Cyfoeth Naturiol Cymru
Natural Resources Wales

Monitoring the Scaly Cricket *Pseudomogoplistes vicentae* at Dale & South Marloes Coast SSSI in Pembrokeshire in 2020 and a survey for further populations on nearby beaches

Jon Hudson Ecological Consultancy

NRW Evidence Report No. 496

About Natural Resources Wales

Natural Resources Wales is the organisation responsible for the work carried out by the three former organisations, the Countryside Council for Wales, Environment Agency Wales and Forestry Commission Wales. It is also responsible for some functions previously undertaken by Welsh Government.

Our purpose is to ensure that the natural resources of Wales are sustainably maintained, used and enhanced, now and in the future.

We work for the communities of Wales to protect people and their homes as much as possible from environmental incidents like flooding and pollution. We provide opportunities for people to learn, use and benefit from Wales' natural resources.

We work to support Wales' economy by enabling the sustainable use of natural resources to support jobs and enterprise. We help businesses and developers to understand and consider environmental limits when they make important decisions.

We work to maintain and improve the quality of the environment for everyone and we work towards making the environment and our natural resources more resilient to climate change and other pressures.

Evidence at Natural Resources Wales

Natural Resources Wales is an evidence based organisation. We seek to ensure that our strategy, decisions, operations and advice to Welsh Government and others are underpinned by sound and quality-assured evidence. We recognise that it is critically important to have a good understanding of our changing environment.

We will realise this vision by:

- Maintaining and developing the technical specialist skills of our staff;
- Securing our data and information;
- Having a well-resourced proactive programme of evidence work;
- Continuing to review and add to our evidence to ensure it is fit for the challenges facing us; and
- Communicating our evidence in an open and transparent way.

This Evidence Report series serves as a record of work carried out or commissioned by Natural Resources Wales. It also helps us to share and promote use of our evidence by others and develop future collaborations. However, the views and recommendations presented in this report are not necessarily those of NRW and should, therefore, not be attributed to NRW.

Report series: NRW Evidence Report
Report number: 496
Publication date: November 2020
Contract number:
Contractor: Jon Hudson Ecological Consultancy
Contract manager: Mike Howe
Title: **Monitoring the Scaly Cricket *Pseudomogoplistes vicentae* at Dales & South Marloes Coast SSI in Pembrokeshire in 2020 and a survey for further populations on nearby beaches**
Author(s): Jon Hudson Ecological Consultancy
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)

Dr Mike Howe, NRW Lead Specialist Advisor – Invertebrates
Paul Culyer, NRW Senior Officer, Land Management
Chris Lawrence, NRW Senior Officer, Environment Team
Mary Chadwick, PCNPA

Recommended citation for this volume:

Jon Hudson Ecological Consultancy. 2020. Monitoring the Scaly Cricket *Pseudomogoplistes vicentae* at Dale & South Marloes Coast SSSI in Pembrokeshire in 2020 and a survey for further populations on nearby beaches. NRW Evidence Report No: **496**, 23pp. Natural Resources Wales, Bangor.

Contents

1. Crynodeb Gweithredol 1
2. Executive Summary 2
3. Background 3
4. Methods 4
5. Results 5
6. Conservation Objective & Condition Assessment 8
7. Wider Surveys 9
8. Management Recommendations & Threats 10
9. Acknowledgements 11
10. References 12
11. Appendix 1. Maps 14
12. Appendix 2. Photographs 15
13. Data Archive Appendix 23

List of tables

Table 1. Monitoring Plot Grid References 4
Table 2. Habitat condition at all monitoring plots at Marloes Sands and West Dale Bay 6
Table 3. Results of direct searching at Marloes Sands 09/09/2020 & 11/09/2020 7
Table 4. Results of direct searching at West Dale Bay 11/09/2020 8
Table 5. Conservation Objective for Scaly Cricket at Dale & South Marloes Coast SSSI 8
Table 6. Results of wider surveys 10

List of maps

Map 1. Monitoring areas and plots 14
Map 2. Detailed plot location map 14

List of photographs

Photograph 1. Rockfall at Plot MS 1 15
Photograph 2. Plot MS 2 16
Photograph 3. Plots MS 3 & MS 4 (MS 3 foreground, MS 4 distance) 17
Photograph 4. Plot MS 5 17
Photograph 5. Plots MS 6 & MS 7 (MS 6 foreground, MS 7 distance) 18
Photograph 6. Plot MS 8 with small rockfall 19
Photograph 7. Plot MS 9 20
Photograph 8. Plot MS 10 21
Photograph 9. Plot WDB 1 22

1. Crynodeb gweithredol

Yr unig le yng Nghymru y dewch chi o hyd i'r cricsyn cennog (*Pseudomogoplistes vicentae*) yw Safle o Ddiddordeb Gwyddonol Arbennig Arfordir Dale a De Marloes, lle cofnodwyd ei bresenoldeb am y tro cyntaf ym 1999. Fel rhan o brosiect arolygu a monitro yn 2006, sefydlwyd rhaglen Monitro Safonau Cyffredin ar gyfer y boblogaeth o griciaid ar Draeth Marloes, yn seiliedig ar nifer o rywogaethau a chynefinoedd a amrywiai o ran eu nodweddion (Ymgynghoriaeth Ecolegol Jon Hudson, 2007). Defnyddiwyd wyth llain fonitro ac mae'r gwaith monitro presennol yn defnyddio'r un rhai gyda'r un nodweddion, ond newidiwyd y targedau ar gyfer yr Amcanion Cadwraeth i roi gwell adlewyrchiad o'r sefyllfa sydd ohoni. Hefyd, yn ogystal â chadw golwg ar y boblogaeth ar Draeth Marloes (TM), estynnwyd y gwaith i gynnwys y boblogaeth ym Mae Gorllewin Dale (BGD).

