Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A

2019-2024

Conservation status assessment for the habitat:

H2150 - Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)

Wales

Cyfoeth Naturiol Cymru
Natural Resources Wales

JNCC

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This report was produced by JNCC in collaboration with Natural Resources Wales.

This document should be cited as:

Natural Resources Wales and JNCC. (2026). Conservation status assessment for the habitat: H2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*).

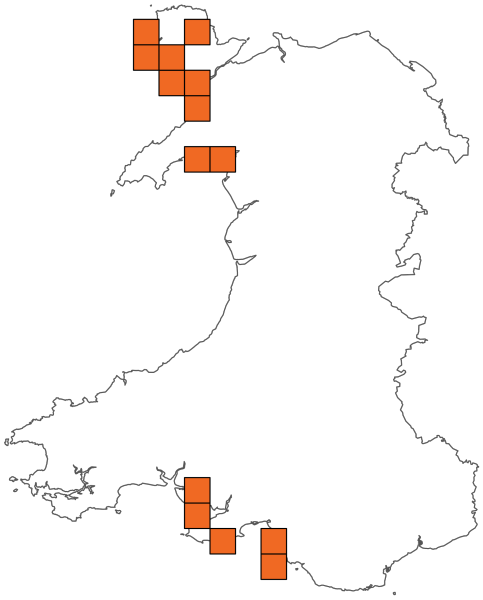
Important note - Please read

- The information in this document represents Wales Report under The Conservation of Habitats and Species Regulations 2017 (as amended), Regulation 9A, for the period 2019-2024.
- It is based on supporting information provided by Natural Resources Wales, which is documented separately.
- The Habitats Regulations reporting 2019-2024 Approach Document provides details on how this supporting information contributed to the UK Report and the fields that were completed for each parameter.
- Maps showing the distribution and range of the habitat are included.
- Explanatory notes (where provided) are included at the end. These provide additional audit trail information to that included within the assessments. Further underpinning explanatory notes are available in the related country reports.
- Some of the reporting fields have been left blank because either: (i) there was insufficient information to complete the field; (ii) completion of the field was not obligatory; and/or (iii) the field was not relevant to this habitat (section 11 National Site Network coverage for Annex I habitats).

Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)

Distribution Map



Range Map

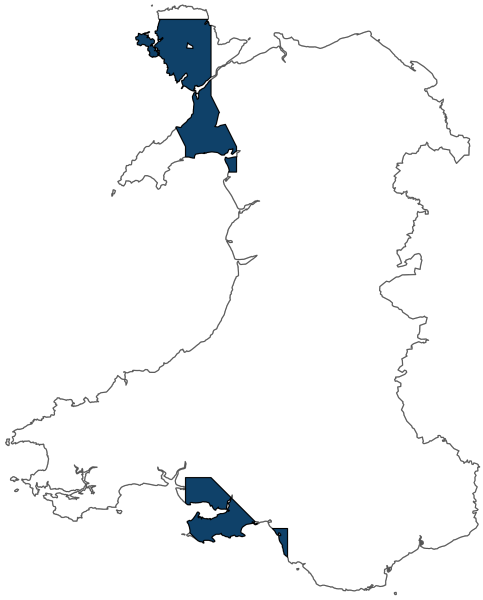


Figure 1: Wales distribution and range map for H2150 - Atlantic decalcified fixed dunes (*Calluno-Ulicetea*). Coastline boundary derived from the Oil and Gas Authority's OGA and Lloyd's Register SNS Regional Geological Maps (Open Source). Open Government Licence v3 (OGL). Contains data © 2017 Oil and Gas Authority. The 10km grid square distribution map is based on available habitat records within the current reporting period.

Table 1: Table summarising the conservation status for H2150 - Atlantic decalcified fixed dunes (*Calluno-Ulicetea*). Overall conservation status for habitat is based on assessments of range, area covered by habitat, structure and functions, and future prospects.

Overall Conservation Status (see section 10)

Unfavourable-bad (U2)

Breakdown of Overall Conservation Status

Range (see section 4)	**Favourable (FV)**
Area covered by habitat (see section 5)	**Unfavourable-inadequate (U1)**
Structure and functions (see section 6)	**Unfavourable-bad (U2)**
Future prospects (see section 9)	**Unfavourable-bad (U2)**

List of Sections

National Level

1. General information

1.1 Country	Wales
1.2 Habitat code	H2150 - Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)

2. Maps

2.1 Year or period	1991-2022
2.2 Distribution map	Yes
2.3 Distribution map; Method used	Complete survey or a statistically robust estimate

2.4 Additional information

No additional information

Biogeographical Level

3. Biogeographical and marine regions

3.1 Biogeographical or marine region where the habitat occurs ATL

3.2 Sources of information

See section 13 References

4. Range

4.1 Surface area (km²)	1,092.38
4.2 Short-term trend; Period	2013-2024
4.3 Short-term trend; Direction	Stable
4.4 Short-term trend; Magnitude	

a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
4.5 Short-term trend; Method used	Complete survey or a statistically robust estimate
4.6 Long-term trend; Period	
4.7 Long-term trend; Direction	
4.8 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Rate of decrease	
4.9 Long-term trend; Method used	

