Cyfoeth Naturiol Cymru
Natural Resources Wales

Pre-intervention sand lizard surveys at Tywyn Aberffraw and Newborough Warren for Sands of LIFE

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SoLIFE: LIFE 17 NAT/UK/000023
The Twyni Byw-Sands of LIFE project has received funding from the LIFE Programme of the European Union
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Executive Summary

- Sands of LIFE (SoLIFE LIFE17 NAT/UK/000023) is a major conservation project to rejuvenate 2,400 ha of sand dunes across Wales between 2018 and 2022. It will reprofile dunes, create bare sand to promote mobility, lower the surface of dried-out dune slacks, encourage sustainable grazing, and remove scrub and invasive non-native species.
- Sands of LIFE has received funding from the LIFE Programme of the European Union and is part funded by the Welsh Government.
- Sand lizard populations were discovered at Tywyn Aberffraw and Newborough Warren during the early 21st century, presumed to be unofficial introductions. As European Protected Species, appropriate survey and mitigation is necessary before any interventions are carried out.
- The survey was carried out in areas in the fore-dunes where SoLIFE interventions are planned.
- At each site, 10 visual-search survey visits were made during the main sand lizard survey periods of April, May and September, during extensive walkovers of the intervention areas and 200m buffers. All sand lizard and common lizard sightings were recorded. Despite selecting optimal months, detectability was impaired by weather conditions being too warm or too cool at times.
- Sand lizards were recorded extensively along the frontal dunes at both sites, albeit with some gaps. Sightings on secondary dunes were scarce, and none at all were seen in rear dunes more than 100m from the frontal edge. Common lizards were similarly distributed on the frontals, scarce on fixed/secondary dunes up to 200m back, and rare (Newborough Warren) or absent (Tywyn Aberffraw) from the rear dunes.
- Across 10 visits, 35 sand lizard encounters were recorded within the 200m buffer survey area at Tywyn Aberffraw, but only 13 in the survey area at Newborough Warren, the larger site. Breeding within the last year was evident at both sites. Common lizard sightings were 52 within the survey area at Tywyn Aberffraw, and 27 at Newborough Warren.
- The sand lizard population at Tywyn Aberffraw appears well-established, albeit confined to the frontal area, as is typical for dune sites. Up to 50cm of mobile sand was deposited on the frontal ridge during summer 2019, which is likely to have buried some sand lizards.
- The sand lizard population at Newborough Warren is low-density, patchy and disjunct, and has been heavily impacted by recent frontal erosion. Much of the frontal ridge has been lost, and with it, much of the previously-occupied sand lizard habitat. Existing notches form potential barriers to dispersal. Eroded areas and accreting areas are devoid of sand lizards, as they lack the required ecotonal stability and marram thatch. The topography of the remaining frontal edge is unfavourable in many places, with significant stretches of steep east-facing frontal dunes being all that remain.
- As expected, sand lizards are completely absent from the extensive stock-grazed areas at Newborough Warren, and from the extensive blow-outs, slacks and areas of short-cropped vegetation within the surveyed area at both sites.
- The proposed frontal notch at Tywyn Aberffraw will have a high impact on sand lizards, requiring mitigation. A programme of strimming to reduce the vegetation cover, combined with capture/translocation, would be needed to clear the notch

area of lizards prior to the works. A reptile ecologist should be present during the notch works. If the notch location could be moved 200m west (to the west edge of the buffer), it would have minimal impact, as no sand lizards were recorded there.

- The two proposed frontal notches at Newborough Warren will have a low impact, as sand lizards are scarce along the frontal edge. Strimming should be conducted to disperse any lizards from the notch areas. A reptile ecologist should be present during the notch works as a precaution, but capture/translocation is not warranted and would not be proportionate for the minimal risk to sand lizards.
- An EPS licence will be needed at Tywyn Aberffraw for the currently-proposed notch location but will not be needed at Newborough Warren.
- The proposed slack-lowering works and other interventions at Newborough Warren will not impact sand lizards and will not require an EPS licence.

1. Introduction

1.1. Sands of LIFE

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

The project covers 10 sites across four Special Areas of Conservation. These are: Tywyn Aberffraw; Newborough Warren; Morfa Dinlle; Morfa Harlech; Morfa Dyffryn; Laugharne-Pendine Burrows; Pembrey Burrows; Whiteford Burrows; Kenfig and Merthyr Mawr. The project runs from September 2018 to December 2022.

