Surveys for additional populations of Scaly Cricket *Pseudomogoplistes vicentae* in Pembrokeshire and west Carmarthenshire in 2023 and 2024

NRW Evidence Report No. 817

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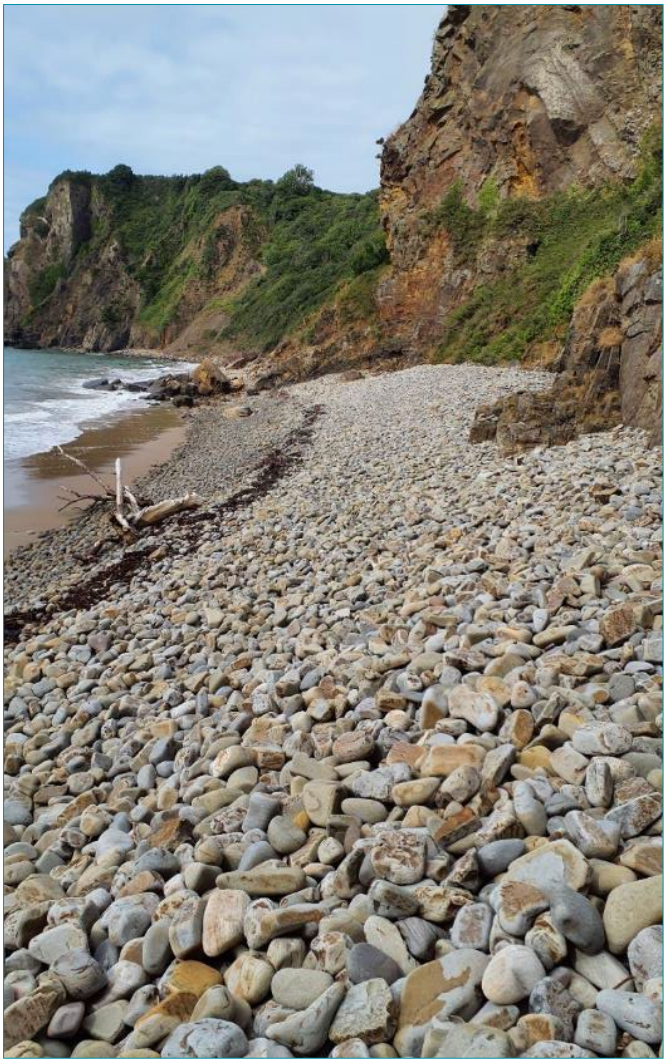

Monkstone Beach, Pembrokeshire, 2023

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Crynodeb gweithredol

Mae'r Criciedyn Cennog *Pseudomoplistes vicentae* yn gysylltiedig â thraethlinau ar raean arfordirol agored o amgylch arfordir yr Iwerydd. Yn y DU, fe'i darganfuwyd yn wreiddiol ger Portland yn Dorset ym 1940 ac fe'i cofnodwyd gyntaf yng Nghymru ym mis Awst 1999 ar y traeth graean ar Draeth Marloes yn Sir Benfro. Cafwyd hyd i boblogaeth lai ym Mae Gorllewin Dale ar Benrhyn Dale sydd gerllaw yn 2017, unwaith eto yn gysylltiedig â graean arfordirol. Yn 2020, cynhaliwyd arolwg hefyd i chwilio am y rhywogaeth mewn lleoedd eraill a allai fod yn addas yn agos at Draeth Marloes. Nid oedd gan unrhyw un o'r safleoedd hyn unrhyw ddarnau sylweddol o gynefin addas ac ni ddaethpwyd o hyd i Griciedau Cennog. Canfuwyd tair nymff yn Freshwater West yn 2022 ond methodd arolwg manwl yn 2023 â dod o hyd i sbesimenau pellach.

Aeth yr arolwg dwy flynedd presennol i un ar ddeg safle arall yn Sir Benfro ac un yng ngorllewin Sir Gaerfyrddin. Daethpwyd o hyd i un nymff sy'n perthyn i'r Criciedyn Cennog mewn pydew maglu ar Draeth Monkstone ger Dinbych-y-pysgod ym mis Hydref 2023. Cofnodwyd saith nymff ychwanegol ar yr un safle ym mis Hydref 2024, eto mewn pydewau maglu, sy'n awgrymu bod poblogaeth breswyl yn bresennol. Mae hyn yn cynrychioli'r bedwaredd ardal hysbys yng Nghymru, gyda phob un ohonynt yn Sir Benfro, a'r chweched yn y DU.

Mae'r arolwg presennol yn awgrymu nad oes llawer o draethau addas ar gyfer Criciedau Cennog ac, hyd yn oed lle mae cynefin addas yn bresennol, nad yw'n cael ei ddefnyddio bob amser gan y rhywogaeth, sydd â dosbarthiad cyfyngedig iawn yn ôl pob golwg. Mae'r arolwg yn amlygu ymhellach bwysigrwydd poblogaeth Traeth Marloes gan mai dyma'r boblogaeth fwyaf yng Nghymru. Mae'r poblogaethau yn Nhraeth Marloes, Bae Gorllewin Dale a Thraeth Monkstone yn parhau i fod yn agored iawn i golli eu cynefin oherwydd erydiad arfordirol a chodiad yn lefel y môr.

Executive summary

The Scaly Cricket or Atlantic Beach-cricket *Pseudomogoplistes vicentae* is associated with strandlines on exposed coastal shingle around the Atlantic coastline. In the UK, it was found originally near Portland in Dorset in 1940 and was first recorded in Wales in August 1999 on the shingle beach at Marloes Sands in Pembrokeshire. A smaller population was found at West Dale Bay on the adjacent Dale Peninsula in 2017, again associated with coastal shingle. In 2020, a survey was also undertaken to search for the species at other potentially suitable localities close to Marloes Sands. None of these sites held any significant amounts of suitable habitat and no Scaly Crickets were found. Three nymphs were found at Freshwater West in 2022 but a detailed survey in 2023 failed to locate further specimens.

The current two-year survey visited a further eleven sites in Pembrokeshire and one in west Carmarthenshire. A single Scaly Cricket nymph was found in a pitfall trap at Monkstone Beach near Tenby in October 2023. An additional seven nymphs were recorded at the same site in October 2024, again in pitfall traps, suggesting that a resident population is present. This represents the 4th known locality in Wales, all of which are in Pembrokeshire, and the 6th in the UK.

The current survey suggests that there are few suitable beaches for Scaly Cricket and that, even where suitable habitat is present, it is not always utilised by the species which seems to have a very restricted distribution. The survey further highlights the importance of the Marloes Sands population as it is clearly the largest in Wales. Populations at Marloes Sands, West Dale Bay and Monkstone Beach remain very vulnerable to habitat loss due to coastal erosion and sea-level rise.

1. Introduction

The Scaly Cricket or Atlantic Beach-cricket *Pseudomogoplistes vicentae* is associated with strandlines on exposed coastal shingle around the Atlantic coastline. In the UK, it was found originally near Portland in Dorset in 1940 (Sutton, 1999) and was first recorded in Wales in August 1999 on the shingle beach at Marloes Sands in Pembrokeshire (Anon., 2001; Sutton, 2003). A smaller population was found at West Dale Bay on the adjacent Dale Peninsula in 2017, again associated with coastal shingle (Vahed, 2017). Three nymphs were found at Freshwater West in 2022 (Banner *et al*., 2023) but a detailed survey in 2023 involving pitfall trapping failed to locate further specimens (Banner & Banner, 2024).

The Marloes and West Dale Bay populations have been subject to detailed monitoring in 2007 and again in 2020 (Jon Hudson Ecological Consultancy, 2007, 2020). The 2020 monitoring showed both populations to be in unfavourable condition due primarily to a loss of suitable deep shingle deposits and a reduction in the distribution of Scaly Crickets. Both populations are considered to be vulnerable to marine pollution, sea level rise and loss of the shingle habitat they rely upon with backing cliffs preventing the migration of the shingle beaches inland. 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 processes appear to be affecting some of the beaches covered in the present survey too.

In 2020, a survey was also undertaken to search for the species at other potentially suitable localities close to Marloes Sands including Albion Sands, The Gann, Lindsway Bay, Mill Bay, Musselwick, Musselwick Sands, Sandy Haven, Sleeping Bay and Watick Bay (Jon Hudson Ecological Consultancy, 2020). None of the searched sites held any significant suitable habitat, no Scaly Crickets were found and it is doubtful that they support the species. It was recommended that additional sites were searched in south Pembrokeshire and west Carmarthenshire given the perceived vulnerability of the Marloes and West Dale Bay populations and the lack of management options at these sites that could help maintain the habitat.