Cynhaliwyd gwaith monitro fis Medi 2020 yn y mannau hynny lle gwyddys fod yno Griciaid Cennog ar Draeth Marloes a Bae Gorllewin Dale, ac aethpwyd ati i chwilio â llaw (troi cerrig) a chyfrif faint o griciaid aeddfed a nymffau a welwyd. Estynnodd y gwaith dros oddeutu 2 cilometr ar hyd Traeth Marloes a 0.25 cilometr ym Mae Gorllewin Dale; mae'r ddau'n rhan o SoDdGA Dale a De Marloes. Canfuwyd nad oes yno gynefinoedd addas ond ar hyd tua 262 metr ar Draeth Marloes, a 40 metr ym Mae Gorllewin Dale. Yn 2006, estynnai'r cynefinoedd addas ar hyd tua 600 metr ar Draeth Marloes ac ymddengys fod y cynefinoedd wedi crebachu'n sylweddol yno. Ni wyddys faint o gynefinoedd addas oedd ym Mae Gorllewin Dale yn 2006, gan nad oedd gwaith monitro'n digwydd ar y safle bryd hynny, ac ni ddaethpwyd o hyd i'r boblogaeth ond ar ôl gorffen y rhaglen waith. Cofnodwyd cyfanswm o 287 o Griciaid Cennog aeddfed (gwrywod a benywod) a nymffau yn 2020, sy'n dangos fod poblogaethau'n cenhedlu ar Draeth Marloes ac ym Mae Gorllewin Dale. Serch hynny, ni ddaethpwyd o hyd i'r Cricsyn Cennog ond mewn pedair llain fonitro ar Draeth Marloes, ac nid oedd yno gynefin addas ond mewn chwe llain. Yn ôl yr Amcanion Cadwraeth mae'n ofynnol bod Criciaid Cennog yn byw mewn o leiaf chwe llain a bod yno gynefin addas mewn deg o leiniau ar Draeth Marloes, ac un llain ym Mae Gorllewin Dale. Ar sail hynny, felly, credir bod y Cricsyn Cennog mewn cyflwr anffafriol yn y SoDdGA hwn, gan na fodlonwyd gofynion yr Amcanion Cadwraeth ynghylch cynefinoedd na nodweddion y rhywogaeth.

Gwnaed arolwg ar nifer o draethau eraill gerllaw mewn ymdrech i ganfod i ba raddau'r oedd Criciaid Cennog wedi ymledu'n ehangach yn Sir Benfro. Ymysg y safleoedd hynny roedd Traeth yr Albion, y Gann ac ochr ddwyreiniol Bae Dale, Bae Lindsway, Mill Bay, Bae Watwick, Traeth Musselwick, Sandy Haven, Butts Bay a Sleeping Bay. Prin iawn oedd y cynefinoedd addas a ganfuwyd ar y safleoedd hynny, ac ni ddaethpwyd o hyd i unrhyw boblogaethau eraill o'r cricsyn cennog.

2. Executive summary

The Scaly Cricket *Pseudomogoplistes vicentae* is found in Wales only within Dale & South Marloes Coast SSSI where it was first recorded in 1999. A survey and monitoring project undertaken in 2006 established a Common Standards Monitoring (CSM) programme for the cricket population on Marloes Sands using a number of species and habitat attributes (Jon Hudson Ecological Consultancy, 2007). Eight monitoring plots were used and the same monitoring plots and attributes are used in the present monitoring although changes have been made to the Conservation Objective targets to better reflect the current situation. Furthermore, as well as monitoring the population at Marloes Sands (MS), monitoring has been extended to include the population at West Dale Bay (WDB).

Monitoring in September 2020 took place at the known sites for Scaly Cricket on Marloes Sands and West Dale Bay and involved hand searching (stone turning) and counting the numbers of adults and nymphs seen. Monitoring covered approximately 2.0km of Marloes Sands and 0.25km of West Dale Bay, both in the Dale and South Marloes Coast SSSI. This work found that suitable habitat exists along approximately just 262 metres at Marloes Sands and 40 metres at West Dale Bay. In 2006, suitable habitat extended along approximately 600 metres of Marloes Sands and there appears to have been a serious reduction in the amount of suitable habitat here. The extent of suitable habitat at West Dale Bay at that time is unknown as the site was not monitored, the population there being discovered after the monitoring programme was complete. A total of 287 adults (male and female) and nymphs of Scaly Cricket was recorded in 2020, indicating that breeding populations exist at both Marloes Sands and West Dale Bay. However, Scaly Cricket was found at just four monitoring plots at Marloes Sands and suitable habitat was present in just six plots. The Conservation Objective requires Scaly Cricket to be present in at least six plots and suitable habitat to be present in ten plots at Marloes Sands and 1 plot at West Dale Bay. The Scaly Cricket is therefore considered to be in unfavourable condition on the SSSI as neither the habitat nor the species attributes set out in the Conservation Objective were met.

A survey of a number of other nearby beaches was also undertaken in an to attempt to discover the wider distribution of the Scaly Cricket in Pembrokeshire. Sites included Albion Sands, The Gann and the east side of Dale Bay, Lindsway Bay, Mill Bay, Watick Bay, Musselwick Sands, Sandy Haven, Butts Bay and Sleeping Bay. Very little suitable habitat was found at any of these and no further populations of the cricket were found.

3. Background

The Scaly Cricket or Atlantic Beach-cricket *Pseudomogoplistes vicentae* (8-13mm) is associated with strandlines on exposed coastal shingle around the Atlantic coastline of Spain, Portugal and Morocco, Brittany and Normandy in northern France, the Channel Islands of Sark and Guernsey, the Habibas Islands, Madeira and the Canary Islands (Bellmann & Luquet, 2017; Haes & Harding, 1997; Marshall & Haes, 1988; Vahed, 2020). Adults are completely wingless and are found mostly from August to October. The cricket has a two-year life cycle, with eggs laid in autumn and over-wintering, and the resulting nymphs over-wintering for a second year and reaching maturity the following summer (Vahed, 2020). Female preferentially lay eggs on driftwood (Vahed, 2020). Adults may also over-winter. Both adults and nymphs live amongst the shingle and stones during the day, emerging at dusk to scavenge on animal and vegetable matter on the strandline and shore.

The Scaly Cricket was found originally in the UK near Portland in Dorset at the eastern end of Chesil Fleet in 1940, with the first record from Chesil itself in 1949 (Sutton, 1999). The population is associated with an 18-mile-long shingle bar and is thought to be one of the largest in the world, numbering in the thousands, and is able to survive occasional flooding and erosion events (Sutton, 2015). It was subsequently found at Branscombe in south Devon in 1987, a shingle beach under cliffs.

The cricket was first recorded in Wales in August 1999 on the shingle beach at Marloes Sands in Pembrokeshire and again in August 2000 (Sutton, 2003) and, as a consequence, it was added as a Qualifying feature of Dale & South Marloes Coast SSSI. Since then, it has been found periodically in reasonable numbers (Jon Hudson Ecological Consultancy, 2007) and the population survived the 2013-14 winter storms (Duigan *et al*., 2014; Vahed, 2017). Smaller populations have also been located in shingle habitat in West Dale Bay on the adjacent Dale Peninsula (Vahed, 2017). A Countryside Council for Wales-funded survey of Marloes Sands in autumn 2006 found that suitable habitat was restricted to only 600 metres of beach but that the Scaly Cricket was present throughout much of this area, with 581 adults and nymphs recorded (Jon Hudson Ecological Consultancy, 2007). The Conservation Objective developed at that time has been updated (Table 5) to take account of the newly discovered population at West Dale Bay (WDB). Intensive studies between 2013 and 2016 by Karim Vahed highlighted the loss of shingle habitat over a large section of its former range following winter storms in 2015-16, with the main population restricted to just 200 metres of suitable habitat although the number of crickets recorded was comparable to 2007 numbers (Vahed, 2017, 2020). The habitat attribute targets in the Conservation Objective have been updated in the light of concerns regarding the loss of suitable habitat at Marloes Sands.