1.2. Tywyn Aberffraw and Newborough Warren

Tywyn Aberffraw and Newborough Warren are coastal dune sites on the southwest coast of Anglesey in Northwest Wales. Sand lizard (*Lacerta agilis*) was historically present on the North and Northwest Wales coast, and has been reintroduced to multiple mainland sites in the early 21st century, but not Anglesey. Sand lizards were discovered at Tywyn Aberffraw and Newborough Warren during the early 21st century, and are presumed to be from unofficial introductions.

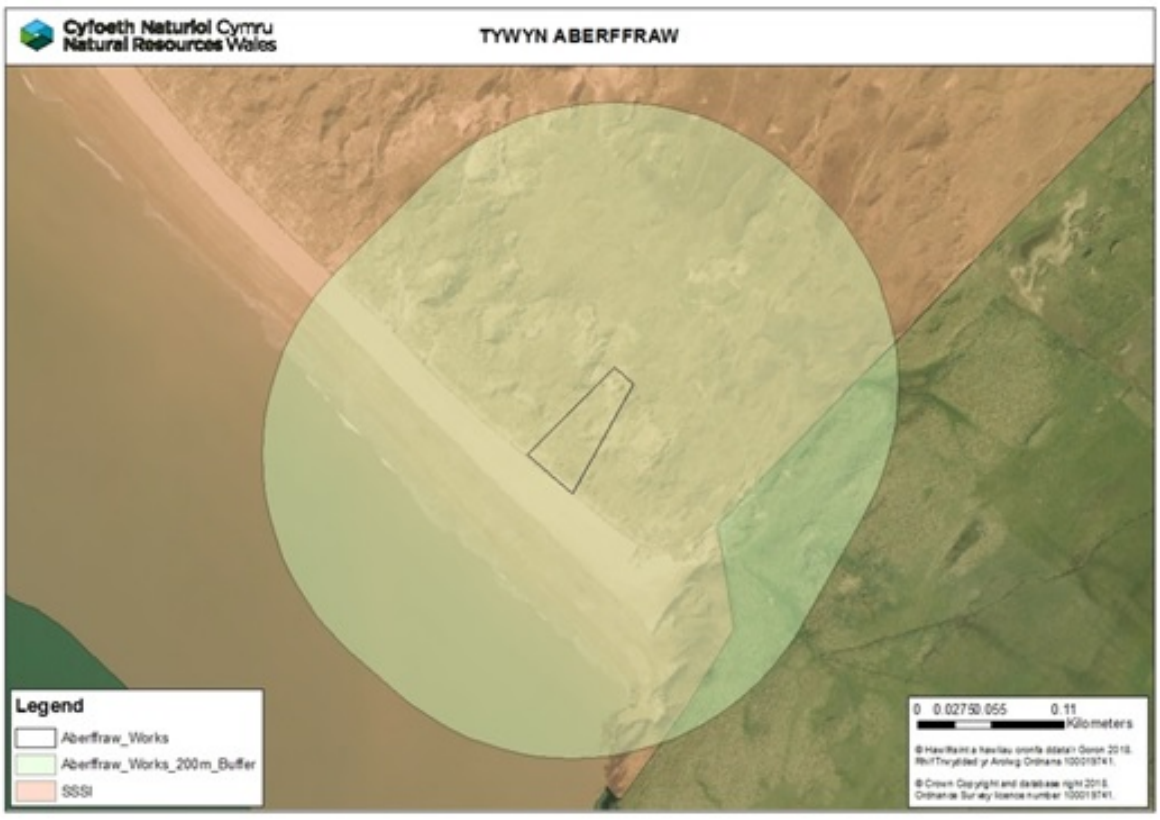

Figure 1 – Proposed notch and 200m buffer at Tywyn Aberffraw.