The present survey, therefore, assessed the suitability of the habitat and looked for the presence of Scaly Crickets using a combination of pitfall trapping and hand searching in the following survey areas:

1. Newgale SM8421;

2. Castlemartin Firing Range end of Fresh West and Bullslaughter Bay SR8899;

3. Lydstep SS0998;

4. Skrinkle Haven SS0797;

5. Manorbier SS0697;

6. Monkstone Beach SN1403;

7. Saundersfoot SN1305;

8. Coppet Hall SN1405;

9. Wiseman's Bridge (village) SN1406;

10. Wiseman's Bridge (Northeast) SN1406;

11. Amroth SN1607;

12. Marros Sands SN2007.

The survey was undertaken over two years (Phase 1 in 2023 and Phase 2 in 2024). This allowed the survey work to be undertaken at different times of the year at each beach and was useful as the "visibility" of the species can be highly variable, between years and/or months. Phase 1 was carried out in July and October 2023 and aimed to:

- visit all twelve beaches where substantial shingle deposits were present and undertake a habitat assessment based upon the Marloes Sands Common Standards Monitoring Habitat Performance Indicators - see Jon Hudson Ecological Consultancy (2007) and Methods section of this report;

- undertake hand searches and pitfall trapping in areas of suitable habitat.

The results of this survey were used to inform further surveys in 2024 (Phase 2) which aimed to:

- undertake more hand searches and pitfall trapping on sites identified as being of high potential (or where Scaly Crickets were found) in Phase 1;

- provide information to help develop a Conservation Objective and Performance Indicators for any new Scaly Cricket sites;

- provide management recommendations.

Figure 1. Survey areas in 2023 and 2024, showing where suitable habitat occurred.

2. Methods

Habitat assessment

During monitoring at the Dale and South Marloes Coast SSSI in 2006, a number of characteristics of the shingle habitat utilised by Scaly Crickets were measured or visually assessed to help define what constituted “Suitable” Scaly Cricket habitat (Jon Hudson Ecological Consultancy, 2007). Suitable habitat was defined as “*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. The shingle deposits are composed predominately of pebbles/cobbles between 50 and 100mm width, occurring in multiple layers, providing a complex of interstices*”. This definition was used during the present survey to assess habitat suitability. However, additional features such as the presence of sea walls were added to cover the wider range of situations in which shingle beaches occur within the survey area.

On those beaches in Pembrokeshire where Scaly Crickets have been found, the cliffs are usually of slumped earth/cliff fall debris or rough, creviced rock which could potentially offer an escape from extremely high tides or storm waves. Scaly Crickets have not been found where the shingle is backed by wave-smoothed cliffs. Where beaches were backed by artificial hard sea defences (e.g. at Amroth, Saundersfoot and Wiseman's Bridge), this was considered likely to render the habitat unsuitable as such defences are wave-smoothed by the erosive actions of normal high tides, indicating that the shingle is regularly inundated and disturbed by winter storms and that there is a lack of "escapes". Furthermore, Scaly Crickets have only been found on beaches with a south-westerly to south-easterly aspect. Beaches facing east and north, particularly those such as the coves between Monkstone Beach and Saundersfoot that are also backed by mature woodland, are considered to be unsuitable due to the amount of shading they receive. Using the above criteria, areas of suitable shingle habitat were searched for at the survey sites. Where suitable habitat was not present, the sites were excluded from further investigation (see Results section). Monitoring was undertaken by Jon Hudson CIEEM (Jon Hudson Ecological Consultancy) and Louis Hudson (Heartwood Arboricultural and Ecology Services).

Hand searching

Within areas of suitable habitat, large pebbles, cobbles and stones were swiftly removed or lifted by one edge. Large pebbles beneath the lifted stone were then removed to a depth of around 10-20cm. Where the upper layers of the beach deposits have become dry these were removed and the above search methods were applied to the newly exposed, damper layers. Searches were focussed on areas of suitable habitat where strandline deposits were present.

Pitfall trapping

A plastic pint beer glass was sunk into the beach deposits. The bait used was dried cat biscuits and pieces of cooked sausage. Fine shingle was placed around the traps to ensure invertebrates were able to access the traps and a large flat stone was placed on top of the trap. Trap locations were marked by pebble cairns and photographed to aid relocation.

3. Results

Phase 1 – surveys in July and October 2023

During July and October 2023, survey areas 1-12 were visited and the suitability of the habitat was assessed. The habitat and survey effort at each site is described briefly below.

1. Newgale SM8421

1874m of Suitable habitat on a deep shingle ridge. Hand searched only. Pitfall traps were not placed along the main ridge due to the high chance of them being disturbed by the many visitors the beach receives. No Scaly Crickets were seen. Near Maidenhall Point, on the southeastern end of Newgale Beach, a further 192m of very promising-looking (and less visited) Suitable habitat was hand searched and 6 pitfall traps were placed. No Scaly Crickets were found. **The site was, however, considered high potential and was resurveyed in Phase 2 of the project**.

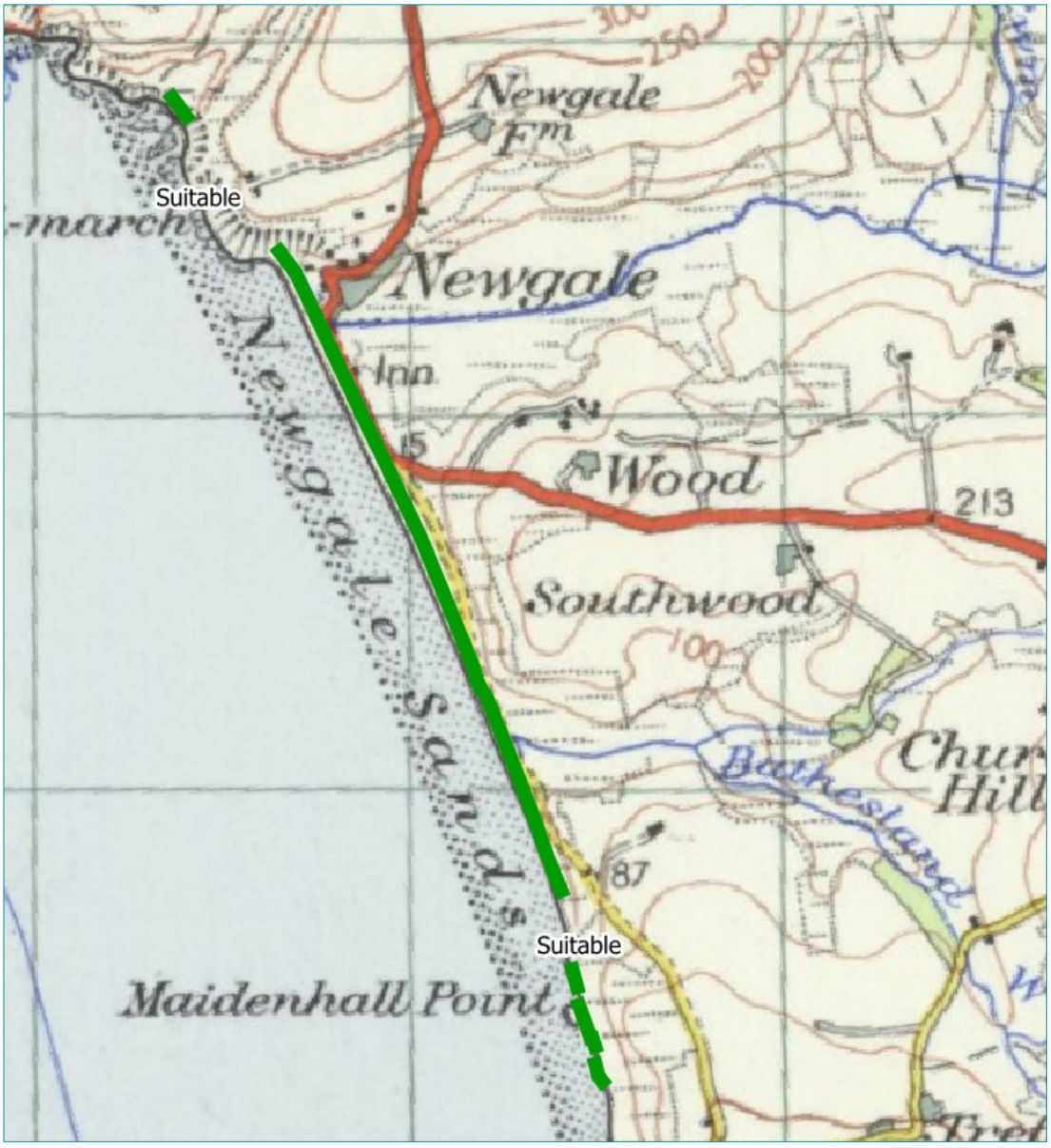

Figure 2. Newgale, showing where suitable habitat occurred.

