely overgrazed, with longer latrine &/or rush-dominated patches (only 2 ponies were on site at the time of the survey). They

contain a large amount of *Succisa*, probably more than was observed (on 8/11/19), since the non-flowering rosettes were so tiny. There was 0.18ha of *Good Condition*, 0.26ha of *Suitable Undergrazed*, 1.11ha of *Suitable Overgrazed*, 0.01ha of *Suitable Sparse* and 4.65ha of *Not Suitable* habitat (mostly short, damp or taller, rushy grassland with some woodland).

5.7. Community grazing – Sites 48 & 49 in SN6401

There are several adjoining fields near Waun y Garn-wen which historically came into diverse ownership, mainly as a way of settling debts. There are up to eleven different owners but we were able to trace and get permission to access three fields which contained some *Suitable* habitat. Access is complicated and inevitably involves transit over other fields where owners were not approached. Two of these fields were part of one very large grazing unit, without stockproof internal fencing, with several owners but grazed by cattle by one of those owners. The third (adjoining) field at SN647019 was fenced off and not grazed but had been burnt throughout earlier in the season. Between the three fields, there was 0.1ha of *Good Condition*, 1.307ha of *Suitable Overgrazed* and 0.109ha of *Suitable Sparse* habitat. The *Suitable* patches were in habitat that was heathy, with *Molinia* but not too much rush.

5.8. South of A48

This was an area of marshy grassland underneath pylons and open to the A48 and the common, although it may have been grazed, possibly by a pony, earlier in the year. It contained 0.0466ha of *Good Condition*, 0.082ha of *Suitable Sparse* and 0.0025ha of *Suitable Undergrazed* habitat.

5.9. South of upper Afan Llan – Site 64 in SN6300 & SN6400

This block of land sits adjoining the west side of the public road from Park & Share parking towards Felindre village. It consisted of seven fields originally, many of which are wooded and the internal fencing which now divides the area into a smaller number of grazing units is difficult to follow. Mostly of the grassland is *Molinia*-dominated and mostly very tussocky, with bramble and scrub incursion to a significant degree. There are no signs of recent grazing and the site is becoming rank, scrubby or wooded with the exception only of the field centred at SN638002 and the upper half of the field at SN638007. In total, the block contains 0.366ha of *Good Condition*, 0.657ha of *Suitable Undergrazed* and 1.401ha of *Potential Rank* habitat. The fields adjoining the road are in need of urgent grazing, preferably by cattle or ponies and it is recommended that owners work with Butterfly Conservation, NRW or PONT to achieve a more sympathetic management regime.

5.10. North of upper Afan Llan – Site 58 in SN6301

Consisting of four marshy fields with *Suitable* habitat, unlike the adjacent Site 64, these fields were open to grazing by horses which also appeared to have a free run over several drier fields further west and south. The fields with *Suitable* habitat were very wet, mostly *Molinia*-dominated with patches of wet heath and Hard Rush. Grazing effect was variable depending upon the nature of the ground and distance from adjoining drier fields. In total, they contained 0.064ha of *Good Condition*, 0.007ha of *Suitable Overgrazed*, 0.0025ha of *Suitable Undergrazed* and 0.0025ha of *Suitable Sparse* habitat.

5.11. Cadle Heath – Site 15

This 11.69ha Swansea Council-owned Local Nature Reserve lies on the edge of Swansea. It is ungrazed with little burning, and some management by the Council and volunteers (scrub cutting, bracken rolling, Japanese Knotweed treatment and firebreak cutting). Swansea Community Farm is interested in grazing the southwestern area nearest the farm. 8.91ha are *Not Suitable*, predominantly rank *Molinia* with no *Succisa* and wooded edges. There is 0.24ha of *Good Condition*, 1.07ha of *Mosaic*, 1.42ha of *Suitable Undergrazed* and 0.05ha of *Potential Rank* habitat. By including estimates of habitat from the *Mosaic* field (*Good Condition* = 10%, *Suitable Sparse* = 5%, *Suitable Undergrazed* = 50%, *Potential Rank* = 30% and *Not Suitable* = 5%), the overall totals are approximately 0.35ha of *Good Condition*, 1.95ha of *Suitable Undergrazed*, 0.05ha of *Suitable Sparse*, 0.37ha of *Potential Rank* and 8.96ha of *Not Suitable* habitat. Marsh Fritillary has not been recorded here for many years. Considering the low level of management, there is a good amount of *Suitable* and *Potential Rank* habitat here.