4.10 Favourable Reference Range (FRR)

a) Area (km²)	
b) Pre-defined increment	Current range is less than 2% smaller than the FRR
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

4.11 Change and reason for change in surface area of range

a) Change	Yes
b) Genuine change	No

c) Improved knowledge or more accurate data	Yes
d) Different method	No
e) No information	No
f) Other reason	No
g) Main reason	Improved knowledge/more accurate data

4.12 Additional information

No additional information

5. Area covered by habitat

5.1 Year or period	1991-2022
5.2 Surface area (km²)	
a) Minimum	
b) Maximum	
c) Best single value	0.2011
5.3 Type of estimate	Best estimate
5.4 Surface area; Method used	Complete survey or a statistically robust estimate
5.5 Short-term trend; Period	
5.6 Short-term trend; Direction	Unknown
5.7 Short-term trend; Magnitude	
a) Estimated minimum	
b) Estimated maximum	
c) Pre-defined range	
d) Unknown	
e) Type of estimate	
f) Rate of decrease	
5.8 Short-term trend; Method used	Insufficient or no data available

5.9 Long-term trend; Period	1991-2022
5.10 Long-term trend; Direction	Decreasing
5.11 Long-term trend; Magnitude	
a) Minimum	40
b) Maximum	40
c) Confidence interval	
d) Rate of decrease	Decreasing <=1% (one percent or less) per year on average
5.12 Long-term trend; Method used	Based mainly on extrapolation from a limited amount of data
5.13 Favourable Reference Area (FRA)	
a) Area (km²)	
b) Pre-defined increment	Current area is between 2% and 10% smaller than the FRA
c) Unknown	No
d) Method used	Reference-based approach
e) Quality of information	moderate

5.14 Change and reason for change in surface area of range

a) Change	Yes
b) Genuine change	Yes
c) Improved knowledge or more accurate data	Yes
d) Different method	Yes
e) No information	No
f) Other reason	No
g) Main reason	Genuine change

5.15 Additional information

No additional information

6. Structure and functions

6.1 Condition of habitat (km²)

Area in good condition	
ai) Minimum	0
aii) Maximum	0
Area not in good condition	
bi) Minimum	0.0741
bii) Maximum	0.0741
Area where condition is unknown	
ci) Minimum	0.127
cii) Maximum	0.127
6.2 Condition of habitat; Method used	Based mainly on extrapolation from a limited amount of data
6.3 Short-term trend of habitat area in good condition; Period	
6.4 Short-term trend of habitat area in good condition; Direction	Unknown
6.5 Short-term trend of habitat area in good condition; Method used	Insufficient or no data available

6.6 Typical species

Has the list of typical species changed in comparison to the previous reporting period?	No

6.7 Typical species; Method used

6.8 Additional information

Typical species were not used directly in the assessment of conservation status for habitat structure and function as a comprehensive list of typical species for each habitat was not available. However, the status of typical species was considered when the condition of individual sites was assessed using Common Standards Monitoring Guidance. Common Standards Monitoring (CSM) data was used to assess the area of habitat in 'good' and 'not good' condition (field 6.1). Species were a component of the attributes assessed under CSM. Therefore, an assessment of species is considered to have formed part of the reporting under field 6.1 which supported the Habitats Structure and Function assessment (field 10.3).

7. Main pressures

7.1 Characterisation of pressures

Table 2: Pressures affecting the habitat, including timing and importance/impact ranking. Pressures are defined as factors acting currently and/or during the reporting period (2019–2024). Rankings are: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Pressure	Timing	Ranking
PA05: Abandonment of management/use of grasslands and other agricultural and agroforestry systems (e.g. cessation of grazing, mowing or traditional farming)	Ongoing and likely to be in the future	High (H)
PA08: Extensive grazing or undergrazing by livestock	Ongoing and likely to be in the future	High (H)
PA20: Live stock farming generating pollution	Ongoing and likely to be in the future	High (H)
PB02: Conversion from one type of forestry land use to another	Ongoing and likely to be in the future	Medium (M)
PE01: Roads, paths, railroads and related infrastructure	Ongoing and likely to be in the future	Medium (M)
PF05: Sports, tourism and leisure activities	Ongoing and likely to be in the future	High (H)
PH01: Military, paramilitary or police exercises and operations on land and freshwater	Ongoing and likely to be in the future	Medium (M)
PI02: Other invasive alien species (other than species of Union concern)	Ongoing and likely to be in the future	High (H)