2. Castlemartin Firing Range end of Freshwater West and Bullslaughter Bay SR8899

Suitable habitat. Due to live firing restrictions, this site was not surveyed in 2023. Habitat suitability was assessed from the clifftops with binoculars. In 2022, a single Scaly cricket had been found on the northwestern end of Freshwater West beach (Banner *et al*., 2023). That area was resurveyed in 2023 but no Scaly Crickets were found (Banner & Banner, 2024). **The site was, therefore, considered high potential and was resurveyed in Phase 2 of the project**.

Figure 3. Castlemartin end of Freshwater West, showing where suitable habitat occurred.

3. Lydstep SS0998

No Suitable habitat. The shingle is too fine and occurs as a thin layer over sand. The beach is defended with large boulders, leading to a loss of deep shingle deposits. Screened out from further survey.

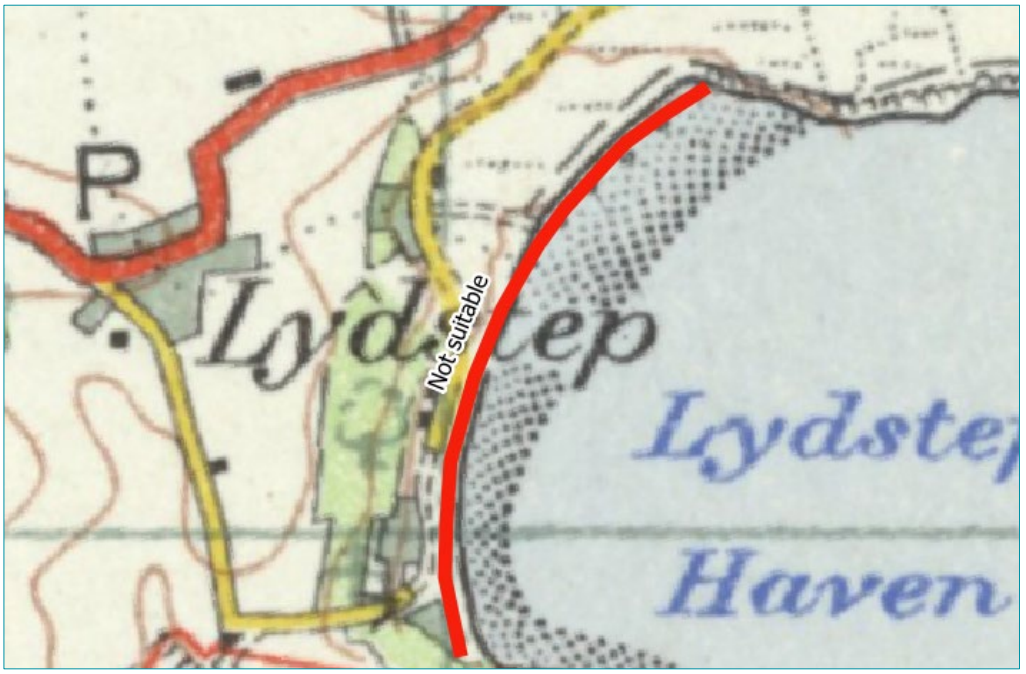

Figure 4. Lydstep. No suitable habitat.

4. Skrinkle Haven SS0797

No Suitable habitat. The beach has no small shingle and is composed of large cobbles/boulders with no 'escapes" as the beach is backed by steep, wave-smoothed cliffs. Screened out from further survey.

Figure 5. Skrinkle Haven. No suitable habitat.

5. Manorbier SS0697

No suitable habitat. The beach has just a thin layer of small/medium shingle over sand with a few small deeper shingle areas. Screened out from further survey.

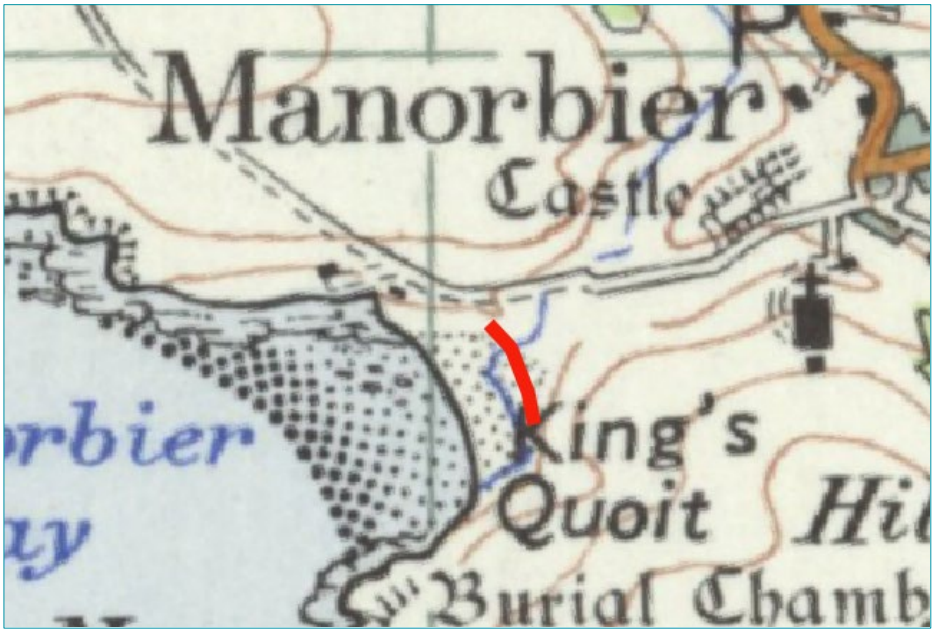

Figure 6. Manorbier. No suitable habitat.

6. Monkstone Beach SN1403

296m of Suitable habitat backed by a stable storm-ridge of lichen-covered shingle with soft cliff “escapes”. Hand searched, no Scaly Crickets seen. Six pitfall traps set, **one female nymph found in a pitfall trap on 21/10/23**.

Due to the presence of a Scaly Cricket at Monkstone Beach, nine small coves to the north of Monkstone were also surveyed. A further 193m of apparently suitable habitat was present in four coves with the remaining five being unsuitable. However, none of these coves was considered likely to support Scaly Crickets due to them being very small, east-facing and backed by woodland and therefore shaded for much of the day. A further five coves to the south of Monkstone as far as Waterwynch Bay were also surveyed. All of these (apart from Waterwynch Bay with just 20m of Suitable habitat) were unsuitable. Appendix 2 shows photographs of the habitats in these coves. **Due to the presence of a Scaly Cricket nymph, the site was considered high potential and was resurveyed in Phase 2 of the project**. The coves on either side of Monkstone Beach are not considered high potential and no further surveys are recommended at any of them.