Females are known to oviposit in driftwood which may allow the cricket to ‘raft’ to neighbouring areas of suitable habitat. This observation and the elusive nature of the cricket suggests that there may be additional, overlooked populations in Wales. Despite the cricket being well adapted to its shifting habitat, it remains vulnerable to shingle loss as a consequence of winter storms. Climate change and concomitant sea level rises pose a significant long-term threat, with backing cliffs preventing the migration of the shingle beaches inland. The removal of driftwood during beach cleaning operations or its use for barbeques and bonfires are also a threat.

4. Methods

Both direct hand searches and pitfall trapping were trialled during the initial survey in 2006. There were a number of disadvantages associated with pitfall trapping whereas hand searching proved to be a simple method that adequately revealed the presence of Scaly Cricket. Only direct hand searching was used during the present monitoring projec., on 09/09/20 and 11/09/20 within 2 hours either side of low tide. The weather on both occasions was warm for the time of year. The hand searching and habitat assessment methods are described below.

4.1. Monitoring plots

Area 1, which contains at least eight montoring plots, is the core area of suitable Scaly Cricket habitat on the beach at Marloes Sands. During the monitoring, all Scaly Cricket records came from within this area. The monitoring plots are marked on Map 1 in Appendix 1 and their Grid References given in Table 1 below. Photographs of the plots are provided in Appendix 2. The plots are not of a defined size or shape. Rather, an area of suitable shingle around each monitoring plot grid reference is searched for 30 minutes. Each plot should first be assessed against the habitat attributes to ensure that it contains suitable habitat. If any plots are found to no longer contain suitable habitat, then adjacent areas should be checked for the presence of suitable habitat. If these new areas are found to contain suitable habitat, population monitoring should take place here instead.

Given the current understanding of the distribution of Scaly Cricket in the Dale & South Marloes Coast SSSI, monitoring should focus on eight plots in Area 1 and 1 plot at West Dale Bay (see Map 2 in Appendix 1). However, if the Conservation Objective is not achieved here then Area 2 at Marloes should also be investigated. Currently, two potential monitoring plots have been identified here (see Map 1 in Appendix 1). Area 3 does not contain suitable habitat at present (and did not in 2006) and hence sampling plots have not been identified here. However, if the Conservation Objective targets are not met in Areas 1 & 2 then Area 3 (see Map 1 in Appendix 1) should be checked to see if any new habitat has developed. If so, plots should be identified and monitored as above. However, it is considered unlikely that new suitable habitat will develop in Area 3 in the future as it appears to be actively eroding and losing shingle.

Table 1. Monitoring plot grid references. MS = Marloes Sands.

Monitoring plot	Grid ref.
MS area 1, plot 1	SM 78229 07590
MS area 1, plot 2	SM 78288 07551
MS area 1, plot 3	SM 78382 07509
MS area 1, plot 4	SM 78428 07461
MS area 1, plot 5	SM 78575 07397
MS area 1, plot 6	SM 78627 07345
MS area 1, plot 7	SM 78723 07294
MS area 1, plot 8	SM 78748 07276
MS area 1, plot 9	SM 78166 07596
MS area 1, plot 10	SM 78069 07660
MS area 2, plot 1	SM 77614 07755
MS area 2, plot 2	SM 77268 07596
West Dale Bay, plot 1	SM 79902 05932

4.2. Habitat assessment

In 2006, the monitoring plots were sampled and a number of characteristics of the habitat measured to allow an assessment to be made of those elements that distinguish suitable

habitat from unsuitable habitat. Characteristics measured or visually assessed included; shingle size, percentage cover of shingle in the 50-100mm width range, shingle depth, the presence or absence of decaying organic matter, whether the plot was above the level of all normal tides, and distance from the cliff face. Suitable habitat is thus defined as being "*Composed of beach shingle deposited during storm events above the height of all normal tides. This is recognisable in the field by the fact that such deposits lie adjacent to cliff faces that are not wave-smoothed by the erosive actions of normal high tides. Such cliffs are identified as being composed, at their bases, of either rough, creviced rock or else they are coastal slopes where angular fragments of loose earth and/or stone are present. Such deposits are composed predominately of pebbles/cobbles between 50 and 100mm width, occurring in multiple layers, providing a complex of interstices*". See Jon Hudson Ecological Consultancy (2007) for a more detailed discussion of the habitat attributes and their assessment.

4.3. Direct searching

Within areas of suitable habitat, very large pebbles (width 33-64mm) and cobbles (width 64-256mm) were swiftly removed or lifted by one edge. Scaly Cricket was often seen at this point rapidly dispersing from the area beneath the stone. Some individuals may leave the immediate vicinity of the disturbed stone, hopping or running to other adjacent stones whilst others "bury" down among the pebbles beneath the lifted stone. Careful removal of large pebbles (width 17-32mm), very large pebbles, and any cobbles beneath the lifted stone, to a depth of around 10cm, often reveals further individuals. As long as each stone selected for searching is around 20-30cm away from any previously searched stone it is unlikely that the same individual will be counted twice. When disturbed, Scaly Cricket generally does not disperse very far in daylight. A short dash to the nearest available dark crevice is the usual escape method. Where the upper layers of the beach deposits have become dry these may need to be removed and the above search methods applied to the newly exposed, damper layers. Within each monitoring plot, searching continues for thirty minutes. Search effort is most productive when concentrated along the shingle/cliff base edge, within 4m of the cliff base.

5. Results

5.1. Habitat results

Marloes beach is approximately 2.4km long but monitoring in 2020 indicated that the Scaly Cricket population is now restricted to areas of suitable habitat that extend for approximately 262m along Marloes beach and 40m along West Dale Bay. In 2006, suitable habitat was noted as occurring along approximately 600m of Marloes Sands (Jon Hudson Ecological Consultancy, 2007) but its extent at West Dale Bay at that time is unknown. Furthermore, the Conservation Objective requires there to be suitable habitat in at least 10 monitoring plots. In 2020, suitable habitat was found in just six plots. Therefore, there appears to have been a reduction in the extent and distribution of suitable habitat at Marloes Sands.

The actual amount of suitable habitat recorded in 2020 is approximately:

- 262 metres along Area 1 on Marloes Sands (MS)
- 40 metres along the north-western side of West Dale Bay (WDB)

These are very small amounts of suitable habitat and at Marloes Sands the amount of suitable habitat has reduced by as much as 56% since 2006. This seems likely to be a permanent loss which was first recorded in Professor Karim Vahid between 2013 and 2016 and has not recovered since that time. Table 2 below summarises the habitat condition at all monitoring plots at Marloes Sands and West Dale Bay.

