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

2019-2024

Conservation status assessment for the habitat:

H3140 - Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

Wales

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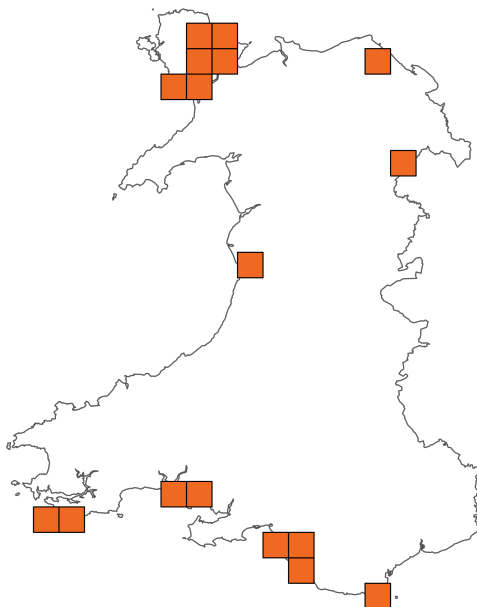
Important note - Please read

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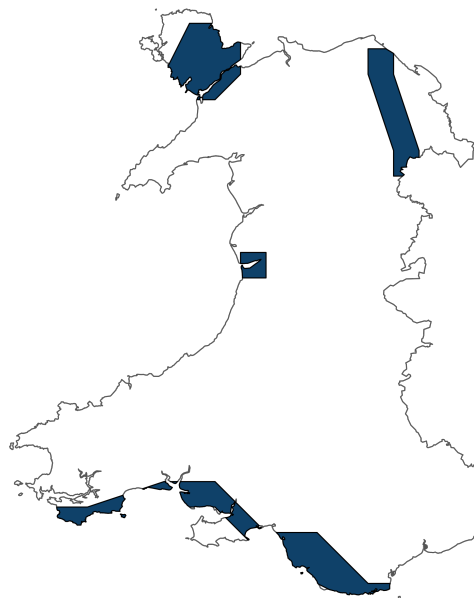
Further details on the approach to the Habitats Regulations Reporting 2019-2024 are available on the JNCC website.

Assessment Summary: Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

Distribution Map

Range Map

Figure 1: Wales distribution and range map for H3140 - Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.. 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 H3140 - Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.. 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)	**Favourable (FV)**
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	H3140 - Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.

2. Maps

2.1 Year or period	2007-2024
2.2 Distribution map	Yes
2.3 Distribution map; Method used	Based mainly on extrapolation from a limited amount of data

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)	1,967.43
4.2 Short-term trend; Period	2007-2024
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	Based mainly on extrapolation from a limited amount of data
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	Based mainly on expert opinion with very limited data
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	No
b) Genuine change	

c) Improved knowledge or more accurate data

d) Different method

e) No information

f) Other reason

g) Main reason

4.12 Additional information

No additional information

5. Area covered by habitat

5.1 Year or period	2014-
5.2 Surface area (km²)	
a) Minimum	
b) Maximum	
c) Best single value	0.855
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	2007-2024
5.6 Short-term trend; Direction	Stable
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	Complete survey or a statistically robust estimate

5.9 Long-term trend; Period	1995-2024
5.10 Long-term trend; Direction	Stable
5.11 Long-term trend; Magnitude	
a) Minimum	
b) Maximum	
c) Confidence interval	
d) Rate of decrease	
5.12 Long-term trend; Method used	Based mainly on expert opinion with very limited data
5.13 Favourable Reference Area (FRA)	
a) Area (km²)	
b) Pre-defined increment	Current area is less than 2% 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	No
b) Genuine change	
c) Improved knowledge or more accurate data	
d) Different method	
e) No information	
f) Other reason	
g) Main reason	

5.15 Additional information

No additional information

6. Structure and functions

6.1 Condition of habitat (km²)

Area in good condition

ai) Minimum	0.04
aii) Maximum	0.04

Area not in good condition

bi) Minimum	0.78
bii) Maximum	0.78

Area where condition is unknown

ci) Minimum	0.09
cii) Maximum	0.09
6.2 Condition of habitat; Method used	Complete survey or a statistically robust estimate
6.3 Short-term trend of habitat area in good condition; Period	2007-2024
6.4 Short-term trend of habitat area in good condition; Direction	Decreasing
6.5 Short-term trend of habitat area in good condition; Method used	Complete survey or a statistically robust estimate