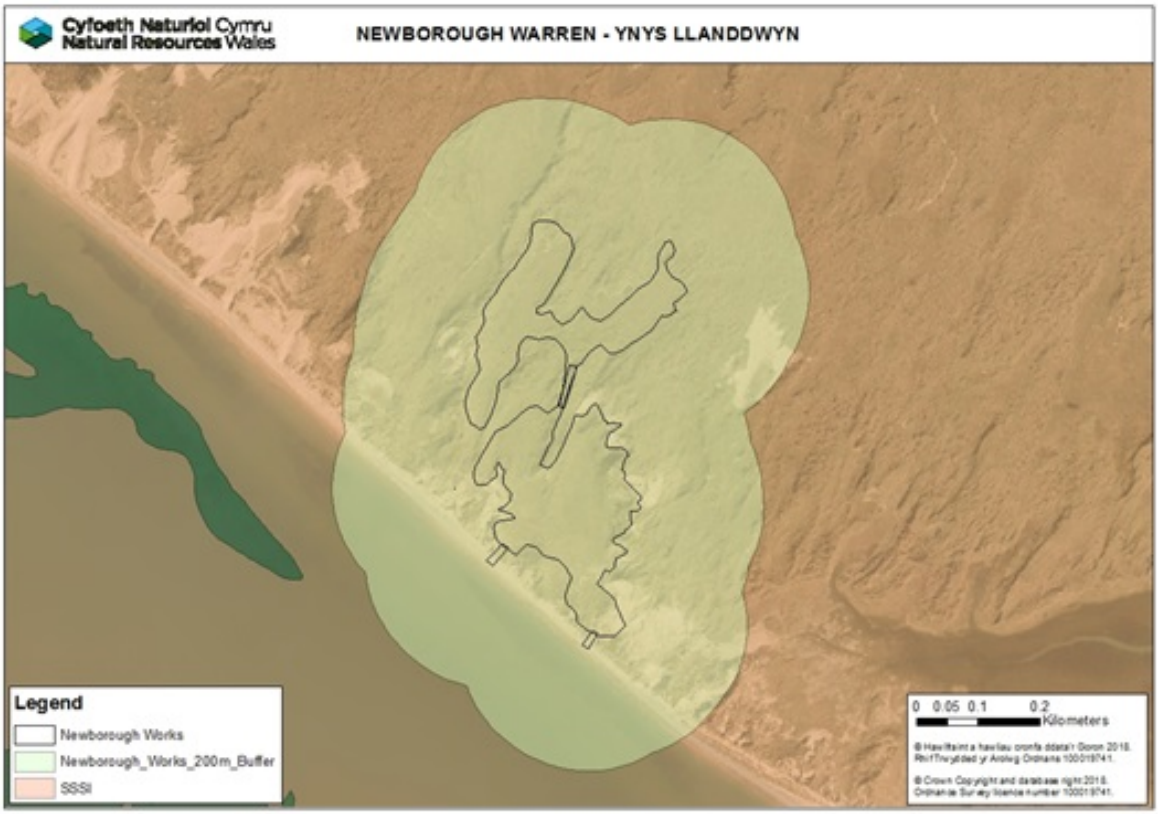

Figure 2 – Proposed notch, slack scrapes and 200m buffer at Newborough Warren.

A previous survey by Amphibian and Reptile Conservation at Newborough in September 2015, conducted to assess the impact of recent notch works, recorded 10 sand lizards from six days of searching (Hill et al 2018). Although September is suboptimal for survey, this was a low detection rate for sand lizards, with common lizards (*Zootoca vivipara*) being comparatively more frequent. It was concluded that 17% of occupied habitat had been lost due to notch works, and that such works should be mitigated. As sand lizard is a European Protected Species, a pre-intervention survey is necessary for Sands of LIFE, with appropriate mitigation if required.

3.3. Survey brief

The Sands of LIFE project is conducting pre-intervention surveys in order to obtain up-to-date evidence on the distribution of sand lizard as a EPS, and to be able to identify suitable methods of avoidance, mitigation, translocation or compensation to avoid impact of proposed management interventions if necessary. Sands of LIFE commissioned skilled and appropriately-licensed surveyors to carry out the work, using standard techniques and survey periods. The pre-intervention survey was carried out in spring and late summer 2019. The post-intervention re-survey will follow the same methodology, and take place in spring and late summer 2022.

2. Methods

2.1. Survey effort

At each site, 10 walkover survey visits were made during the main sand lizard survey periods of April, May and September 2019. Detectability is highest during April and May, particularly for adults, and especially males. The summer months generally have poor detectability. September is better than the summer, but not as good as spring, but are useful for detecting hatchlings.