PI03: Problematic native species	Ongoing and likely to be in the future	High (H)
PJ01: Temperature changes and extremes due to climate change	Ongoing and likely to be in the future	Medium (M)
PJ03: Changes in precipitation regimes due to climate change	Ongoing and likely to be in the future	Medium (M)
PJ10: Change of habitat location, size, and / or quality due to climate change	Ongoing and likely to be in the future	Medium (M)
PK03: Mixed source air pollution, air-borne pollutants	Ongoing and likely to be in the future	High (H)
PK04: Atmospheric N-deposition	Ongoing and likely to be in the future	High (H)
PM07: Natural processes without direct or indirect influence from human activities or climate change	Ongoing and likely to be in the future	High (H)

7.2 Sources of information

See section 13 References

7.3 Additional information

No additional information

8. Conservation measures

8.1: Status of measures

a) Are measures needed?	Yes
b) Indicate the status of measures	Measures identified and taken
8.2 Main purpose of the measures taken	Restore the structure and functions, including the status of typical species (related to 'Specific structure and functions')
8.3 Location of the measures taken	Only outside National Site Network
8.4 Response to measures	Medium-term results (within the next two reporting periods, 2025–2036)

8.5 List of main conservation measures

Table 3: Key conservation measures addressing current pressures and/or anticipated threats during the next two reporting periods (2025–2036). Measures are ranked by importance/impact: High (direct/immediate influence and/or large spatial extent) and Medium (moderate direct/immediate influence, mainly indirect and/or regional extent).

Conservation measure	Ranking
MA04: Reinstate appropriate agricultural practices to address abandonment, including mowing, grazing, burning or equivalent measures	High (H)
MA05: Adapt mowing, grazing and other equivalent agricultural activities (e.g. burning)	High (H)
MB01: Prevent conversion of (semi-) natural habitats into forests and of (semi-) natural forests into intensive forest plantation	Medium (M)
MB05: Adapt/change forest management and exploitation practices	Medium (M)
MC06: Reduce impact of service corridors and networks	Medium (M)
MC07: Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure	Medium (M)
ME01: Reduce impact of transport operation and infrastructure	Medium (M)
MF02: Habitat restoration of areas impacted by residential, commercial, industrial and recreational infrastructure, operations and activities	High (H)
MF03: Reduce impact of outdoor sports, leisure and recreational activities (incl. restoration of habitats)	High (H)
MF08: Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats).	High (H)
MH01: Reduce impact of military installations and activities	Medium (M)
MH04: Habitat restoration of areas related to military installations and activities and other specific human activities.	Medium (M)
MI03: Management, control or eradication of other invasive alien species	High (H)
MI05: Management of problematic native species	Medium (M)

MJ02: Implement climate change adaptation measures	High (H)
MK01: Reduce impact of mixed source pollution	High (H)
MM01: Management of habitats (others than agriculture and forest) to slow, stop or reverse natural processes that occur without direct or indirect influence from human activities or climate change	Medium (M)
MS03: Restoration of habitat of species from the directives	Medium (M)

8.6 Additional information

No additional information

9. Future prospects

9.1a Future trends of parameters

ai) Range	Overall stable
bi) Area	Unknown
ci) Structure and functions	Negative - slight/moderate deterioration

9.1b Future prospects of parameters

aii) Range	Good
bii) Area	Unknown
cii) Structure and functions	Bad

9.2 Additional information

No additional information

10. Conclusions

10.1 Range	Favourable (FV)
10.2 Area	Unfavourable-inadequate (U1)
10.3 Specific structure and functions (incl. typical species)	Unfavourable-bad (U2)
10.4 Future prospects	Unfavourable-bad (U2)

10.5 Overall assessment of Conservation Status	Unfavourable-bad (U2)
10.6 Overall trend in Conservation Status	Unknown

10.7 Change and reason for change in conservation status

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

10.7 Change and reason for change in conservation status trend

This field is not reported as the period 2019-2024 marks the first instance in which conservation status has been assessed at the national level, meaning no comparisons to previous reports can be drawn.

10.8 Additional information

No additional information

11. UK National Site Network (pSCIs, SCIs, SACs) coverage for Annex I habitat types

11.1 Surface area of the habitat type inside the pSCIs, SCIs and SACs network (km²)

a) Minimum	
b) Maximum	
c) Best single value	0.0521
11.2 Type of estimate	Best estimate
11.3 Habitat area inside the network; Method used	Complete survey or a statistically robust estimate
11.4 Short-term trend of habitat area within the network; Direction	Unknown

11.5 Short-term trend of habitat area within the network; Method used	Insufficient or no data available
11.6 Short-term trend of habitat area in good condition within the network; Direction	Unknown
11.7 Short-term trend of habitat area in good condition within the network; Method used	Insufficient or no data available