Table 2. Habitat condition at all monitoring plots at Marloes Sands and West Dale Bay.

Sample no.	Grid ref.	Suitable habitat present?	Comments
MS plot 1	SM 78229 07590	Yes	Rock fall obscures part of the plot area.
MS plot 2	SM 78288 07551	Yes	Shingle has been tide scoured and some carried away. Forms a relatively thin layer
MS plot 3	SM 78382 07509	Yes	Raised thick bed of pebbles and cobbles
MS plot 4	SM 78428 07461	No	Shingle mostly washed away with just a thin layer over sand
MS plot 5	SM 78575 07397	No	Shingle mostly washed away with just a thin layer over sand
MS plot 6	SM 78627 07345	No	The “Raised shingle bank” noted in 2006 is no longer present and the tides appear to regularly reach to base of cliffs. Shingle mostly washed away with just a thin layer over sand
MS plot 7	SM 78723 07294	No	The “Raised shingle bank” noted in 2006 is no longer present and the tides appear to regularly reach to base of cliffs. Shingle mostly washed away with just a thin layer over sand
MS plot 8	SM 78748 07276	No	The “Raised shingle bank” noted in 2006 is no longer present and the tides appear to regularly reach to base of cliffs. Shingle mostly washed away with just a thin layer over sand
MS plot 9	SM 78166 07596	Yes	Mostly finer grade shingle.
MS plot 10	SM 78069 07660	Yes	Small amount of suitable habitat, mostly a single layer of shingle over fine grit.
WDB plot 1	SM 79902 05932	Yes	Small area of suitable, mostly sub-optimal

5.2. Species results

At Marloes Sands, searches took place for 30 minutes around 10 monitoring plots. Initially, eight monitoring plots (Plots 1 - 8) had been selected for searching but a further two plots (Plots 9 & 10) were searched when it became clear that Plots 4 - 8 were no longer suitable habitat and no Scaly Crickets ad been seen in these four plots. See Maps 1 & 2 in Appendix 1 for the monitoring plot locations.

At West Dale Bay, a search took place for 30 minutes around 1 monitoring plot. Only a single plot was identified here due to the small amount of suitable habitat present. The remainder of the beach was searched but no Scaly Cricket was seen outside of Plot 1.

At Marloes Sands, Scaly Cricket was found at just four monitoring plots (Plots 1, 2, 3 & 9). Plots 4, 5,6, 7, 8 & 10 produced none. The habitat in these plots was largely unsuitable except in Plot 10. Where Scaly Cricket was found, the counts exceeded the Conservation Objective targets and were within the typical range of previous counts (Jon Hudson Ecological Consultancy, 2007; Vahed, 2017). However, as noted above, the number of plots supporting Scaly Cricket was less than that required in the Conservation Objective. Tables 3 and 4 below show the numbers of Scaly Cricket found during monitoring.

Table 3. Results of direct searching at Marloes Sands 09/09/2020 & 11/09/2020. Ad m = adult male. Ad f = adult female. Nymph = all non-adult instars of either sex.

Plot no.	Grid ref.	Search time	No. ad M	No. ad F	No. nymphs	Plot total
MS plot 1	SM 78229 07590	30 min	41	45	48	**134**
MS plot 2	SM 78288 07551	30 min	20	38	11	**69**
MS plot 3	SM 78382 07509	30 min	13	25	17	**55**
MS plot 4	SM 78428 07461	30 min	0	0	0	**0**
MS plot 5	SM 78575 07397	30 min	0	0	0	**0**
MS plot 6	SM 78627 07345	30 min	0	0	0	**0**
MS plot 7	SM 78723 07294	30 min	0	0	0	**0**
MS plot 8	SM 78748 07276	30 min	0	0	0	**0**
MS plot 9	SM 78166 07596	30 min	2	3	5	**10**
MS plot 10	SM 78069 07660	30 min	0	0	0	**0**
Totals	-	-	**76**	**111**	**81**	**268**

Table 4. Results of direct searching at West Dale Bay 11/09/2020. Ad m = adult male. Ad f = adult female. Nymph = all non-adult instars of either sex.

Plot no.	Grid ref.	Search time	No. ad M	No. ad F	No. nymphs	Plot total
WDB plot 1	SM 79902 05932	30 min	4	7	8	**19**

6. Conservation objective & condition assessment

Table 5. Conservation objective for Scaly Cricket at Dale & South Marloes Coast SSSI. Adapted from Jon Hudson Ecological Consultancy (2007).

Conservation objective (for when the feature is in favourable condition)	To maintain the Scaly Cricket *(Pseudomogoplistes vicentae)* on Dale & South Marloes Coast SSSI in favourable condition where:
Lower limit	In one year in six, within 30 minutes of searching at each monitoring plot, 50 Individuals are found in each of 6 of the monitoring plots in Area 1 at Marloes Sands. AND In one year in six, within 30 minutes of searching at each monitoring plot, 50 Individuals are found at least 1 monitoring plot at West Dale Bay.
Habitat extent Lower limit	At Marloes Sands, at least 10 monitoring plots must contain suitable habitat and suitable habitat should extend for at least 500 metres along the beach in Area 1. AND At West Dale Bay, suitable habitat should extend for at least 60 metres along the beach.
Definition of suitable habitat	Suitable habitat is composed of beach shingle deposited during storm events above the height of all normal tides. This is recognisable in the field by the fact that such deposits lie adjacent to cliff faces that are not wave-smoothed by the erosive actions of normal high tides. Such cliffs are identified as being composed, at their bases, of either rough, creviced rock or else they are coastal slopes where angular fragments of loose earth and/or stone are present. Such deposits are composed predominately of pebbles/cobbles between 50 and 100mm width, occurring in multiple layers, providing a complex of interstices.

6.1. Rationale for targets

The population attributes are based upon the results of hand searches undertaken during the 2006 survey. During that survey, at least 10 Scaly Crickets were found at each of 8 plots within thirty minutes of searching. Based on these results, the expectation of finding at least 10 crickets within 30 minutes of searching seemed reasonable.

A target was set for the population attributes to be favourable when at least 10 individuals were found at each of at least 6 plots within thirty minutes of searching at each plot. The species attribute targets were set below the levels found in the 2006 survey to allow for the fact that it was thought that detection rates might vary enormously with weather, tides and storms and to allow for the clumped nature of the species distribution. However, since that time counts made by Vahid (2017) and counts during the present round of monitoring suggest that this figure should be raised significantly. Areas of suitable habitat might be expected to turn up anywhere from 30 to over 100 individuals in 30 minutes of searching. A revised target of at least 50 Scaly Crickets at each monitoring plot may be more appropriate and has been adopted during this monitoring project.