At Tywyn Aberffraw, visits 1, 2, 3, 5 and 6 were conducted by Peter Hill, with visits 4, 7, 8, 9 and 10 conducted by Chris Gleed-Owen. At Newborough, visits 1, 2, 5 and 6 were by Peter Hill, with visits 3, 4, 7, 8, 9 and 10 by Chris Gleed-Owen. Both are licensed surveyors with extensive experience of sand lizard survey on coastal dune systems in England and Wales.

One whole day was allocated for each survey visit at Newborough Warren, and half a day for each visit at Tywyn Aberffraw. Effort was spread across the 200m buffer zone evenly, making zigzag 'Pollard walks' to cover as much ground as possible, whilst targeting the most likely habitat features. Walking to and from Aberffraw took about half an hour each way, and at Newborough took around 45 minutes each way. Lizards were recorded during the walks to and from site if observed, but no survey techniques were employed.

2.2. Detection method

Visual search was used for detecting sand lizards (and common lizards), targeting times of day and weather conditions when lizards were expected to be basking and active. This tends to be sunny or intermittently-sunny weather with air temperature around 10-15°C; or bright cloudy weather with air temperature of 15-20°C. High winds (which are often unavoidable on dunes) hamper detection. Sunshine after rain is a particularly good time to survey, especially after a spell of dry weather.

Artificial refugia were not used. They can be effective for sand lizard detection, but are impractical to deploy on the scale required for this project.

All lizard sightings were recorded, and grid references captured using handheld GPS (Global Positioning System) devices. Photographs were taken where possible. Data were imported into GIS (Geographical Information System) and digital maps were produced to show sand lizard distribution in relation to the proposed interventions and buffer areas.

2.3. Limitations

It is difficult to survey a large site in consistent weather conditions, as the weather changes, and survey windows of optimal conditions rarely last for more than one or two hours. To survey a whole day or even half a day, there is unavoidable inherent variability in detection rates; hence the need for at least 10 visits. The weather in April and May 2019 was particularly uncooperative, with extended periods that were too warm and dry or too cool and cloudy. Nevertheless, the data collected are robust enough to draw the conclusions required.

3. Results

3.1. Overview

Sand lizards were recorded extensively along the frontal dunes at both sites, albeit with some gaps. Sightings on secondary dunes were scarce, and none at all were seen in rear dunes more than 100m from the frontal edge. Common lizards were similarly distributed on the frontals, scarce on fixed/secondary dunes up to 200m back, and rare (Newborough Warren) or absent (Tywyn Aberffraw) from the rear dunes.

3.2. Tywyn Aberffraw

Across 10 visits, a total of 35 sand lizards encounters were recorded within the 200m buffer survey area at Aberffraw. An additional eight sand lizards were seen during the walks to and from the survey area, along the frontal ridge. Breeding was evident from five sand lizard juveniles hatched in 2018, but no 2019 hatchlings were seen in the September visits. There were 52 common lizard sightings within the survey area, with an additional six on the walk to and from site. Five unidentified lizards were recorded in the survey area, and one outside, any of which could have been sand lizards.

The frontal dune habitat at Aberffraw is in broadly favourable condition, although windy weather in summer 2019 mobilised beach sand and dumped up to 50cm of sand on the frontal ridge. This inevitably buried some sand lizards. Blowouts, slacks and most of the rear dune areas are uninhabitable for sand lizards. The vegetation is either too short or too fixed and scrubbed-up.

Figure 3 – Overview of survey results at Tywyn Aberffraw.
Green dots = sand lizard, brown dots = common lizard, grey dots = indeterminate lizard, yellow line = survey area.