11.8 Additional information

No additional information

12. Complementary information

12.1 Justification of percentage thresholds for trends

No justification information

12.2 Other relevant information

No other relevant information

13. References

Biogeographical and marine regions

3.2 Sources of information

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Main pressures

7.2 Sources of information

No sources of information

14. Explanatory Notes

Field label	Note
2.3: Distribution map; Method used	The 10km square distribution and habitat area estimates are derived from a combination of different original sources, summarised below. A single updated aggregated GIS layer has been created for this habitat across Wales (data source 1 below) joining together the maps and records from the other listed sources. Data source 1 (MAIN DATA SOURCE): Digital GIS Map Layer: Reg 9A H2150 Atlantic decalcified dunes (Calluno – Ulicetea) Extent Layer (NRW, 2025). This GIS layer (updated in 2025) supersedes the layer produced for the 2019 Article 17 submission. Data source 2 (MAIN DATA SOURCE): Sands of LIFE National Vegetation Classification (NVC) survey (Heathcote, Finch, Lamacraft, et al., 2022), is a vegetation survey of the Sands of LIFE sand dune sites using the UKs National Vegetation Classification (NVC) (Rodwell, 2000). Data source 3 (MAIN DATA SOURCE): Dynamic Dunescapes National Vegetation Classification (NVC) survey (Heathcote, Finch, Carter, et al., 2022), is a vegetation survey of the Dynamic Dunescapes Welsh sand dunes sites using the UKs National Vegetation Classification (NVC) (Rodwell, 2000). Data source 4 (MAIN DATA SOURCE): National Vegetation Classification Survey of coastal shingle sites in Wales 2022 (Heathcote, Finch, & Harrison, 2022), is a vegetation survey of the vegetated shingle structures around the coastline of Wales using the UKs National Vegetation Classification (NVC) (Rodwell, 2000) and Coastal Vegetated Shingle communities defined by Sneddon and Randall (Sneddon & Randall, 1993).

Data source 5 (MAIN DATA SOURCE): Sand Dune Vegetation Survey of Great Britain Part 3 – Wales (Dargie, 1995). This was a comprehensive survey of all sand dunes in Wales (Ashall, Duckworth, & Holder, 1992a, 1992b, 1994, 1995; Ashall, Duckworth, Holder, et al., 1992a, 1992b, 1992c, 1994a, 1994b; Ashall, Duckworth, Holder, McConnell, et al., 1995a, 1995b; Ashall, Duckworth, Holder, & Smart, 1995a, 1995b; Ashall et al., 1994, 1994, 1994, 1994, 1995, 1995; Ashall, Holder, et al., 1992; Ashall & Holder, 1992a, 1992b, 1992c; Duckworth et al., 1992, 1995a, 1995b, 1995c; Duckworth & Holder, 1995a, 1995b; Holder, Duckworth, et al., 1994; Holder, Smart, et al., 1994; Huckbody et al., 1993) based on the UKs National Vegetation Classification (NVC) (Rodwell, 2000).

Data source 6 (MAIN DATA SOURCE): NRW survey and assessment of H11 Calluna vulgaris – Carex arenaria Dune Heath 2014-2015 (Sherry, 2015). This survey mapped dune heath at four location in Wales which are believed to be the largest extant areas of the habitat in Wales.

The Sand Dune surveys (Dargie, 1995) were carried out over 20 years ago and so several intra-site changes are likely to have occurred with one site known to have been virtually lost with only fragments of H2150 habitat remaining.

The H2150 habitat is found in 14, 10km grid squares, the distribution differs to that reported in 2013 (16 grid squares), however, this is due to the use of recent surveys (Heathcote, Finch, Carter, et al., 2022; Heathcote, Finch, & Harrison, 2022; Heathcote, Finch, Lamacraft, et al., 2022) rather than a genuine change in the distribution of the feature.

The data presented in this report is considered to give good representation of the current distribution and extent of this habitat.

4.3: Short-term trend; Direction	Whilst losses and (more rarely) gains in the area of this habitat have undoubtedly occurred at individual sites over the last twelve years, changes to the 10km square distribution and linked range of H2150 are considered unlikely. There are no known instances where the habitat has either been totally lost from a 10km square or created or restored within a 10km square, where it was not present at the start of the period.
4.4: Short-term trend; Magnitude	Not applicable (no decrease in range), i.e. 'stable' see 4.3
4.8: Long-term trend; Magnitude	Not applicable (no decrease in range)
4.11: Change and reason for change in surface area of range	There is no evidence of actual change in the range of this habitat since the last report in 2018. Re-analysis of the Sand Dune surveys (Dargie, 1995) and the Sherry (2015) dataset against the new Sands of LIFE and Dynamic Dunescapes vegetation surveys (Heathcote, Finch, Carter, et al., 2022; Heathcote, Finch, Lamacraft, et al., 2022) has resulted in 13, 10km squares where this habitat occurs (an addition of 2 new 10km grid squares (SH36 and SS77) and the removal of 5, 10km grid squares (SH46, SN40, SS39, SS49 and SS79)). The range now differs to that reported in 2018. This is due to recent vegetation survey data confirming presence or absence of the habitat.
5.2: Surface area	[2013-2018: 0.3364 km2 (33.64 ha)] Surface area figure has been generated from recent National Vegetation Classification (NVC) survey data from the Sands of Life and Dynamic Dunescapes projects (Heathcote, Finch, Carter, et al., 2022; Heathcote, Finch, Lamacraft, et al., 2022). These datasets have been combined with two older datasets the Sand Dune Survey of Wales (Dargie, 1995) dataset using occurrences of all H (Heath) communities and the 2015 NRW dune heath survey (Sherry, 2015), to determine an area figure for the Annex I habitat. Analysis of the 2022 data compared