6. Conclusions

Marsh Fritillary metapopulations require a large, well-connected network of sites to maintain their populations, with between 76 and 104ha of *Suitable* habitat within a defined landscape recommended for its long-term survival (Bulman *et al.*, 2007). NRW's landscape model although the current Natural Resources Wales (NRW) Marsh Fritillary landscape model regards 50ha of *Good* and *Suitable Condition* habitat, of which 10ha is in *Good Condition*, within a 2km radius as an appropriate target for achieving Favourable Condition (Fowles, 2004, 2005).

Within the defined 2458ha landscape of North Swansea, 403.21ha in 80 land parcels were surveyed including 8.07ha by the Rapid Assessment Method. A total of 33.00ha of *Suitable* habitat were found in 43 land parcels, including 9.62ha of *Good Condition* habitat. Much of the remaining *Suitable* habitat was *Suitable Overgrazed* (16.17ha), and there was 2.07ha of *Potential Rank* habitat, giving an overall *Suitable* and *Potential Rank* habitat of 35.07ha. 65% of all *Suitable* habitat was found on Nant y Crimp SSSI and Penplas Grasslands SSSI, highlighting the importance of these sites to the landscape. Four land parcels totalling 8ha were potentially restorable.

A very high proportion (27.5%) of total suitable habitat patches found during this survey are in *Good Condition*. This is largely due to the high proportion (7.87ha) within Nant y Crimp SSSI, and the Glan Lliw Uchaf holding in particular, where 49 larval webs were found in a separate visit by NRW and BC surveyors in August 2019.

Although the total of *Suitable* and *Potential Rank* (35.07ha) falls well below the NRW Favourable Condition threshold value, the landscape area has yet to be fully evaluated. There appears to be a high industrial or housing development potential within the landscape which resulted in a high number of access refusals at the time of survey – ten land parcels totalling 25ha. These areas should be mapped as a matter of urgency to determine how much *Suitable* habitat is present, for example, two sites which contained *Suitable* habitat just in excess of 1ha were found where access had not been agreed and therefore cannot be included in this report. Further visits during the flight or larval web periods may find additional sites occupied by Marsh Fritillary just outside the current landscape buffer, resulting in either a wider

core landscape (1km buffer) or functional landscape (2km buffer) with additional *Suitable* habitat.

There are four localities where the amount and condition of habitat patches, together with landowner comments, suggest a strong likelihood of the presence of Marsh Fritillary but where no records exist within last decade. These localities are provided with the GIS data. It is recommended that targeted visits are made during 2020 to record adults or larval webs.

GIS tables have been produced to show the locations of fields surveyed and the category of suitability for Marsh Fritillary at the whole field level. Where possible, suitable habitat patches have also been mapped onto GIS, with target notes provided.

Key actions required

1. Ensure all SSSI land supporting Marsh Fritillary, including Nant y Crimp, is in favourable management. Maintain good dialogue between owners and NRW; ensure monitoring is undertaken and feedback, advice and support is provided.
2. Further liaison with landowners to arrange access and assessment of the 50 hectares of land which was not accessed during the project timescale e.g. Llys Nini and Sites 48 and 49. This will allow a fuller evaluation of the Landscape.
3. Undertake full Habitat Assessments on sites which supported *Molinia* but were surveyed too late in the season to assess presence of *Succisa* e.g. Site 6, which was identified as having *Potential* using the Rapid Assessment Method.
4. Further surveys are recommended on four sites to confirm presence of adults or larval webs (identified in GIS data).
5. Mynydd Lliw Common – provision of grazing advice to Commoners' Association (through Butterfly Conservation and PONT).
6. Site 15 Cadle Heath – the LNR has received only low levels of management in recent years but still supports a mosaic of *Suitable* habitat. PR habitat requires more intensive management.
7. Site 29 – liaison with landowner to secure grazing with appropriate stock at a suitable density. The land is currently pony-grazed with over 1ha of severely over-grazed land and smaller areas of SU and GC.
8. Site 64 – this site needs urgent grazing to prevent its loss altogether to scrub and secondary woodland. Liaison with the landowner is necessary to achieve a more sympathetic management regime.