For the habitat attributes to achieve favourable condition, at Marloes Sands a target was set in 2006 for at least 10 monitoring plots to contain suitable habitat. Due to the serious concerns regarding habitat loss in the SSSI, a revised target that suitable habitat must extend for at least 500 metres along the beach in Area 1 at Marloes Sands and for at least 60 metres along the beach at West Dale Bay may be more appropriate and has been adopted during this monitoring project. The habitat attribute target is set above the level found during the present monitoring project as the feature is in unfavourable condition due primarily to loss of suitable habitat. It was felt that the lack of suitable habitat was the primary cause for the failure of the Scaly Cricket feature at Dale & South Marloes Coast SSSI.

6.2. Condition assessment

The habitat targets were not met at Marloes Sands or at West Dale Bay. The species targets were also not met at either site. The Scaly Cricket at Dale & South Marloes Coast SSSI is therefore considered to be in **Unfavourable Condition** in 2020 as neither the habitat nor the species attributes set out in the Conservation Objective were met during the present monitoring project.

7. Wider surveys

Wider searches to determine the presence of Scaly Cricket in other potentially suitable localities within approximately 6.5km of the populations at Marloes Sands and West Dale Bay were undertaken at Albion Sands, The Gann and the east side of Dale Bay, Lindsway Bay, Mill Bay, Watick Bay, Musselwick Sands, Sandy Haven, Butts Bay and Sleeping Bay. Very little suitable habitat was found at any of these sites and no further populations of the cricket were dicovered. The results of this survey are summarised in Table 6 below.

Table 6. Results of wider surveys.

Site name	Grid reference	Scaly crickets present?	Suitable habitat present?
Albion Sands	SM77010766	No	No: Suitable shingle deposits but the sea reaches to cliff base (wave-smoothed cliff base)
The Gann and the east side of Dale Bay	SM81440698	No	No: Thin layer of shingle over sand
Lindsway Bay	SM84240662	No	No: Thin layer of shingle over sand
Mill Bay	SM80940344	No	No: Thin layer of shingle over sand
Watick Bay	SM81660400	No	No: No shingle
Musselwick Sands	SM78500886	No	No: No shingle
Sandy Haven	SM86280697	No	Some small areas
Butts Bay	SM85250652	No	No. Thin layer of shingle over sand
Sleeping Bay	SM85480681	No	No. Thin layer of shingle over sand

Clearly, there is insufficient suitable habitat available on any of the beaches close to the occupied sites at Marloes Sands and West Dale Bay to support further Scaly Cricket populations. Given the rarity and vulnerability of the Marloes Sands and West Dale Bay populations, it is recommended that the search for the cricket is extended more widely in Pembrokeshire. Suitable shingle ridges occur at Caldey Island, Tenby South Beach, Marros

Sands, Manorbier and Freshwater West and these should be surveyed as a matter of urgency. The large shingle ridge at Newgale Sands has been casually searched by the author on numerous occasions and does not appear to support a Scaly Cricket population.

8. Threats and management recommendations

Sampling and research have shown that the British populations of Scaly Cricket are fairly widespread and relatively large. These populations appear to be of international significance as the species is considered to be an international rarity. There are perhaps few management measures that can be applied to a species inhabiting such mobile and dynamic habitats. Sea-level rise and increased storminess brought about by global warming and climate change are likely to further reduce the amount of suitable habitat present at both Marloes Sands and West Dale Bay, leading to a depletion of shingle deposits or narrowing of the supralittoral zone. These are the most significant threats to the species here. There seems little that can be done to manage these types of threats. Changes in sediment supply from off-shore dredging could also change beach sediment supply and composition and reduce the amount of suitable habitat. Marine pollution could also adversely affect the populations.

Human disturbance (in the form of trampling and the collection of driftwood) is a factor that could also have negative impacts. Indeed, at Marloes Sands and West Dale Bay, the remains of fires are commonplace on the high shingle areas favoured by Scaly Cricket. These impacts are likely to become more damaging as the Scaly Cricket population at Marloes Sands is becoming restricted the more popular north-western end of the beach where these impacts are concentrated. By late summer/early autumn, the beach has very little left in the way of small pieces of driftwood (most having been collected for fires or driftwood art). However, large driftwood pieces are generally unaffected and remain reasonably commonplace.

Although there does not appear to have been any decline of the species in Great Britain, Scaly Cricket is currently known from just four localities making it a species vulnerable to extinction. There are few recommendations that can be practically enacted in order to help maintain and conserve the populations at Marloes and and West Dale Bay. Sea-level rise and increased storminess are the biggest threats to these populations and there appears to be little that can be done to ameliorate these pressures. There are no opportunities for managed re-alignment or other interventions such as beach replenishment at either site due to the high cliffs that back these beaches. However, it may be useful to consider the following options:

1. Place information boards at both sites to inform the public of the presence of Scaly Cricket and the effects that driftwood collection may have on the populations.

2. Inform local organisations about the populations and the potential for beach cleans to reduce feeding opportunities through disturbance and removal of strand line debris.

3. Monitor the amount of suitable shingle habitat at both sites and consider translocation if the suitable habitat is further reduced.

9. Acknowledgements

The author would like to thank the following people for help with several aspects of this project: Mike Howe of NRW and Dr Karim Vahed, Professor of Entomology at the University of Derby; Jo-Anne Jones for assistance with the fieldwork.

10. References

Anon. 2001. Rare species: Scaly cricket *Pseudomogoplistes vicentae. Orthoptera Recording Scheme Newsletter*. **27**: 2.

Bellmann, H. 1988. *A Field Guide to the Grasshoppers and Crickets of Britain and Northern Europe*. Collins, London.

Bellmann, H. & Luquet, G. 2017. *Sauterelles, grillons et criquets d'Europe occidentale*. Guide Delachaux.

Benton, T., 2012. *Grasshoppers and Crickets*. Collins New Naturalist Volume **120**.

Duigan, C.A., Rimington, N.A. & Howe, M.A. 2014. Welsh Coastal Storms, December 2013 & January 2014 – an assessment of environmental change. NRW Evidence Report No. **33**. Natural Resources Wales, Bangor.

Haes, E.C.M. & Harding, P.T. 1997. *Atlas of Grasshoppers, Crickets and Allied Insects in Britain and Ireland*. NERC & Centre for Hydrology.

Halstead, A.J. 2003. 2002 annual exhibition: Orthoptera (Wilson, M.R.). *British Journal of Entomology and Natural History*. **16**: 189.

Howe, M.A. 2020. Species Account – Scaly Cricket *Pseudomogoplistes vicentae*. NRW unpublished account. Natural Resources Wales, Bangor.

Jon Hudson Ecological Consultancy. 2007. Monitoring invertebrate features on SSSIs: scaly cricket (*Pseudomogolistes vicentae*) on Marloes Coast, Pembrokeshire. CCW Contract Science Report No. **766**. Countryside Council for Wales, Bangor.