	against the Sand Dune Vegetation Survey of Wales (Dargie, 1995) shows that the habitat has changed in extent and area on some sites due to vegetation succession and changes in management. Overall decrease in recorded area of 13.53 ha (40%).
5.6: Short-term trend; Direction	Studies show there has been a clear trend towards increasing stabilisation that has likely resulted in the loss of part of this habitat due to successional changes with decalcified fixed dunes being lost to scrub development (Rhind et al., 2001, 2006, 2013; Rhind & Jones, 2009).
5.8: Short-term trend; Method used	There is limited information on short term trends in extent of area for this habitat.
5.14: Change and reason for change in surface area	The change in the estimated area of this habitat is also the result of the re-analysis of existing sand dune NVC survey data (Dargie, 1995) (see section 5.2) against new survey data (Heathcote, Finch, Carter, et al., 2022; Heathcote, Finch, Lamacraft, et al., 2022) the shows that the habitat has changed in extent and area on some sites due to vegetation succession and changes in management. Genuine changes in surface area have been recorded from five sites in Wales – Cymyran, Morfa Bychan, Oxwich, Penmaen, Pennard Burrows and Crymlyn Burrows (Gillis & Heathcote, 2024; Heathcote, 2024b, 2024c, 2024a; Heathcote & Jones, 2024a, 2024b) since the Sand Dune Survey (Dargie, 1995) where decreases in area have been attributed to development, and vegetation changes such as encroachment of bracken and scrub species.
6.1: Condition of habitat	Figures from habitat condition monitoring from the Dynamic Dunescapes project.
6.2: Condition of habitat; Method used	H2150 is not a notified N2K feature on any of the Welsh SACs and resultantly the feature has not been condition assessed using Common Standards Monitoring (CSM) methodology. There is very little information available regarding the condition of the habitat both on statutory and non-statutory sites, due to small patch sizes of the habitat and relative isolation in all but a few examples. However, the condition of the habitat was assessed during the

	Dynamic Dunescapes project where broad condition assessments were made for each of the Annex I habitats occurring within the project sites (Gillis & Heathcote, 2024; Heathcote, 2024b, 2024c, 2024a; Heathcote & Jones, 2024a, 2024c, 2024b; Williams & Heathcote, 2024). The Dynamic Dunescapes project did not cover all the dune heath in Wales resultantly there is a large figure for the area of dune heath where the condition is not known. The condition of the dune heath outside of the Dynamic Dunescapes project (i.e. area where condition is not known) is likely to be 'not-good' since the failing attributes on assessed sites will be similar across all of the dune heath sites in Wales (e.g. bracken and scrub encroachment, over or under-grazing and the negative effects associated with atmospheric nitrogen deposition). 54% of the habitat resource in Wales is found in areas where the deposition of atmospheric nitrogen (2022 data) exceeds the Critical Load. The remainder of the habitat may be also be affected, to a lesser extent, by sub-critical load deposition. Condition is unknown for 63% of the dune heath habitat in Wales.
7.1: Characterisation of pressures	The assessment for the pressures and threats for H2150 is mainly based on expert judgement on the severity of these pressures and threats (at a generic level), to give an overall evaluation of the pressure and threat level. It must be noted that this habitat is not specifically identified in the NRW Safle database, therefore, no information can be provided regarding any identified issues for the habitat. The special sites (SSSI and SAC) include 68% of the H2150 resource in Wales by area. Pressures: Nine pressures are ranked as having a High impact.

PA05: Abandonment of management/use of grasslands and other agricultural and agroforestry systems (e.g. cessation of grazing, mowing or traditional farming) – Several dune systems in Wales have had a cessation of grazing and traditional management such as rabbit warrening, which has allowed dune habitats to become rank with scrubby species becoming dominant changing the character of the dune vegetation. Gorse, scrub and/or bracken can spread into dune heath and thisencroachment is problematic on several sites where there has been an abandonment of management (i.e. grazing).

PA08: Extensive grazing or under-grazing by livestock – Establishing and maintaining adequate grazing has been an ongoing problem for a number of sites and several sites are now showing evidence of insufficient grazing, resulting in rank grassland vegetation and scrub encroachment. Efforts are being made to reverse this trend on a number of sites. Some degree of grazing is normally necessary to maintain the typical dune heath communities of H2150. The H2150 habitat in Wales is typically under-grazed leading to invasion by coarse grasses and scrub.