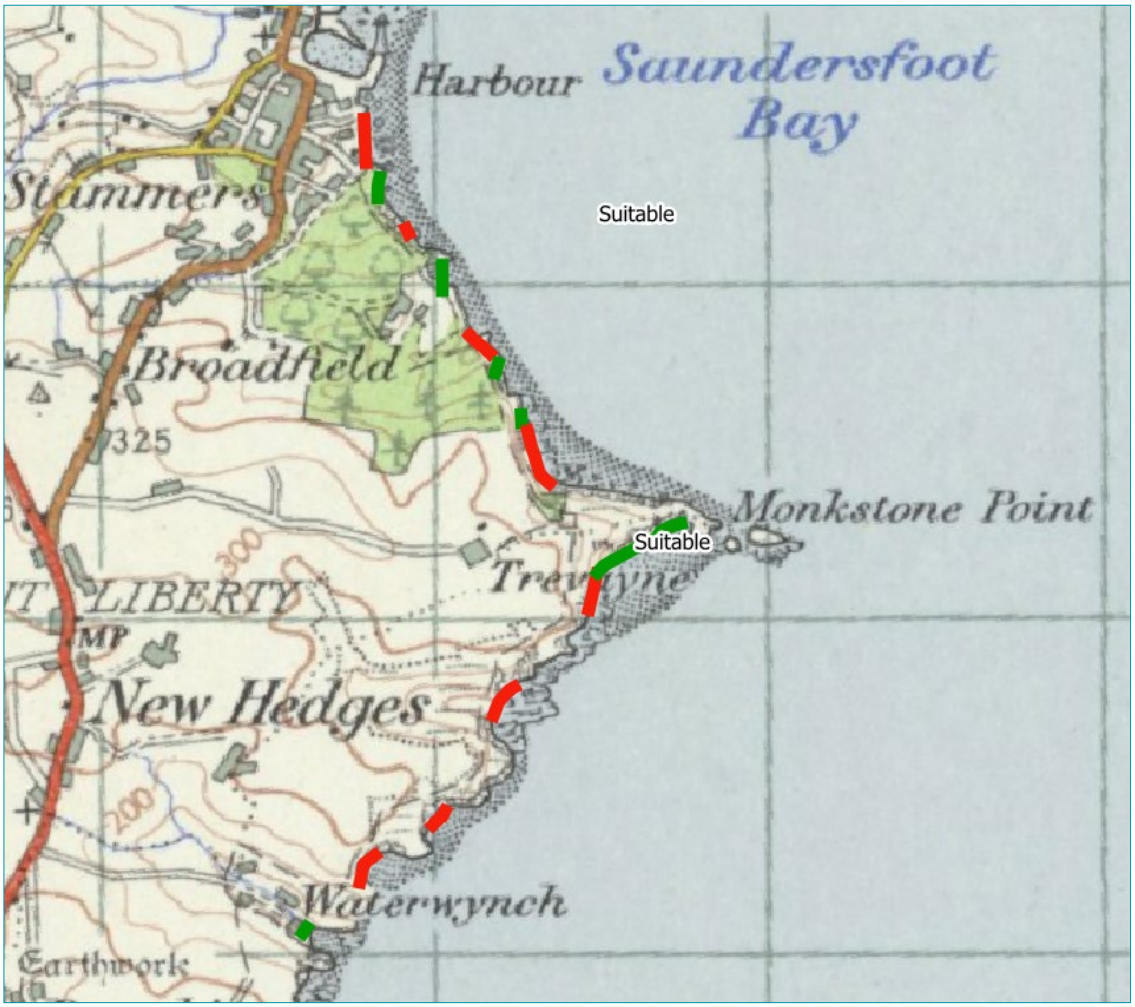

Figure 7. Monkstone Beach, showing where suitable habitat occurred.

7. Saundersfoot SN1305

No suitable habitat. Sea defences render the deep shingle ridge here unsuitable. The seafront is sometimes inundated by winter storms and is heavily disturbed. Screened out from further survey.

8. Coppet Hall SN1405

55m of possibly Suitable habitat. The very well-used beach is backed by low sandy ground with Sea Buckthorn. There is a fairly shallow layer of small to medium shingle over shell sand and grit. The shingle areas are mostly above spring tide height and some deeper

areas were hand searched and 3 pitfall traps were placed. No Scaly Crickets were found, and the habitat is likely to be sub-optimal at best Screened out from further survey.

Figure 8. Saundersfoot and Coppet Hall, showing where suitable habitat occurred.

9. Wiseman's Bridge (southwest & village) SN1406

No suitable habitat along the village seafront. There are some areas of large (unsuitable) boulders, and the rest of the beach has a thin layer of shingle over sand. Screened out from further survey.

10. Wiseman's Bridge (Northeast) SN1406

230m of suitable habitat hand searched and 6 pitfall traps placed. Although no Scaly Crickets were found **the site was considered high potential and was resurveyed in Phase 2 of the project**.

Figure 9. Wiseman's Bridge, showing where suitable habitat occurred.

11. Amroth SN1607

No Suitable habitat. The whole of the seafront at Amroth is unsuitable due to the presence of concrete sea defences. The seafront at Amroth is well known for being inundated by winter storms and is heavily disturbed. Four pitfall traps were placed in areas where the shingle appeared to be less affected by winter storms and defences but no Scaly Crickets were found. Screened out from further survey.

Due to timing and tidal issues, areas of shingle to the north of Amroth (from just west of Telpyn Point to Top Castle were not surveyed in 2023. **The site was therefore surveyed in Phase 2 of the project**.

Figure 10. Amroth. No suitable habitat.

12. Marros Sands SN2007

1352m of suitable habitat from Top Castle to Ragwen Point. A deep shingle ridge backed by a low soft cliff of peaty soils over glacial clays with plentiful “escapes”. The whole area was hand-searched, and 20 pitfall traps were placed. No Scaly Crickets seen. **The site was however considered high potential and was resurveyed in Phase 2 of the project**.

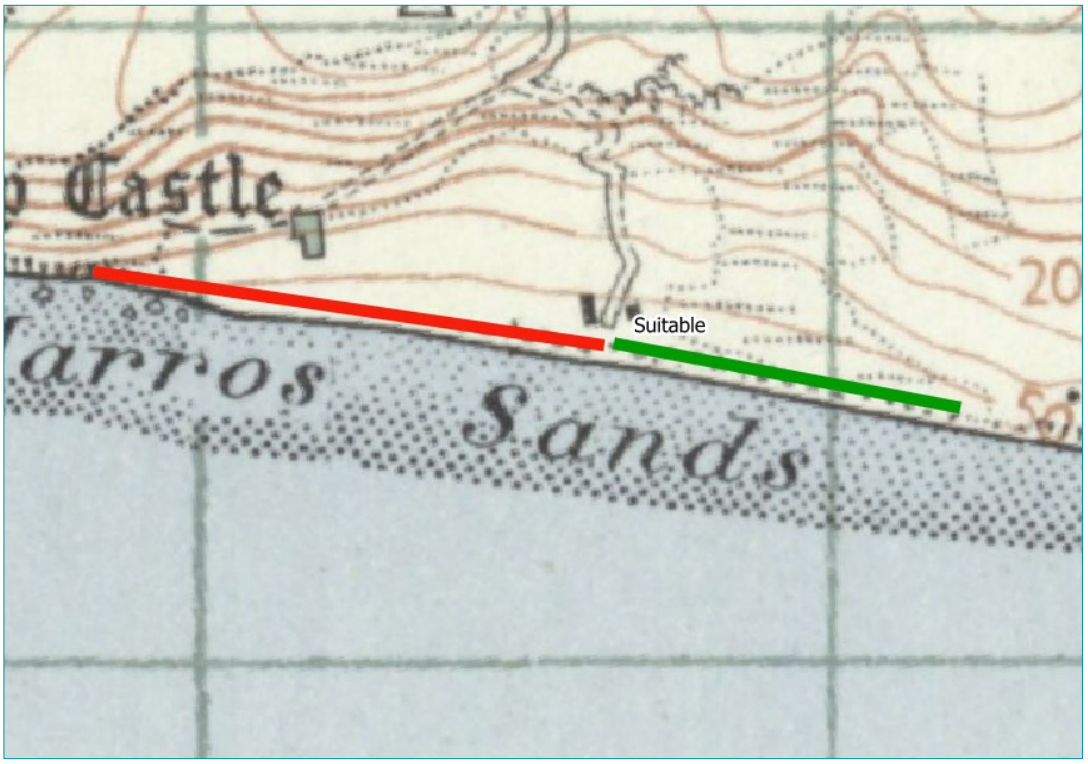

Figure 11. Marros Sands, showing where suitable habitat occurred.

Phase 2 – surveys in September 2024

Phase 2 of the survey was undertaken in September 2024 when the six “high potential” sites identified during Phase 1 were resurveyed with another round of pitfall trapping and hand searching. Site numbers are as those for Phase 1.

1. Newgale SM8421

The extent of Suitable habitat appeared unchanged from 2023. Pitfall trapping (10 traps) and hand searching found no Scaly Crickets. Despite this, the site still appears very suitable and there remains the possibility of an undetected population here.