Kirby, P. 1995. *Lyme Bay Environmental Study: Volume **13** (Terrestrial Ecology: Invertebrates of Chesil Beach).* Ambios Environmental Consultants Ltd. report for Kerr-McGee Oil PLC, London.

Marshall, J.A. & Haes, E.C.M. 1988. *Grasshoppers and Allied Insects of Great Britain and Ireland*. Harley Books, Colchester.

Sutton, P. 1999. The scaly cricket in Britain - a complete history from discovery to citizenship. *British Wildlife.* **10**: 145-151.

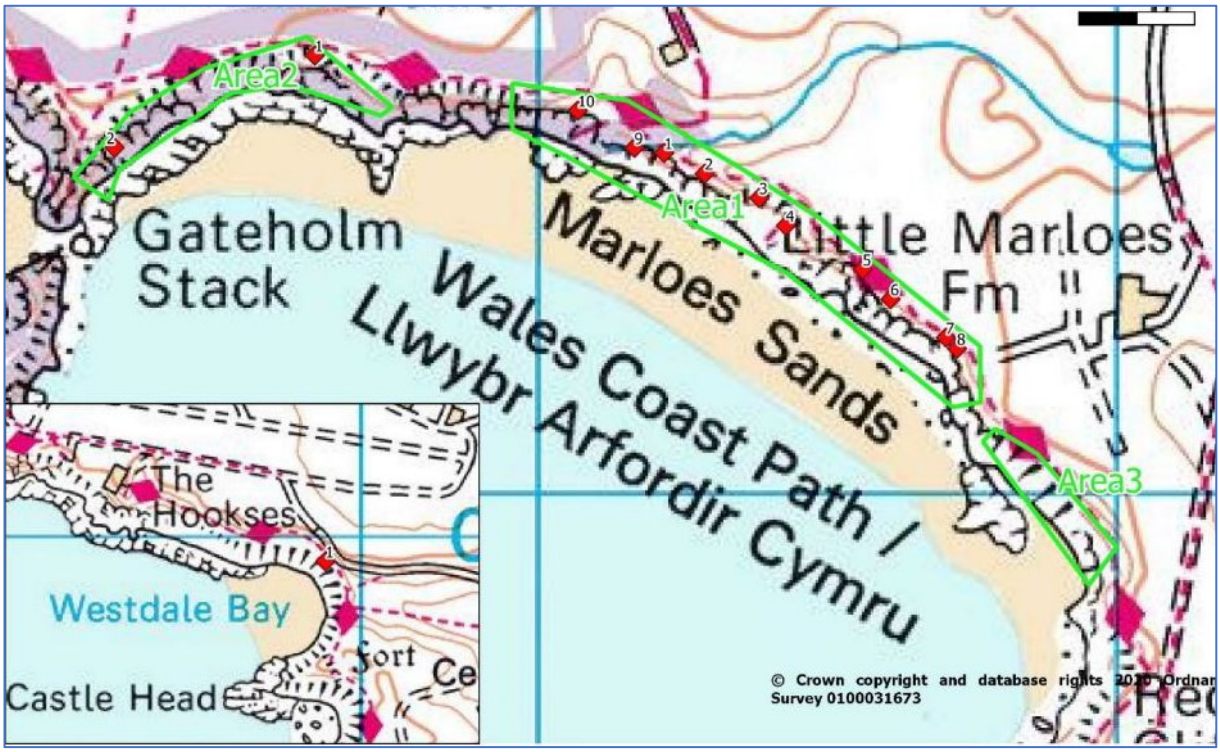
Sutton, P. 2003. Wildlife reports: grasshoppers and relatives. *British Wildlife*. **14**: 208-209.

Sutton, P.G. 2015. A review of the Orthoptera (grasshoppers and crickets) and allied species of Great Britain. Species Status No. **21**. Natural England Commissioned Report No. **187**. Natural England.

Vahed, K. 2017. Scaly crickets at Marloes Sands. *Pembrokeshire Biodiversity Partnership*. **14**: 1-3.

Vahed, K. 2020. The life cycle of the Atlantic Beach-Cricket, *Pseudomogoplistes vicentae* Gorochov, 1996. *Journal of Insect Conservation*. **24**: 473-485.

11. Appendix 1: Maps



Map 1. Monitoring areas and plots.

Map 2. Detailed plot location map.