PA20: Livestock farming generating pollution – Several sand dune systems are in close proximity to, or downwind of farms where agricultural activities generate pollution. Air pollution generated by poultry farming is harmful to sand dune habitats which are naturally nutrient limited. Other agricultural pollution types include runoff and enrichment associated with livestock feeders which can enter the dune system.

PF05: Sports, tourism and leisure activities – Problems include vehicle access, pedestrian access, camping and making fires within the habitat. The effect of pedestrian access can be significant where access to beaches through the dune front can cause significant erosion. Many Welsh sand dunes support golf courses and despite dune flora being 'maintained” outside of the fairways and greens, the

habitat can still be significantly modified by mowing, abstraction / drainage and fertilisation. Atlantic decalcified fixed dunes are particularly susceptible to the negative effects of visitor pressure (including trampling), horse riding and effects from both motorised and non-motorised vehicles. Atlantic decalcified fixed dunes tend to occur towards the back of dune systems where the substrate has become acidified by leaching and in areas out of the reach of calcareous sand rain. These areas are at the highest risk from recreational activities e.g. golf.

PI02: Other invasive alien species (other than species of Union concern) - Several dune systems in Wales (particularly in south Wales) have been badly affected by Sea buckthorn (Hippophae rhamnoides) invasion. The Sands of LIFE and Dynamic Dunescapes projects have both implemented a programme of Sea buckthorn management and control. However, Sea buckthorn is still extensive at Pembrey and Laugharne & Pendine. The AfterLIFE plan outlines actions to continue management to facilitate removal. Until Sea buckthorn has been eradicated from affected sites the pressure will remain classed as High.

PI03: Problematic native species – Lack of appropriate grazing combined with increasing levels of stabilisation have led to native scrub and bracken encroachment on several Atlantic decalcified fixed dunes sites.

PK03: Mixed source air pollution, air-borne pollutants – Sand dunes in close proximity to major roads in Wales are vulnerable to elevated levels of CO2 and other pollutants from road transport. Elevated levels of CO2 are linked to increased plant productivity which on sand dunes results in accelerated succession to rank grassland and scrub communities.

PK04: Atmospheric N-deposition – Atmospheric nitrogen deposition primarily in the form of nitrogen oxides (NOx)

and ammonia (NH3), poses a significant threat to sand dune ecosystems. Excessive nitrogen inputs can accelerate ecological succession, leading to; nutrient imbalances, altered plant communities, and have negative impacts on sensitive sand dune habitats, leading to a loss of diversity in species-rich dune grasslands and hampering restoration goals (Aggenbach et al., 2017). There have been concerns over the levels of atmospheric nitrogen pollution and its links to soil enrichment and eutrophication. 54% of the Atlantic decalcified fixed dunes in Wales are in areas which are currently subject to Nitrogen deposition rates which exceed the relevant Critical Load mapping value (2022 data).

PM07: Natural succession resulting in species composition change (other than by direct changes of agricultural or forestry practices) – Natural succession has undoubtedly been influenced by atmospheric nitrogen deposition and eutrophication of ground water and coupled with the lack of geomorphological processes, most sand dune sites in Wales are undergoing succession towards more stable rank grassland and scrub communities.

The following six pressures are considered to be important and are ranked as having a Medium impact:

PB02: Conversion from one type of forestry land use to another – Opportunities to restore areas of fixed dune grassland and dynamic conditions within conifer plantations on sand dunes are constrained or prevented by existing conifer plantations and future forest plans for re-stocking and changes from commercial conifer plantation to broadleaf forest.

PE01: Roads, paths, railroads and related infrastructure – Roads and paths criss-cross sand dune systems disrupting connectivity, geomorphological processes and acting as barriers to effective grazing. Pressure on sand dune systems also occurs when dune habitats are unable to

rollback with natural geomorphological processes due to the presence of a road, railway or related infrastructure.

PH01: Military, paramilitary or police exercises and operations on land – This relates to various factors such as military use and inappropriate vehicle use. Several of the sand dune sites in Wales have been historically used by the military and some are currently used by the military. Historical pressures relate to abandoned and demolished buildings and structures within the fixed dune grassland and the threat of Unexploded Ordnance (UXO) to management practices for habitat conservation. Where sand dune sites are currently used by the military the risk of UXO is great and military exercises can preclude the occurrence of conservation management due to safety issues.

PJ01: Temperature changes and extremes due to climate change – Sand dune habitats and species are adapted to drought conditions, however, premature desiccation and prolonged periods of drought associated with high temperatures can lead to grassland species change and an overall shift in species composition altering the overall structure and function of the habitat.

PJ03: Changes in precipitation regimes due to climate change – Increased rainfall during winter months can favour INNS such as Sea buckthorn, by facilitating growth (Burden et al., 2020) and exacerbating the effects of accelerated succession in sand dune vegetation communities.

PJ10: Change of habitat location, size, and / or quality due to climate change – Dune habitats naturally fluctuate in size and location in response to geomorphological processes, however, these fluctuations are expected to be more pronounced and acute in response to climate change and the natural balance is likely to be disrupted affecting both structure and function of dune habitats.