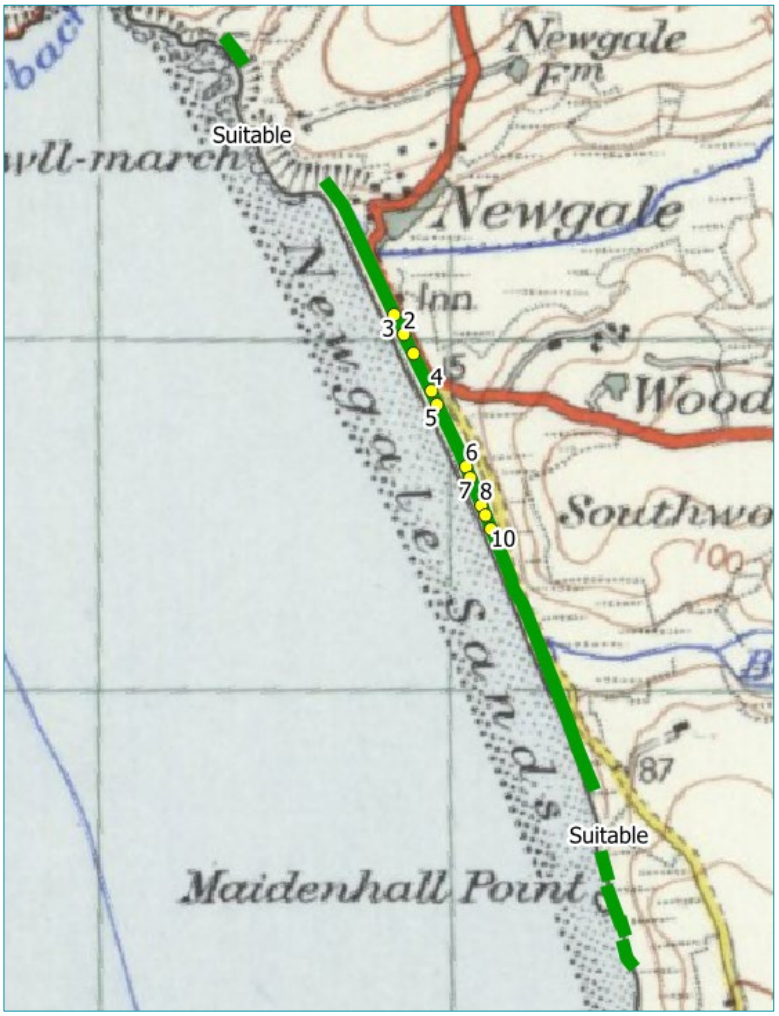

Figure 12. Newgale, showing pitfall trap locations in 2024.

2. Castlemartin Firing Range end of Freshwater West and Bullslaughter Bay SR8899

113m of Suitable habitat. Pitfall trapping (9 traps) and hand searching found no Scaly Crickets. The remainder of the beach was mostly unsuitable with a thin layer of shingle over sand. Despite this, the site still appears suitable and, given the 2022 record from the north of Freshwater West Beach, there remains the possibility that there may be an undetected (probably small) population here. No Suitable habitat was present at Bullslaughter Bay where the beach consists of large cobbles.

Figure 13. Castlemartin end of Freshwater West, showing pitfall trap locations in 2024.

6. Monkstone Beach SN1403

The extent of Suitable habitat appears unchanged from 2023. **Pitfall trapping found seven Scaly cricket nymphs in 8 traps on 21st October 2024 (SN146031)**. No Scaly Crickets were found by hand searching and no adults were seen. However, a breeding population seems to be present here although it is not clear how large this population may be.

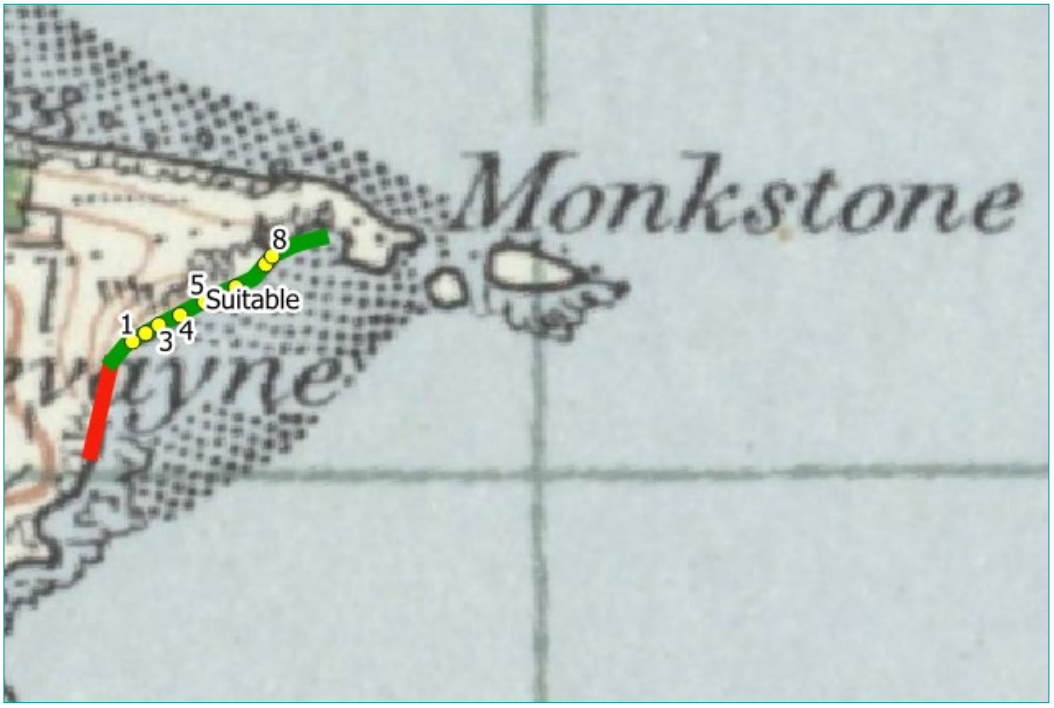

Figure 14. Monkstone Beach, showing pitfall trap locations in 2024. Scaly Crickets were found in Traps 1 to 7.

10. Wiseman's Bridge (Northeast) SN1406

The extent of Suitable habitat appears to have reduced from 2023 down to around 170m as areas of shingle to the very Northeast have been washed out by storms. The shingle here may be too large to be good Scaly Cricket habitat traps were placed in the best areas of habitat. Pitfall trapping (5 traps) and hand searching found no Scaly Crickets. It is considered that there are probably no Scaly Crickets here.

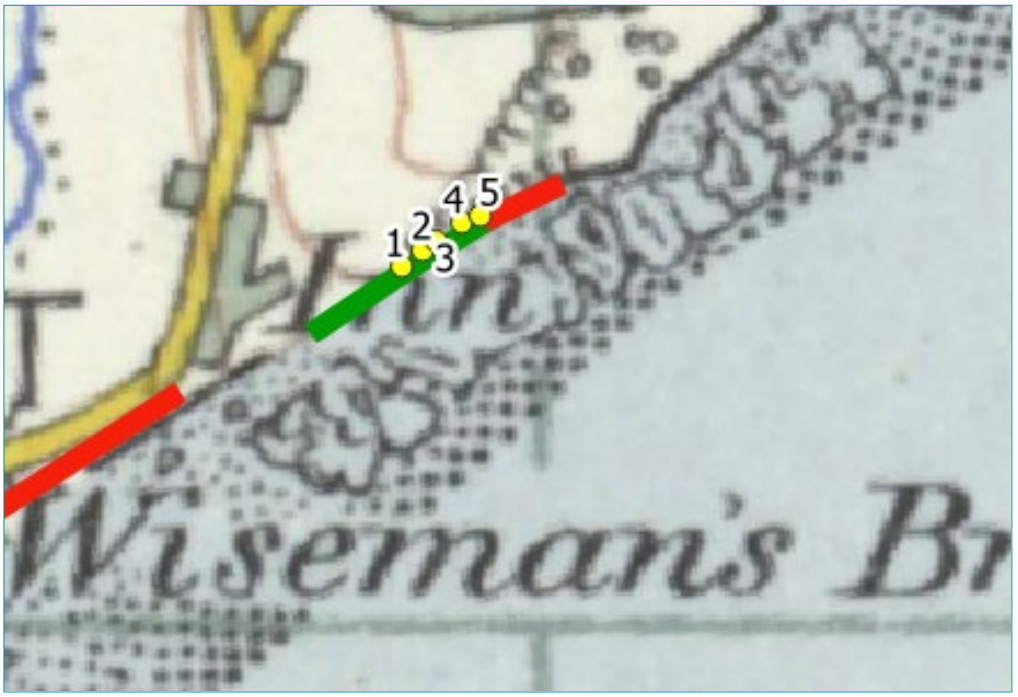

Figure 15. Wiseman's Bridge, showing pitfall trap locations in 2024 and revised habitat extent.