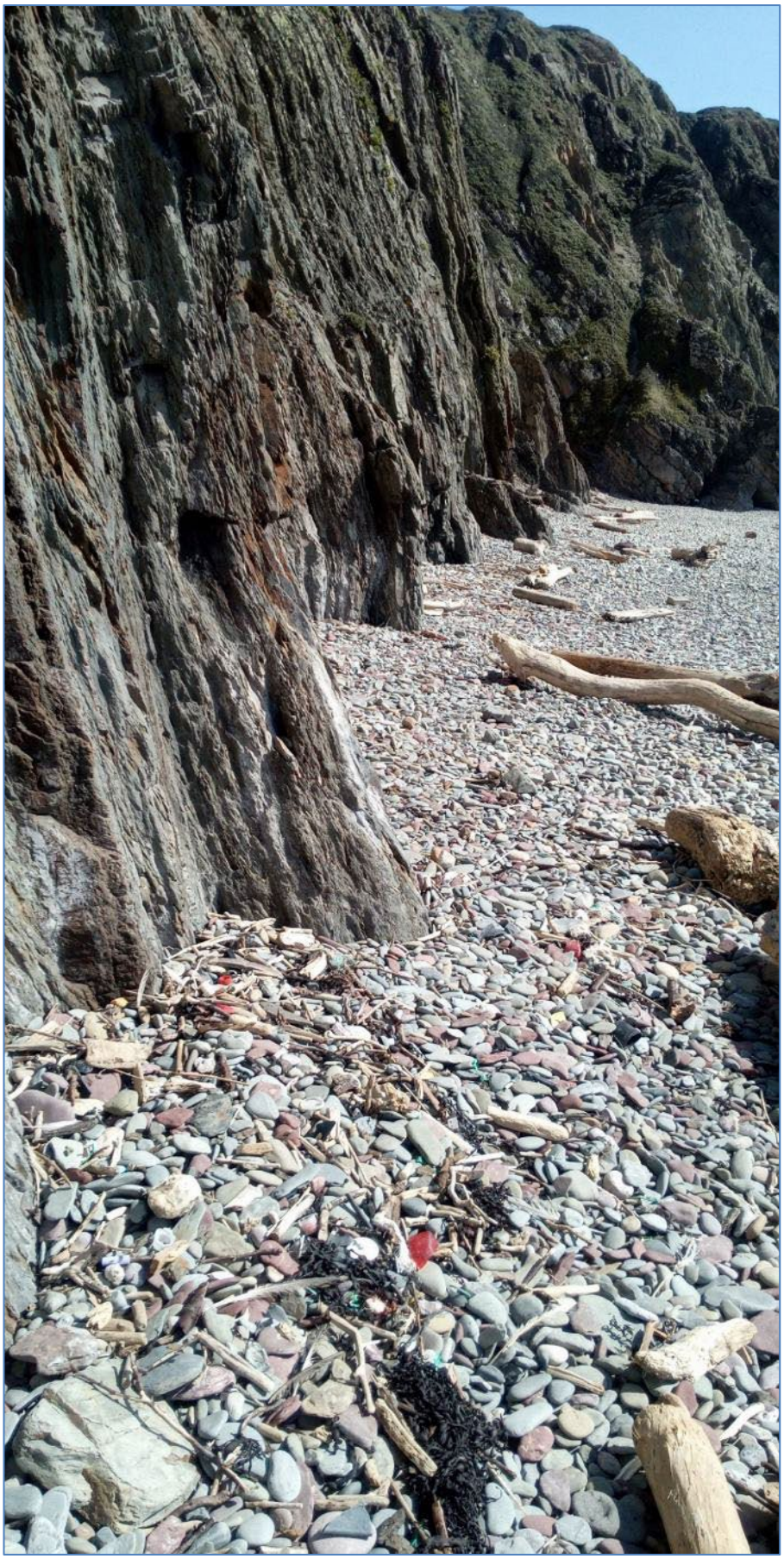
12. Appendix 2: Photographs

Photograph 1. Rockfall at Plot MS 1.

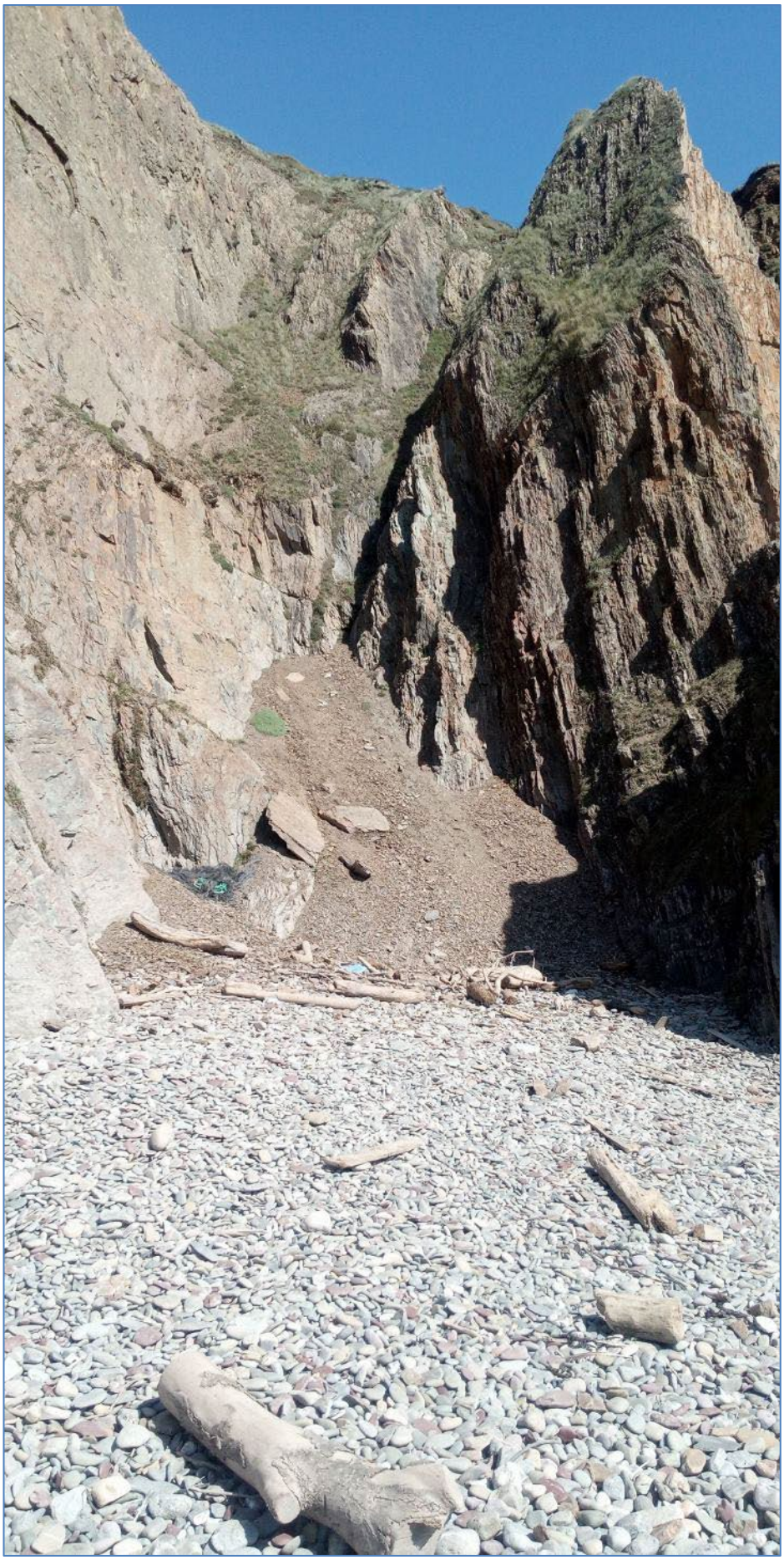
Photograph 2. Plot MS 2.

Photograph 3. Plots MS 3 & MS 4 (MS3 foreground, MS 4 distance).