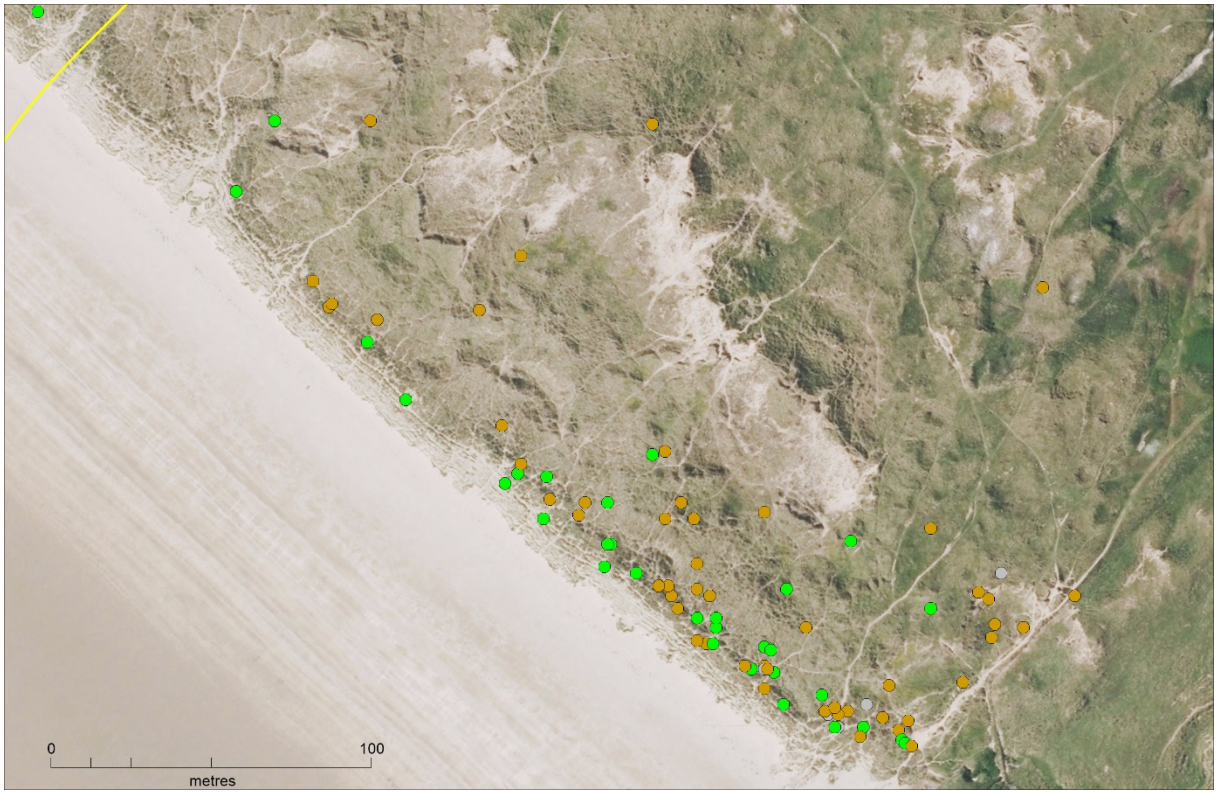

Figure 4 – Detailed view of survey results at Tywyn Aberffraw.
Green dots = sand lizard, brown dots = common lizard, grey dots = indeterminate lizard, yellow line = survey area.

3.3. Newborough Warren

Across 10 visits, a total of 13 sand lizards encounters were recorded within the 200m buffer survey area at Newborough Warren. An additional two sand lizards were seen during the walks to and from the survey area, along the frontal ridge. The only evidence of breeding was one 2019 hatchling observed in September. There were 27 common lizard sightings within the survey area, with an additional 11 on the walk to and from site, and outside the buffer. This included two common lizards in the rear dunes over 400m and 700m away from the frontal ridge. Three unidentified lizards were recorded in the survey area, and four outside, any of which could have been sand lizards.

The frontal dunes at Newborough Warren have suffered severe recent erosion, presumably during the winters of the last two to three years. This has left high sand cliffs, with exposed marram (*Ammophila arenaria*) roots hanging down, and deep blow-outs. The previous notches have also caused significant habitat fragmentation, as pointed out by Hill et al (2018). The remaining frontals are a mix of good/optimal habitat and poor habitat. Some frontal dunes have been reduced to steep east-facing slope remnants, with their west halves completely gone. The east-facing slopes offer insufficient diversity of aspect for sand lizard habitation. Elsewhere on the frontals, sand mobility has created large fields of recently-accreted sand, with only one season of marram protruding. At least two years of growth is required to create sufficient marram thatch for sand lizard colonisation.