11. North of Amroth from just west of Telpyn Point to Top Castle SN1607

Unsuitable. The whole stretch of shingle here is inundated by spring tides and is backed by tall, wave-smoothed cliffs apart from west of Telpyn Point where the shingle is too large to be suitable. No searches were made. It is considered that there almost certainly no Scaly Crickets here.

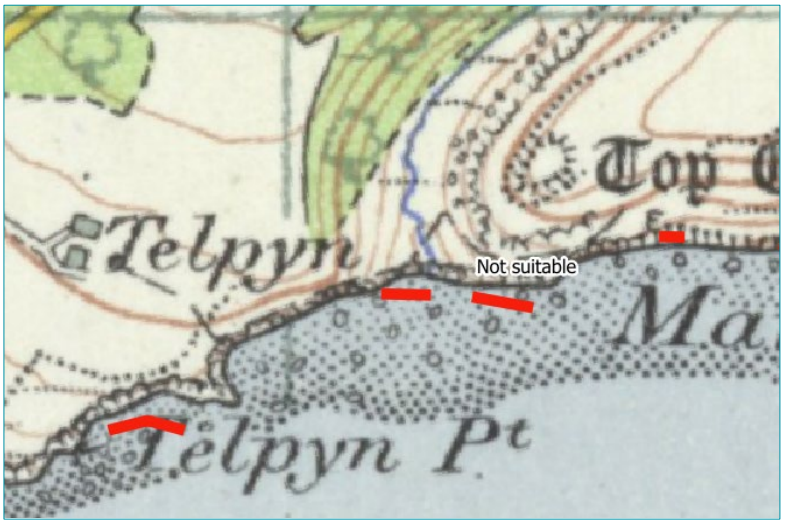

Figure 16. North of Amroth. No suitable habitat.

12. Marros Sands SN2007

The extent of Suitable habitat initially appeared unchanged from 2023. However, it was clear that the very high spring tide and large waves a couple of days before the survey had inundated most of the western part of the ridge. This appeared to reduce the amount of Suitable habitat down to 536m to the eastern end of the beach. There was almost no strandline, and the shingle was very dry and clean. The presence of decaying organic detritus may play a role in habitat selection by Scaly Crickets. At Marloes Sands, high numbers of crickets are found where there is washed-up seaweed and the pebbles are covered with minute particles and films of “slime” from seaweed, and around freshwater seepages (Jon Hudson Ecological Consultancy, 2007). Pitfall traps were therefore placed only in areas where there was washed-up seaweed, large pieces of driftwood or freshwater seepages. Pitfall trapping (10 traps) and hand searching found no Scaly Crickets. Despite this, the site still appears very suitable and there remains the possibility of an undetected population here.

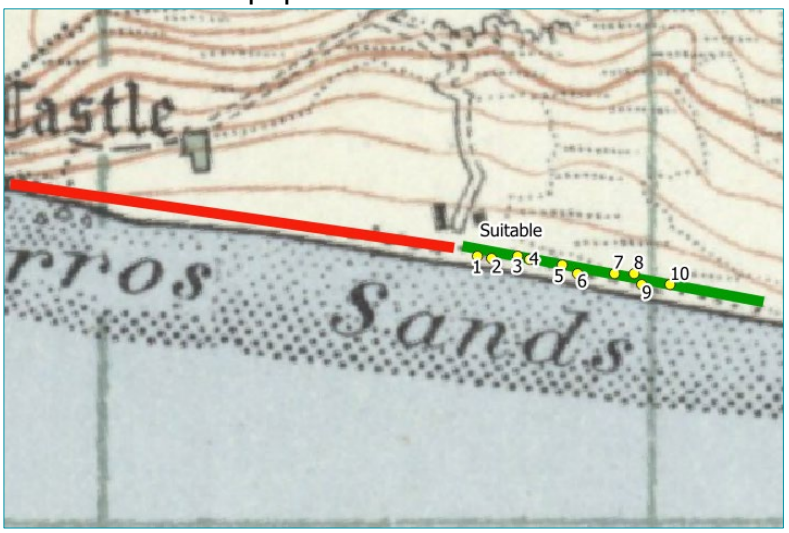

Figure 17. Marros Sands, showing pitfall trap locations in 2024 and revised habitat extent.

4. Discussion

The 2023 survey found a single Scaly Cricket nymph in a pitfall trap at Monkstone Beach near Tenby. At the time, it was unclear if this was part of an established population or the temporary appearance of an individual that had rafted here (as an egg) on driftwood. During the 2024 survey, an established (albeit possibly small) new Scaly Cricket population was confirmed at Monkstone Beach when pitfall trapping found a further seven nymphs of various sizes (different instars) between approximately 6 and 9 mm long. This represents the fourth known locality in Wales, all in Pembrokeshire - Marloes Sands, West Dale Bay, Freshwater West (see Figure 18) - and the sixth for the UK.

The new Monkstone Beach population is within the Waterwynch Bay to Saundersfoot Harbour SSSI. Scaly Crickets should be added as a Qualifying Feature of the SSSI and a monitoring program put in place. Whilst it is not possible to quantify the likely population size here with the limited data available from the current surveys, an intensive monitoring program over several years would address this. The habitat utilised by the Scaly Crickets at Monkstone is very similar to that at Marloes Sands (see Conservation Objective description on p.6).
This extensive two-year survey has also shown that there are few suitable Scaly Cricket beaches in South Pembrokeshire and that, even where Suitable habitat is present, it is not always utilised by Scaly Crickets which do seem to have a very restricted distribution in Pembrokeshire. The surveys further illustrate the absolute key importance of the Marloes Sands population as it is clearly the largest in the area. Both the Marloes and the smaller West Dale Bay populations are very vulnerable, and habitat loss due to coastal erosion and sea-level rise appears to be an issue at both sites (Jon Hudson Ecological Consultancy, 2020).

Three nymphs were found at the northern end of Freshwater West in 2022 (Banner *et al*., 2023) but an in-depth survey in 2023 failed to locate further specimens (Banner & Banner, 2024). This suggests that there is always the possibility that the species might occasionally colonise new sites but that such colonisations might be temporary, with viable populations might not necessarily become established, or be present in such smaller numbers to make it difficult to detect.

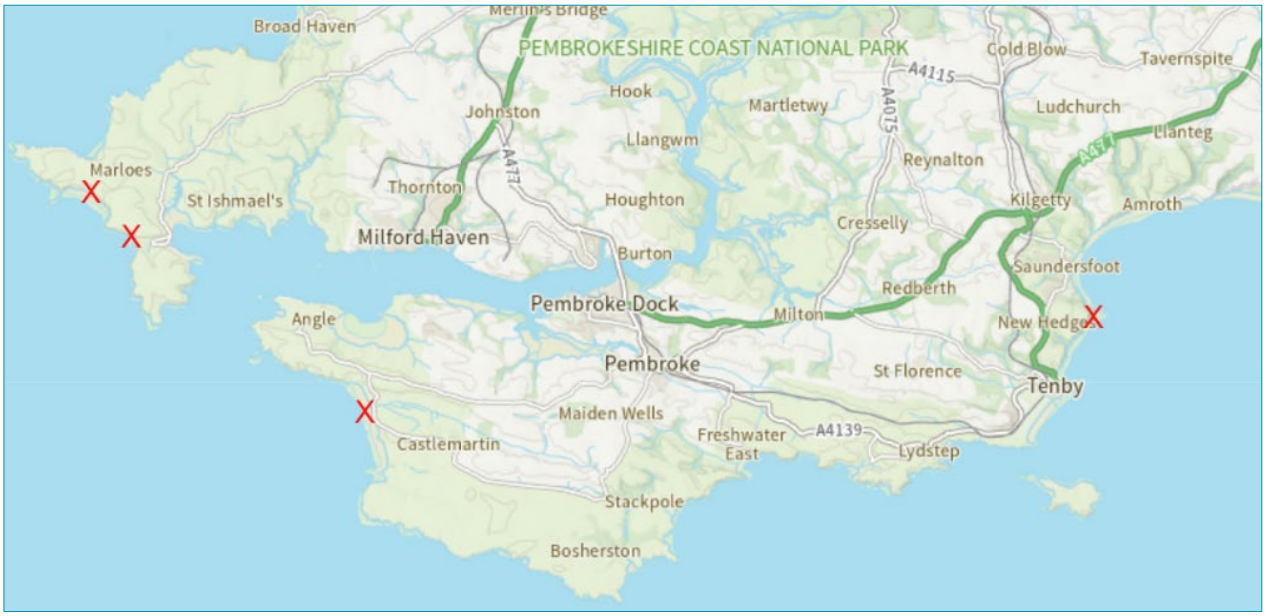

Figure 18. Localities supporting Scaly Cricket in Wales. From west to east: Marloes Sands, West Dale Bay, Freshwater West and Monkstone Beach.