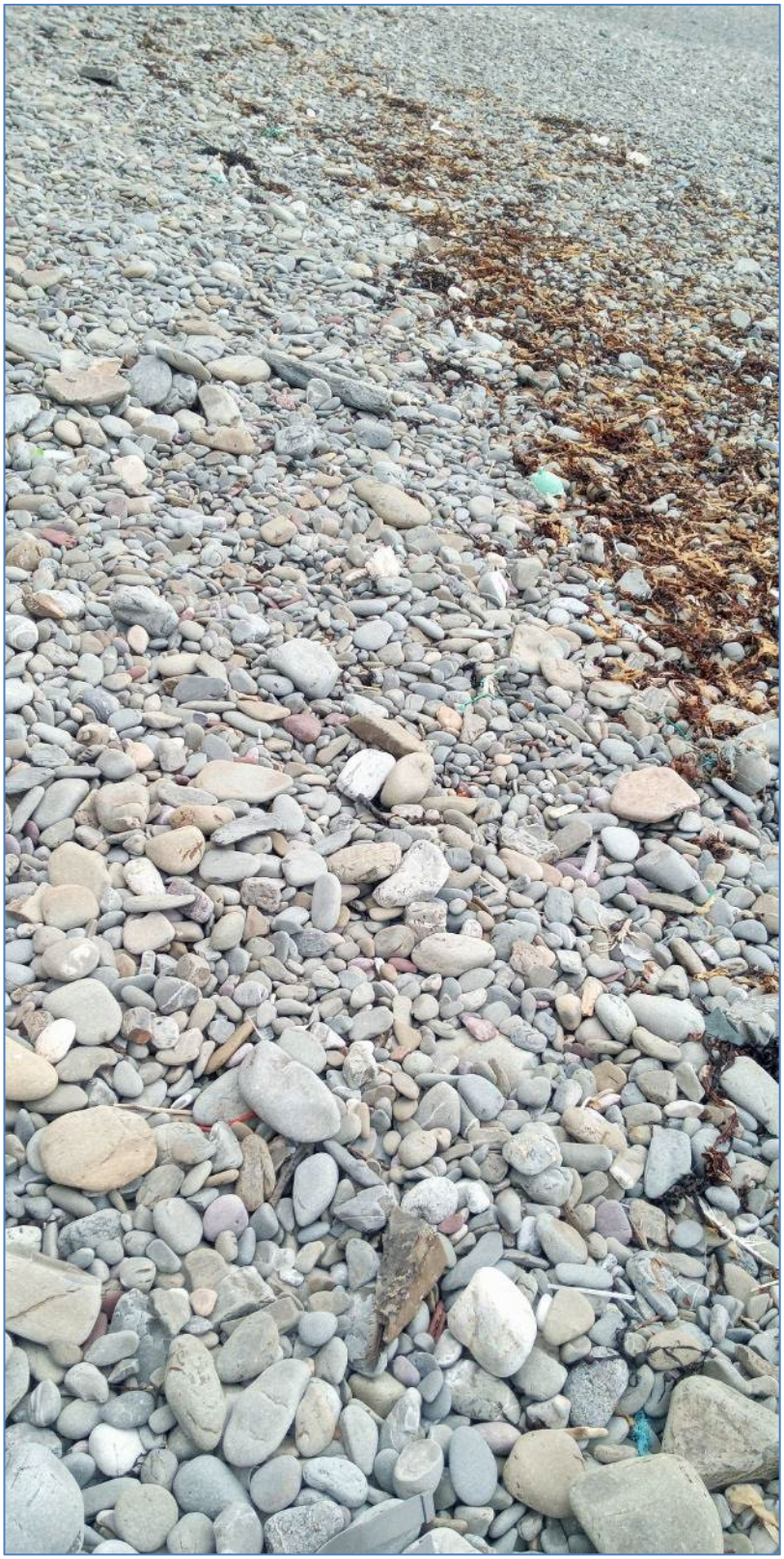
Photograph 4. Plot MS 5.



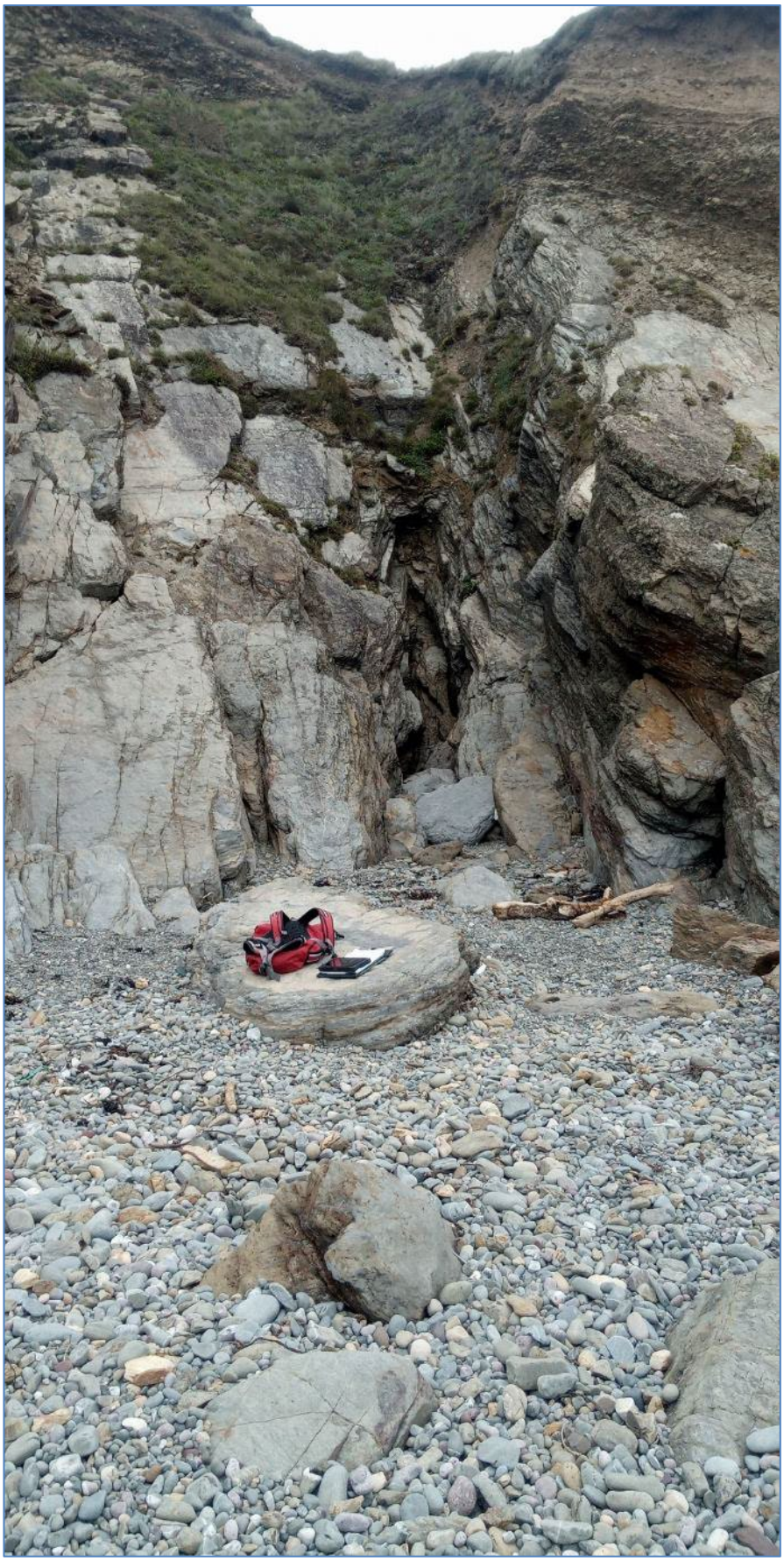
Photograph 5. Plots MS6 & MS 7 (MS 6 foreground, MS 7 distance).



Photograph 6. Plot MS 8 with small rockfall.



Photograph 7. Plot MS 9.



Photograph 8. Plot MS 10.

Photograph 9. Plot WDB 1.

13. 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.

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 124859.