Away from the frontals, the secondary dunes tend to be more fixed, with continuous grass and intermittent scrub that is unattractive to sand lizards. Large stock-grazed enclosures extend back through the rest of the survey areas, including extensive slacks. These grazed areas are almost entirely uninhabitable by sand lizards, as the sward is too short (mostly due to grazing), with only a few isolated dune-tops and localised patches of vegetation that is tall or structured enough for sand lizards. The fragmentation of these patches makes them sterile for sand lizards.

Figure 5 – Overview of survey results at Newborough Warren.
Green dots = sand lizard, brown dots = common lizard, grey dots = indeterminate. lizard, yellow line = survey area.

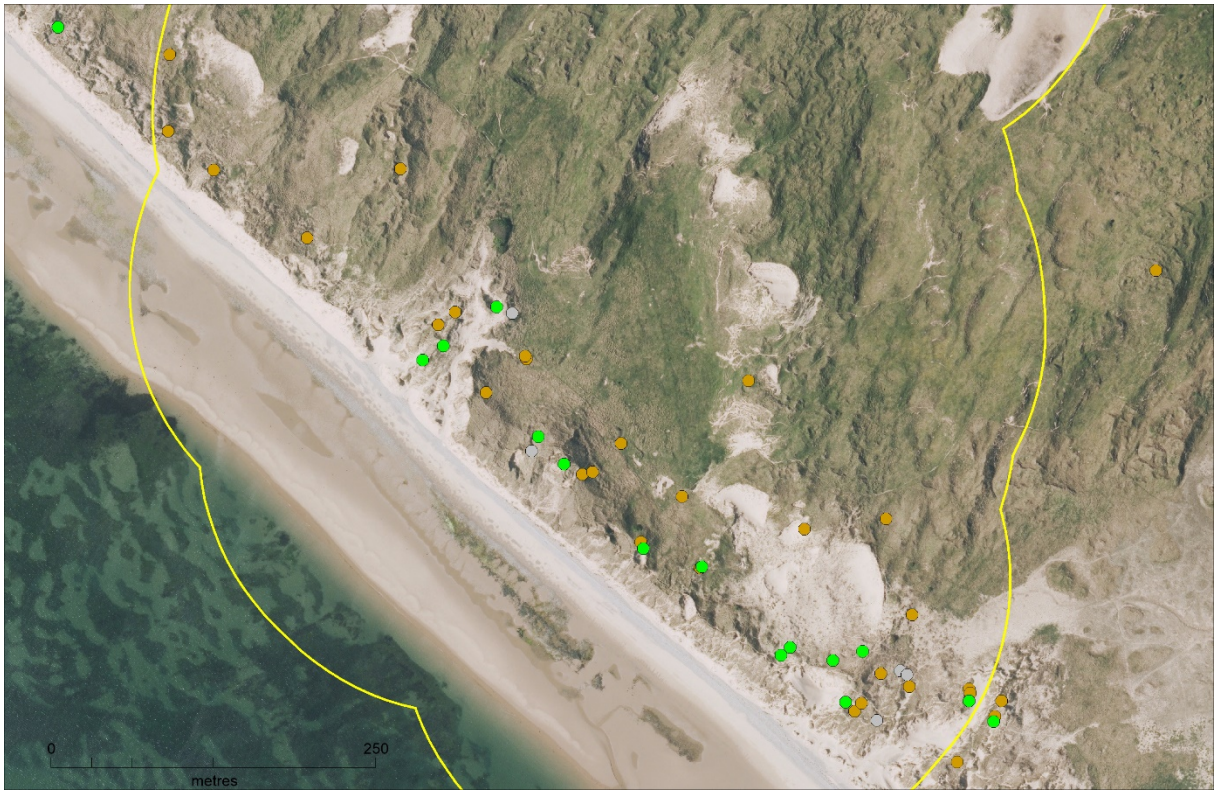

Figure 6 – Detailed view of survey results at Newborough Warren.
Green dots = sand lizard, brown dots = common lizard, grey dots = indeterminate lizard, yellow line = survey area.