5. Recommendations

Females mostly oviposit in driftwood (Vahed 2020), suggesting Scaly Cricket probably disperses (and thus colonises new beaches) by rafting on driftwood at the egg stage. It is very clear from observations made during these surveys that the collecting of driftwood for fires and “driftwood art” or its burning in situ removes almost all driftwood from accessible beaches during the summer. This will reduce both successful breeding and the chance of rafting to new localities. In contrast, inaccessible beaches are little affected, being covered with large amounts of driftwood.
It is recommended that NRW engages with the National Trust, Pembrokeshire Coast National Park and the local community to **investigate possible management actions to eliminate or reduce driftwood collection including signage at occupied sites**. **Providing information to local organisations about the populations and the potential for beach cleans to reduce feeding opportunities through disturbance and removal of strand line debris may also be beneficial**. Undertaking regular (annual) monitoring of the amount of suitable shingle habitat at all occupied sites will provide a forewarning of habitat loss and may allow time to consider translocations if the Suitable habitat is reduced to unacceptably low levels (Jon Hudson Ecological Consultancy, 2007, 2020).

During the pitfall trapping element of the survey, it became apparent that mice, shrews and possibly rats were accessing the traps and eating the bait. Small droppings were found in the majority of traps in 2023 (but oddly not in 2024) and several had all the bait eaten. It is of course also possible that rodents may have eaten at least some of the trapped animals (usually sandhoppers, springtails, woodlice and spiders). Small mammals appear to be

common on the beaches and may well prey on Scaly Crickets in the wild. There is little that could be done about this, were it identified as an issue.

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Appendix 1. Site Photographs

Image 1. Suitable habitat at Newgale.

Image 2. Unsuitable habitat at Lydstep, a thin layer of fine shingle over sand backed by hard sea defences.

Image 3. Unsuitable habitat at Skrinkle Haven. Large cobbles that are regularly inundated by tides with wave-polished backing cliffs.

Image 4. Unsuitable habitat at Manorbier. A thin layer of fine shingle over sand.

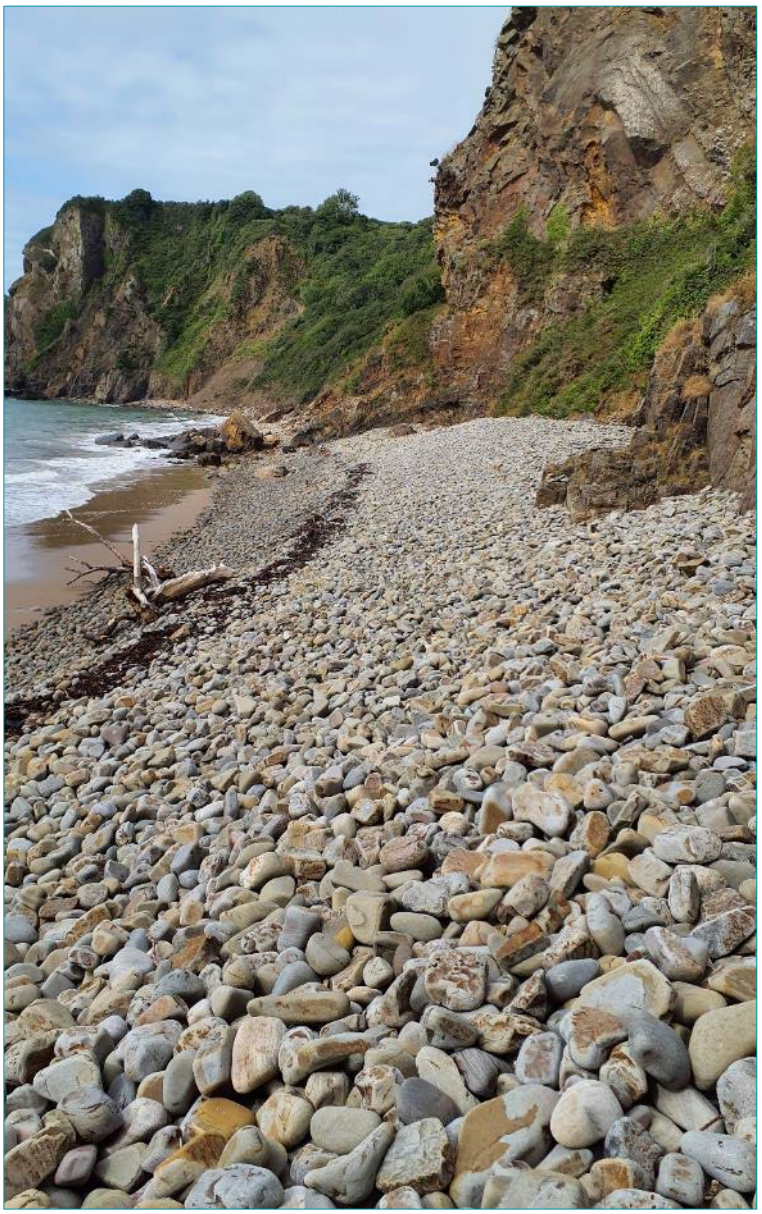


Image 5. Suitable habitat at Monkstone Beach in the area where a Scaly Cricket nymph was found. Note the extensive strandline deposits.

Image 6. Unsuitable habitat at Saundersfoot. Shingle regularly inundated by tides and backed by hard sea defences and a road.

Image 7. Small area of potentially suitable habitat at Coppet Hall although probably sub-optimal (a fairly thin layer of small flat shingle pebbles over sand).

Image 8. Unsuitable habitat at Wiseman's Bridge (village). Shingle that is regularly inundated by tides and backed by hard sea defences and a road.

Image 9. Suitable habitat at Wiseman's Bridge (Northeast).

Image 10. Extensive area of Suitable habitat at Marros Sands.

Appendix 2. Coves north and south of Monkstone Beach

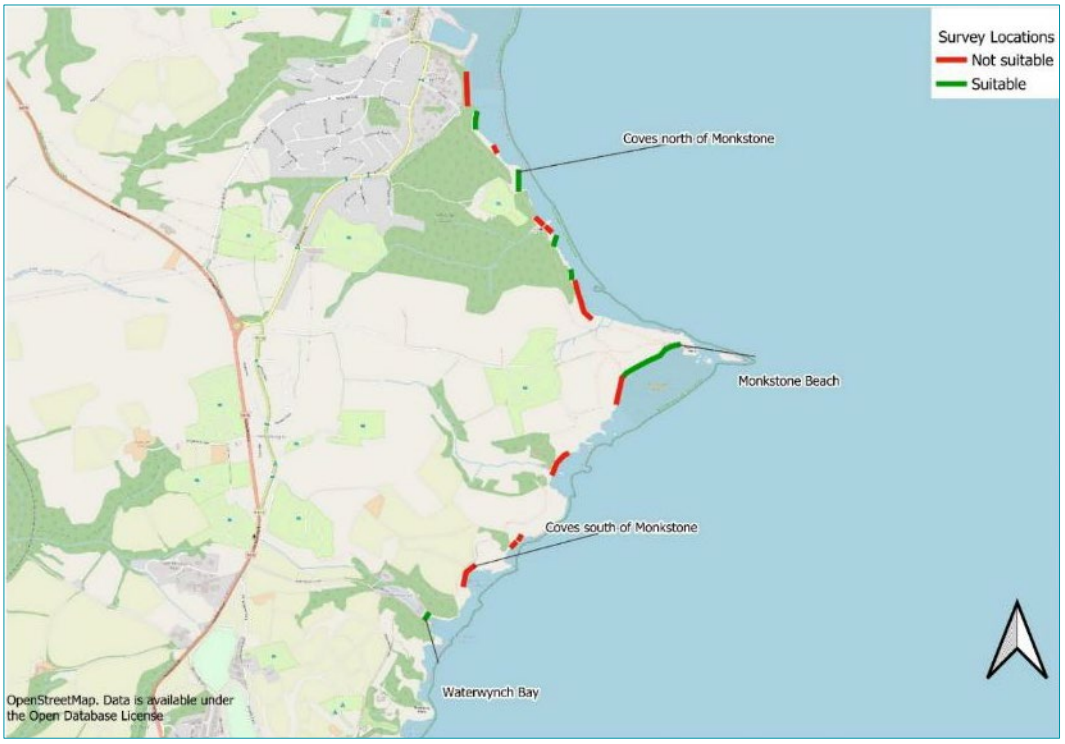


Figure 19. Coves north & south of Monkstone Beach.