7. Acknowledgements

Butterfly Conservation thanks the surveyors, Richard Smith and Deborah Sazer for undertaking the landscape assessment and all owners and occupiers for allowing access. Natural Resources Wales provided the funding to undertake the project, with Gareth Bowen helping with access issues and Mike Howe providing comments on the drafting of the report.

8. References

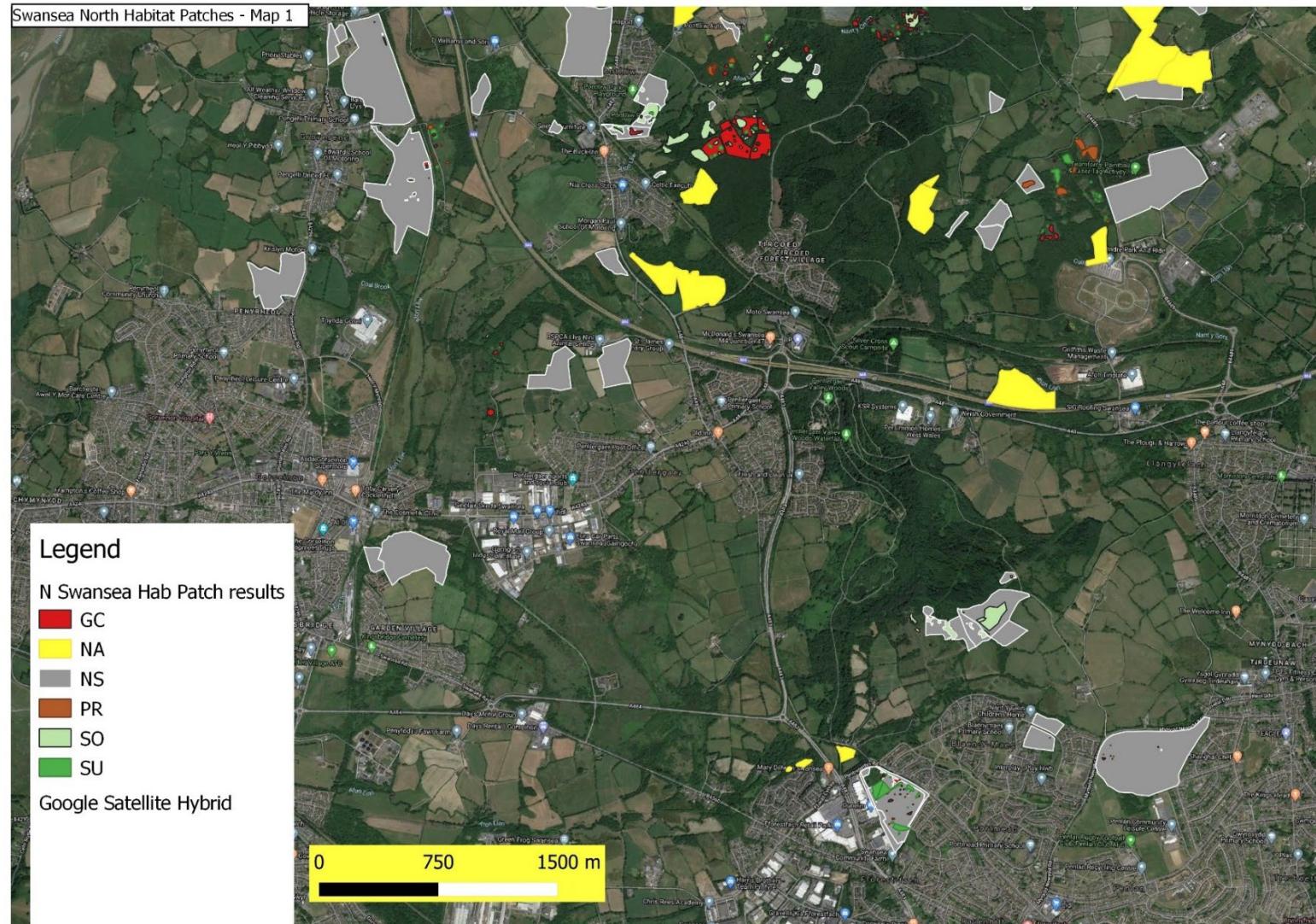
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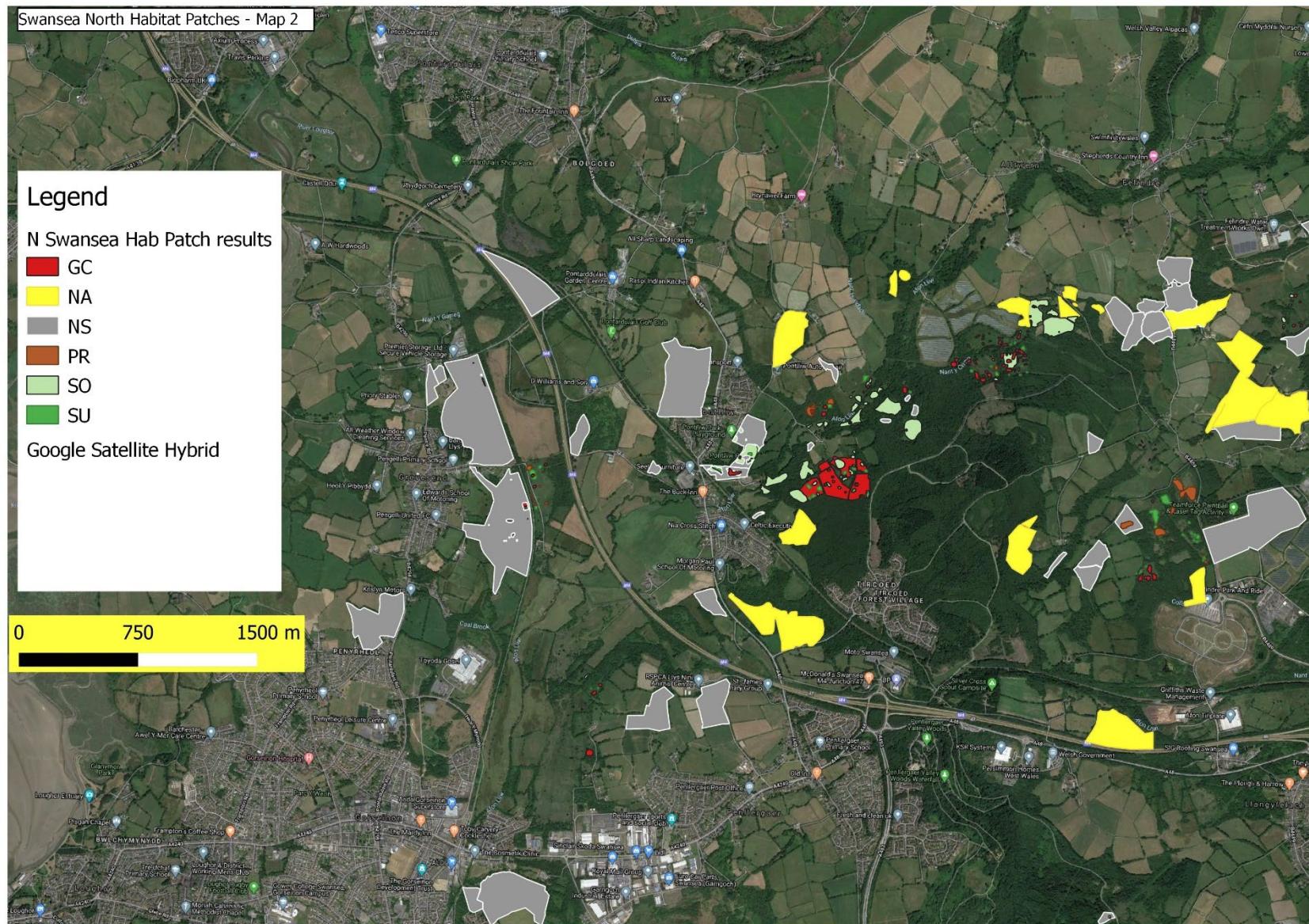
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9. Appendix 1. Habitat condition mapping