	All the main pressures affecting the habitat in Wales are considered to be ongoing and are expected to continue to impact the habitat over the next two reporting cycles.
8.5: List of main conservation measures	The special sites (SSSI and SAC) include 68% of the H2150 resource in Wales by area, a further 32% of the H2150 resource is not covered by any statutory designation. H2150 is not listed as a notified SAC feature. Conservation Measures identified and taken. Acidic dune profiles are scarce in Wales and their natural limitation to the stabilised hind dunes (which have been long exposed to rainfall leaching) has additionally resulted in their widespread loss to agriculture and development. H2150 is susceptible to scrub and bracken invasion and until recently has not been specifically targeted for management. However, conservation measures have been undertaken on several sites to implement restoration via externally funded projects (Sands of LIFE and Dynamic Dunescapes) to maintain the open nature of this habitat, which has become stabilised and often invaded by scrub and invasive native and non-native species. These conservation measures have included mowing, native scrub and bracken removal and the removal non-native invasive species such as Sea buckthorn (MA04, MA05, MB01, MF02, MF03, MH04, MI03, MI05, MM01). Restoration of H2150 has been implemented via externally funded projects under the EU LIFE programme and Heritage Lottery Fund where 105 ha of dunes (including H2150) have been mown, 73ha of dunes (including H2150) have had invasive native species removed, 22ha of non-native conifers have been removed and 35ha of conifer stump and brash removal undertaken. 30km of new fencing has facilitated grazing on dune habitats (including H2150) and 132ha of invasive non-native species have been removed from dune habitats (including H2150) (MA04, MA05, MB01, MB05, MF02, MF03, MI03, MI05, MM01,

MS03). Restoration and conservation measures will continue on these sites through AfterLIFE and legacy management plans.

MH01: Reduce impact of military installations and activities

Both the Sands of LIFE and the Dynamic Dunescapes projects undertook Unexploded Ordnance (UXO) surveys prior to undertaking ground-penetrating conservation interventions. The Sands of LIFE project developed an Unexploded Ordnance (UXO) Assessment and Mitigation Procedure in consultation with the MOD (Explosive Ordnance Clearance Officer Team and Porton Down) and NRW's Health and Safety Team. The Procedure follows CIRIA (industry standard) guidance and aims to ensure that potentially lethal UXO risks to staff and contractors undertaking conservation works on sand dunes are adequately managed in line with legislation and to a consistent and appropriate standard. This procedure can be used on any sand dune site where there is a potential risk of UXO.

Other conservation measures include special projects, e.g. towards BAP targets for maintenance, improvement of condition, restoration and expansion of the resource (MF03, MI03, MI05, MM01).

Measure identified and not yet taken (ranked High)

MF08: Manage changes in hydrological and coastal systems and regimes for construction and development (incl. restoration of habitats).

Pressures relating to construction and development activities (coastal protection and sea defences) causing changes to hydrological conditions are continuing, restoration of shifting dunes impacted by these changes would be beneficial for the structure and function of this coastal habitat. Implementation of Shoreline Management

policies (Atkins, 2010; Halcrow Group Limited, 2012b, 2012a) and associated mitigation measures is required in order to maintain sediment supply to sand dune systems.

MJ02: Implement climate change adaptation measures

The creation of buffer zones with appropriate conservation management to allow for the dynamic movement of dune habitats inland where there are no existing barriers would be beneficial. Where there are defences such as sea walls, targeted realignment to enable more connectivity of dune habitats with the hinterland is desirable. Implementation of Shoreline Management policies (Atkins, 2010; Halcrow Group Limited, 2012b, 2012a) and associated mitigation measures is required in order to maintain sediment supply to sand dune systems.

MK01: Reduce impact of mixed source pollution

National regulations are in place, but have been insufficient to prevent continued high levels of N deposition nationally and locally increasing ammonia pollution from expansion of poultry units.

There are various air quality strategies and initiatives in place to protect and enhance biodiversity. Air quality limit values set out in the Air Quality Strategy (AQS) are transposed into national legislation by the Air Quality Standards Regulations 2010. Nitrogen deposition continues to impact semi-natural habitats in Wales. These regulations are not habitat-specific, however with introduction of The Environment (Air Quality and Soundscapes) (Wales) Act 2024 in Wales, this brings in new national targets for air quality pollutants, with the potential of directly influencing habitat protection.

This key legislative advancement requires mandatory targets for fine particulate matter less than 2.5 micrometers in diameter ($PM_{2.5}$) to be established by February 2027,

including new powers for Welsh Ministers to set pollutant-specific targets in future years (e.g., ammonia, nitrogen dioxide) linked to biodiversity outcomes, potentially enabling future habitat-sensitive thresholds.