4. Discussion

4.1. Tywyn Aberffraw

4.1.1. Sand lizard population status

The sand lizard population at Tywyn Aberffraw appears to be well-distributed and well-established, albeit confined to the frontal area, as is typical for dune sites. Recent breeding was evident, and the density of sightings was good. The habitat is optimal along the length of the frontal dunes. Up to 50cm of mobile sand was deposited on the frontal ridge during summer 2019, which is likely to have buried some sand lizards, but otherwise the population's prospects are good.

4.1.2. Impact of proposed interventions

The proposed frontal notch at Aberffraw will have a high impact on a small area of the sand lizard population. It could cause death or injury to multiple sand lizards, and therefore requires avoidance or mitigation. Avoidance would be preferable. Mitigation will be necessary if avoidance is not possible.

4.1.3. Mitigation required

Avoidance of impact on sand lizards would be possible if the notch location could be moved 200m west (to the west edge of the buffer). Here it would have minimal impact, as no sand lizards were recorded in that area.

Adhering to the proposed notch location will necessitate mitigation. This must involve a programme of strimming to reduce the vegetation cover, combined with capture/translocation, to clear the notch area of lizards prior to the works.

Vegetation should be strimmed to 10cm and then to as close to the ground as possible, during weather or times of day that sand lizards will not be active. A dense array of artificial refugia (such as roofing felt mats 30cm x 50cm) should be deployed on the notch area, to give refuge for emerging lizards. A programme of capture visits should then be conducted during the April-May period, translocating any lizards caught to other optimal habitat. They are unlikely to return if the vegetation is kept strimmed to the ground on a regular basis. As a precaution, a licensed reptile ecologist should be present during the notch works.

An EPS licence will be needed at Aberffraw for the currently-proposed notch location, but would not be needed if the location is moved to an area with no sand lizard records.

4.2. Newborough Warren

4.2.1. Sand lizard population status

The sand lizard population at Newborough Warren is low-density, patchy and disjunct, and has been heavily impacted by recent frontal erosion, as well as by previous notch work (Hill et al 2018). Much of the frontal ridge has been lost to erosion, and with it, much of the previously-occupied sand lizard habitat. The existing notches also form potential barriers to dispersal. Eroded areas

and accreting areas along the frontal ridge are devoid of sand lizards, as they lack the required ecotonal stability and marram thatch. The topography of the remaining frontal edge is unfavourable in many places, with significant stretches of steep east-facing frontal dunes being all that remain. Intensive searching produced few or no sightings on habitat that appeared optimal, presumably a result of the population being stressed overall.

As expected, sand lizards (and common lizards) are completely absent from the extensive stock-grazed areas at Newborough, and from the extensive blow-outs, slacks and areas of short-cropped vegetation at both sites.

4.2.2. Impact of proposed interventions

The two proposed frontal notches at Newborough Warren will have a low impact, as sand lizards are scarce along the frontal edge. The proposed slack-lowering and other interventions will not impact sand lizards.

4.2.3. Mitigation required

Strimming should be conducted to disperse any lizards from the notch areas, A reptile ecologist should be present during the notch works as a precaution, but capture/translocation is not necessary, as the impact on sand lizards will be negligible. The number of individuals affected is likely to be zero or one. None of the proposed works will require an EPS licence.

Figure 7 – Male sand lizard basking at Tywyn Aberffraw on 25 May 2019. (Photo: Chris Gleed-Owen).

Figure 8 – Male sand lizard basking at Newborough Warren on 23 April 2019. (Photo: Chris Gleed-Owen).

Figure 9 – Male sand lizard basking at Newborough Warren on 23 April 2019. (Photo: Chris Gleed-Owen).

Figure 10 – Male sand lizard basking at Newborough Warren on 20 April 2019. (Photo: Peter Hill).

Figure 11 – Hatchling sand lizard captured whilst active at Newborough Warren on 25 September 2019 (Photo: Chris Gleed-Owen).

Figure 12 – Hatchling sand lizard at Newborough Warren on 25 September 2019, after being captured, photographed and released (Photo: Chris Gleed-Owen).

5. References

Hill P, Moulton N & Foster J. 2018. *Sand lizard surveys at Newborough Warren NNR and sand dune habitat management guidance.* NRW Evidence Report No 302. NRW, Bangor.

Data Archive Appendix

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

The data archive contains:

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

[B] 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

[C] A full set of images produced in JPEG format.

[D] Location records as submitted to Cofnod

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

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