10. Appendix 2. Site descriptions

Survey code	Field no.	Description
SW/2019/DS	1	<i>Not Suitable</i> - very short horse-grazed semi-improved grassland
SW/2019/DS	2	Site mainly <i>Not Suitable</i> , neutral to acid grassland with dense <i>Deschampsia cespitosa</i> and small patches of GC, SS and SO.
N Swansea 2019/RS	3	Vast majority of site is <i>Not Suitable</i> , with <i>Molinia</i> dominant in areas, some areas very rank. Numerous dry and small patches of GC with <i>Succisa</i> , SS and undergrazed SO. <i>Succisa</i> sparse at edges of site.
N Swansea 2019/RS	4	Site supports a mix of mainly PR and SU, with small area of SS where track verges have been recently mown and 3 small patches of GC.
SW/2019/DS	5	<i>Not Suitable</i> - unmanaged fields by road 're-wilding' with trees, scrub, bramble.
SW/2019/DS	6	Site supported <i>Molinia</i> , but was surveyed too late in season to see <i>Succisa</i> , so classified using Rapid Assessment Method (RAM) as having Potential.
N Swansea 2019/RS	7	Large site which contained numerous very small SS, SO and SU and patches of <i>Succisa</i> with small patches in GC.
N Swansea 2019/RS	8	<i>Not Suitable</i>
N Swansea 2019/RS	9	<i>Not Suitable</i>
N Swansea 2019/RS	10	<i>Not Suitable</i> – site supports un-grazed areas that have become wooded and sheep-grazed unimproved grassland with <i>Juncus</i> .
N Swansea 2019/RS	11	Site supports a small patch of PR habitat with <i>Succisa</i> present amongst rank <i>Molinia</i> .
N Swansea 2019/RS	12	Penplas Grasslands SSSI. Majority of eastern site is <i>Not Suitable</i> with central patches of SO. Majority of west of site is SO, being overgrazed by cattle/horses, with wet heath and acid grassland. Site also supports 1 patch of GC and a patch identified as Mosaic (around 85% SO and 15% GC).
N Swansea 2019/RS	13	Not Accessed
N Swansea 2019/RS	14	Not Accessed
SW/2019/DS	15	Cadle Heath LNR. Ungrazed with little burning and some management by Council and volunteers, Site is bounded by development to east, south and west and by a road to the north. Majority of south of site is <i>Not Suitable</i> with small patches of SU, some becoming PR. To the north sites supports 10 patches of GC. Marsh Fritillary has not been recorded at this site for many years.
SW/2019/DS	16	<i>Not Suitable</i> – severely overgrazed by horses with bare ground and very small patch of GC.
SW/2019/DS	17	Majority of site (over 20ha) is <i>Not Suitable</i> but supports <i>Molinia</i> , areas of heath and small patches of PR and 4 patches in GC (one of which shows evidence of grazing and burning).
N Swansea 2019/RS	18	<i>Not Suitable</i> although site supports some <i>Molinia</i> .
N Swansea 2019/RS	19	<i>Not Suitable</i>
SW/2019/DS	20	Not accessed
N Swansea 2019/RS	21	<i>Not Suitable</i>
N Swansea 2019/RS	22	Not accessed
N Swansea 2019/RS	23	Not accessed
N Swansea 2019/RS	24	3 patches of SS in small clearings amongst woodland.
N Swansea 2019/RS	25	A patch of SU in a small clearing amongst woodland.
N Swansea 2019/RS	26	A patch of GC and one of SU amongst otherwise <i>Not Suitable</i> habitat which contains dense scrub.