Welsh Government have also introduced The Agriculture (Wales) Act in 2023. It aims to establish a framework of Sustainable Land Management (SLM) objectives to underpin agricultural support, including the Sustainable Farming Scheme (SFS). The Act provides Welsh Ministers with the power to provide support (financial or otherwise) for or in connection with 15 purposes, including 'Improving air quality'. Welsh Government published a consultation on the SFS which closed in March 2024. Welsh Ministers will not be making final scheme design decisions until further stakeholder work is undertaken.

Measures identified and not yet taken (ranked Medium)

MC06: Reduce impact of service corridors and networks &

MC07: Habitat restoration/creation from resources, exploitation areas or areas damaged due to installation of renewable energy infrastructure

Several pressures and their potential impacts of caballing on sand dunes have been identified including but not limited to damage and loss of habitat, disturbance to hydrology, introduction of INNS, loss of sediment and an increased risk of erosion. Conservation measures should take these impacts into consideration to minimise impacts of development on dune habitats from these types of installations.

ME01: Reduce impact of transport operation and infrastructure

Pressure on sand dune systems occurs when dune habitats are unable to rollback with natural

	geomorphological processes due to the presence of a road, railway or related infrastructure. Conservation measures to reduce the fragmentation impact from transport infrastructure is necessary as coastlines change in a response to sea-level rise and climate change. Regulations may often be inadequate to fully protect the habitat, e.g. in tackling under-management or neglect.
9.1:Future trends and prospects of parameters	Range: Despite several ongoing pressures to the habitat, statutory protection of half of the sites with the habitat provides protection against total loss and changes to the 10km2 distribution are considered unlikely in the short to medium term. Area: Dune stabilisation across the wider Welsh sand dune systems has had a negative impact on H2150 Atlantic decalcified fixed dunes (Rhind et al., 2001, 2006, 2013; Rhind & Jones, 2009). H2150 is known to be under significant and ongoing pressures due to atmospheric pollution, over stabilisation of dune systems, insufficient grazing and associated scrub and bracken encroachment. Conservation measures associated with Heritage Lottery funded project Dynamic Dunescapes has had some local successes in restoring some small areas of dune heath, however, the wider picture across the entire H2150 resource in Wales is unknown. As such the future trend in habitat area must be considered as 'unknown'. Structure and function: 68% of the habitat is within the protected sites network. Condition assessments associated with the Dynamic Dunescapes project were undertaken on sites where H2150 occurred (Heathcote, 2024a, 2024b, 2024c;

	Heathcote & Jones, 2024a, 2024b, 2024c) conclude that all 8 sites where the habitat occurred (6 SSSI and 2 non-designated sites) are in unfavourable condition (see section 6.2). Several pressures currently ranked High are projected to intensify in the future e.g. PA05, PA08, PA20, PI02, PI03, PK03, PK04 and PM07 as a result of climate change. Whilst several pressures currently ranked Medium are projected to be exacerbated by climate change and expected to be ranked as High within the next two reporting rounds (PJ01, PJ03 and PJ10). Furthermore, the combined impacts of several listed pressures are also expected to increase in the future adversely affecting the structure and function of H2150. The Future prospects for Structure and functions takes into account that at least 25% of the habitat area is expected to be in unfavourable (not good) condition in c.2035 due to nutrient N critical load exceedance, unless additional measures are taken to reduce N deposition impacts. Taking the above into account it is likely that the future trend for the structure and function of the habitat is likely to be 'negative' if conservation measures are not implemented.
10.1: Range	Conclusion on Range reached because: (i) the short-term trend direction in Range surface area is stable; and (ii) the current Range surface area is approximately equal to the Favourable Reference Range.
10.2: Area	Conclusion on Area reached because:(i) the short-term trend direction in Area is unknown; (ii) the current Area is not more than 10% below the Favourable Reference Area and iii) there have been small losses in distribution pattern within range
10.3: Specific structure and functions	Conclusion on Structure and function reached using the precautionary principle because: i) habitat condition data indicates that more than 25% of the habitat is in

	unfavourable (not good) condition; and ii) short-term trend in area of habitat in good condition is unknown for this habitat.
10.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are good; (ii) the Future prospects for Area covered by habitat are unknown; and (iii) the Future prospects for Structure and function are bad.
10.5: Overall assessment of Conservation Status	Overall assessment of Conservation Status is Unfavourable-bad because two of the conclusions are Unfavourable-bad.
11.1: Surface area of the habitat type inside the pSCIs, SCIs and SACs network	This is the total surface area of the feature within SACs. However, H2150 is not a notified N2K feature on any of the Welsh SACs.
5.13: Favourable Reference Area (FRA)	The UK-level FRV for surface area was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current habitat extent and trends.
4.10: Favourable Reference Range (FRR)	The UK-level FRV for range was developed by JNCC using an audit trail based on the year the FRV was first established and any changes made in subsequent reporting rounds. The audit may draw from any combination of the 2007, 2013, or 2019 Habitats Directive reports and reflects the full rationale used for the 2019 Article 17 reporting. This FRV was reviewed by Welsh experts and considered appropriate for use in Wales based on current distribution and trends.