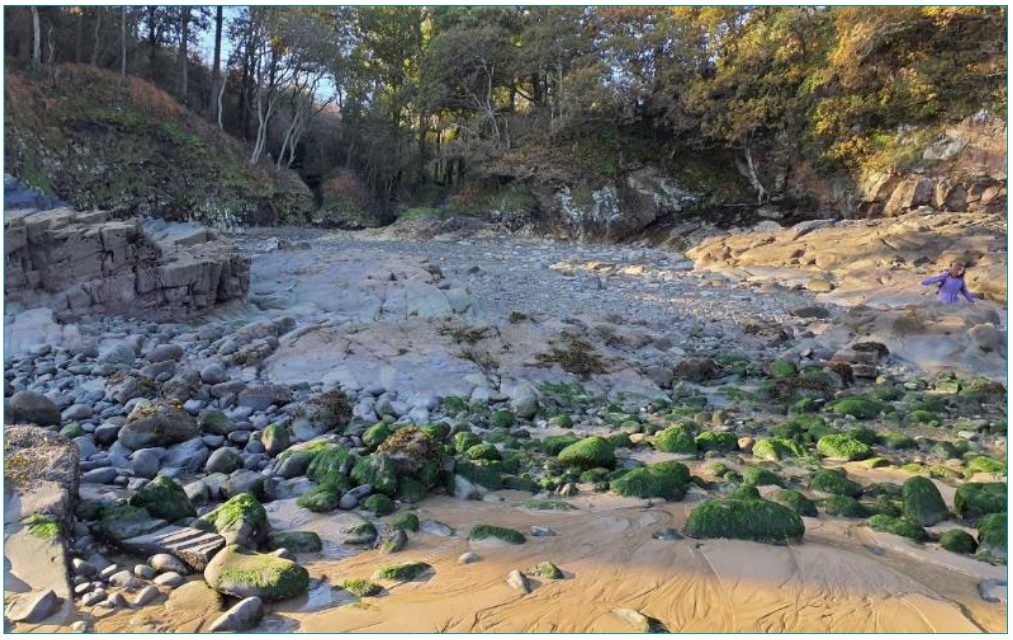
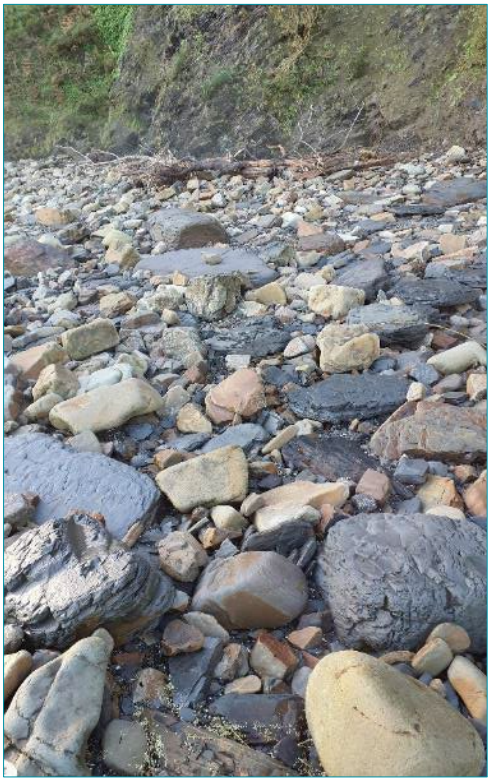


Figure 20. Unsuitable habitat in small coves north of Monkstone Point to Saundersfoot

Figure 21. Unsuitable habitat in small coves north of Monkstone Point to Saundersfoot



Figures 22 and 23. Unsuitable habitat in small coves north of Monkstone Point to Saundersfoot

Three examples of potentially suitable habitat in the four small coves north of Monkstone Point to Saundersfoot. The shingle looks suitable, but their easterly aspect and small size make them sub-optimal.

Figure 24. Potentially suitable habitat Monkstone Point to Saundersfoot

Figure 25. Potentially suitable habitat Monkstone Point to Saundersfoot

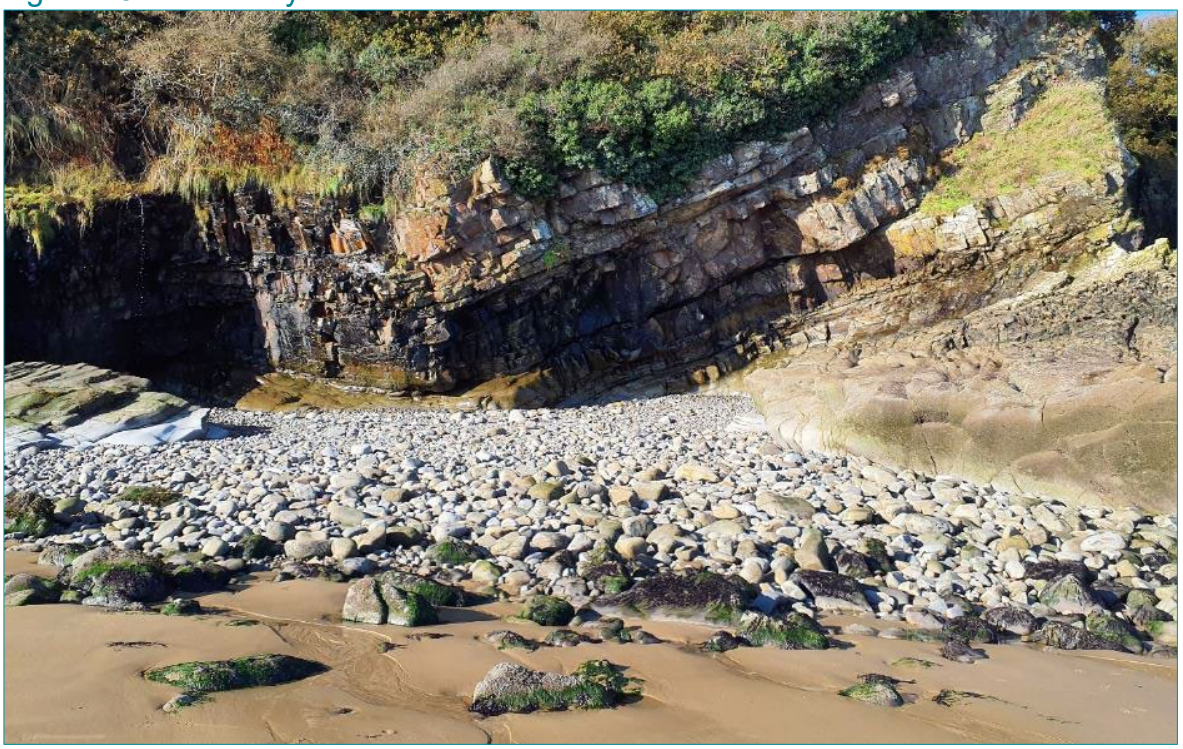


Figure 26. Potentially suitable habitat Monkstone Point to Saundersfoot

Examples of unsuitable habitat in several small coves south of Monkstone Point to Waterwynch Bay.

Figure 27. Unsuitable habitat Monkstone Point to Waterwynch Bay

Figure 28. Unsuitable habitat Monkstone Point to Waterwynch Bay

Figure 29. Waterwynch Bay, with a very small amount of suitable habitat.

Data Archive Appendix

The data archive contains:

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

~~[B] A full set of maps produced in JPEG format~~.

~~[C] A series of GIS layers on which the maps in the report are based with a series of word documents detailing the data processing and structure of the GIS layers~~.

~~[D] A set of raster files in ESRI and ASCII grid formats~~.

~~[E] A database named [name] in Microsoft Access 2000 format with metadata described in a Microsoft Word document [name.doc]~~.

~~[F] A full set of images produced in [jpg/tiff] format~~.

[G] Species records held in Welsh Invertebrate Database (WID).

Metadata for this project is publicly accessible through Natural Resources Wales' Data Discovery Service https://metadata.naturalresources.wales/geonetwork/srv (English version) and https://metadata.cyfoethnaturiol.cymru/geonetwork/cym/ (Welsh Version). The metadata is held as record no. **NRW_DS161306**.