Survey code	Field no.	Description
N Swansea 2019/RS	28	<i>Not Suitable</i> , heavily horse grazed, although site supports some <i>Molinia</i> .
SW/2019/DS	29	Large site which is mostly <i>Not suitable</i> in north and south (very short horse-grazed with longer latrine patches and rush-dominated areas, and wooded areas) with 1 large less grazed patch of GC. Central area is mainly SO (horses) but supports small patch of GC. Site also supports small areas of SU and SS. It is likely that there was more <i>Succisa</i> than observed on day of survey.
N Swansea 2019/RS	30	<i>Not Suitable</i> woodland and 2 small patches of SS within NS field.
N Swansea 2019/RS	31	Site supports a mix of habitat conditions due to levels of grazing resulting in numerous small patches of SU, PR, SO and SS amongst mainly NS. 4 patches of GC are also present. Nant y Crimp SSSI.
N Swansea 2019/RS	33	An area of SO surround by woodland to south and east.
N Swansea 2019/RS	34	<i>Not Suitable</i>
N Swansea 2019/RS	35	<i>Not Suitable</i> woodland and 3 clearings, supporting NS habitat, SS and GC. Nant y Crimp SSSI
N Swansea 2019/RS	36	<i>Not Suitable</i> woodland with 4 clearings, supporting NS habitat, SS, SU and GC. Nant y Crimp SSSI.
N Swansea 2019/RS	38	Large area which is mainly <i>Not Suitable</i> but has numerous small patches with various levels of grazing and structure (including GC, SU, SO, SS and PR). Nant y Crimp SSSI.
N Swansea 2019/RS	39	A series of fields that are mainly SO with evidence of mowing, but also support areas of SS and very small areas of GC. Nant y Crimp SSSI.
N Swansea 2019/RS	39/1 & 39/2	Not accessed
N Swansea 2019/RS	40	Not accessed
N Swansea 2019/RS	41	Not accessed
N Swansea 2019/RS	43	<i>Not Suitable</i> – sheep grazed.
N Swansea 2019/RS	45	<i>Not Suitable</i>
N Swansea 2019/RS	46	<i>Not Suitable</i> . Three fields which are heavily sheep-grazed or secondary woodland with some <i>Molinia</i> .
N Swansea 2019/RS	47	Not accessed. Permission refused.
N Swansea 2019/RS	48	Patches of mainly SO with small area of SS amongst much larger area of NS (contiguous with 49). Part of Community grazing area.
N Swansea 2019/RS	49	Patches of mainly GC and SS amongst much larger area of NS (contiguous with 48). Small area is more grazed SO. Part of community grazing area.
N Swansea 2019/RS	50	<i>Not Suitable</i>
SW/2019/DS	52	Clearing amongst NS woodland, supporting mainly NS habitat with small patch of SU.
N Swansea 2019/RS	53	Not accessed
N Swansea 2019/RS	54	Nant y Crimp SSSI. Site supports significant areas of GC habitat, alongside areas of SO, SU and SS. Only a very small area of PR was identified.
N Swansea 2019/RS	56	Not accessed
N Swansea 2019/RS	57	<i>Not Suitable</i> – sheep grazed and cut.

Survey code	Field no.	Description
		Site consists of 4 marshy fields with areas of GC, SO, SU and SS, open to grazing by horses which also appeared to have a free run over several drier fields further west and south. The fields with <i>Suitable</i> habitat were very wet, mostly <i>Molinia</i> -dominated with patches of wet heath and Hard Rush. Grazing effect was variable depending upon the nature of the ground and distance from adjoining drier fields.
N Swansea 2019/RS	58	
N Swansea 2019/RS	59	Not accessed
N Swansea 2019/RS	60	Not accessed
N Swansea 2019/RS	61	Not accessed
N Swansea 2019/RS	62	Now trees - aerial photo <i>Not Suitable</i> .
N Swansea 2019/RS	63	<i>Not Suitable</i>
		Site is ungrazed and becoming PR and NS scrub and woodland, except for 1 field which still supports GC, SU and PR habitat. Urgent grazing is required to prevent loss altogether. Part of site Not accessed.
N Swansea 2019/RS	64	
N Swansea 2019/RS	65	
N Swansea 2019/RS	65	Not accessed. Permission refused.
N Swansea 2019/RS	66	Not accessed. Permission refused.
N Swansea 2019/RS	67	<i>Not Suitable</i> . Intensive cattle-grazing.
N Swansea 2019/RS	68	<i>Not Suitable</i>
N Swansea 2019/RS	69	Not accessed
N Swansea 2019/RS	70	Not accessed
N Swansea 2019/RS	71	<i>Not Suitable</i> . Some <i>Molinia</i> but sheep-grazed.
N Swansea 2019/RS	72/1	<i>Not Suitable</i>
N Swansea 2019/RS	72	Patches of suitable habitat within larger area of NS. Site supports areas of GC, SU and SS.
SW/2019/DS	73	<i>Not Suitable</i> . Horse-grazed semi-improved grassland.
		Nant y Crimp SSSI. Site supports areas of PR, SS, SO, GC and SU amongst larger areas of NS. Land has been topped and grazed. Web was found in rougher margins, which had not been topped.
N Swansea 2019/RS	75	

11. Data Archive Appendix

The data archive contains:

- [A] The final report in Microsoft Word and Adobe PDF formats.
- [B] Species records, which are held on the NRW Recorder 6 database.
- [C] GIS landscape assessment layer. This will be added to the Master layer which is currently maintained by Butterfly Conservation under grant-aid from Welsh Government.

Metadata for this project is publicly accessible through Natural Resources Wales' Library Catalogue <http://libcat.naturalresources.wales> or <http://catllyfr.cyfoethnaturiol.cymru> by searching 'Dataset Titles'. The metadata is held as record no 124756.