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
PA17: Agricultural activities generating pollution to surface or ground waters (including marine)	Ongoing and likely to be in the future	High (H)
PG09: Management of fishing stocks and game	Ongoing and likely to be in the future	High (H)
PI01: Invasive alien species of Union concern	Only in future	High (H)
PI02: Other invasive alien species (other than species of Union concern)	Ongoing and likely to be in the future	High (H)
PK01: Mixed source pollution to surface and ground waters (limnic and terrestrial)	Ongoing and likely to be in the future	Medium (M)
PJ04: Sea-level rise due to 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	Both inside and outside National Site Network
8.4 Response to measures	Long-term results (after 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
MA07: Restoration of Annex I agricultural habitats (incl. re-establish and improve)	Medium (M)
MA10: Reduce/eliminate point or diffuse source pollution to surface or ground waters (including marine) from agricultural activities	High (H)
MG03: Reducing the impact of (re-) stocking for fishing and hunting, of artificial feeding and predator control	High (H)
MI03: Management, control or eradication of other invasive alien species	High (H)
MJ02: Implement climate change adaptation measures	High (H)
MK01: Reduce impact of mixed source pollution	High (H)
MK03: Restoration of habitats impacted by multi-purpose hydrological changes	Medium (M)
MK04: Other measures related to mixed source pollution.	High (H)

8.6 Additional information

No additional information

9. Future prospects

9.1a Future trends of parameters

ai) Range	Very Negative - decreasing >1% (more than one percent) per year on average
bi) Area	Unknown
ci) Structure and functions	Very negative - important deterioration

9.1b Future prospects of parameters

aii) Range	Bad
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	Favourable (FV)
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	Deteriorating

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	0.71
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	Stable
11.5 Short-term trend of habitat area within the network; Method used	Complete survey or a statistically robust estimate
11.6 Short-term trend of habitat area in good condition within the network; Direction	Decreasing
11.7 Short-term trend of habitat area in good condition within the network; Method used	Complete survey or a statistically robust estimate

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	Method The extent map was updated for the 2018 reporting round using a combination of NRW Lake survey data (Baxter & Stewart 2015; Goldsmith et al. 2013, 2014a, 2014b, 2016; Shilland et al. in press) and the recent review of Welsh stonewort distribution (Stewart & Hatton-Ellis 2020). Squares were included where (i) lake survey data confirmed presence of the habitat or (ii) where there were post 1994 records for key charophyte species (Chara aculeolata; C. aspera; C. baltica; C. contraria; C. curta; C. hispida; C. rudis; Tolypella glomerata) that could be linked to examples of this habitat type. In some cases we were unable to confirm the presence of this habitat in individual previously recorded 10km squares and these were therefore been removed from the analysis. No further update was considered necessary for the current reporting round, as the distribution of freshwater habitats rarely changes substantially. Results As above, the distribution is unchanged. The text below reflects the previous reporting round and is included for context. The distribution of this habitat in Wales is extremely localised, with records from only seventeen 10km squares. Of these, the large majority have small areas of habitat, estimated at 1ha or less in extent (Hatton-Ellis, 2025 - Map 1). These are mainly small, shallow ponds in dune slacks or calcareous fen. Only two 10km squares have extensive areas of this habitat, SR99 in Pembrokeshire (Bosherston

Lakes) and SS78 in Bridgend (Kenfig Pool).

Although the larger examples of this habitat are well studied, small stonewort ponds that account for a high proportion of the distribution are not.

Based on updated locations of lakes within the UK Lakes Inventory, cross-checked against aerial photographs, GIS map of limestone geology, records of critical Chara taxa, and survey data, converted to 10km grid squares. See Hatton-Ellis (2014) for details. All data used are from 2007-17 but where no groundtruthing data was available, predicted habitat occurrence was used. This is likely to affect range/distribution more than area. Seven 10km squares have habitat presence predicted but not confirmed; the remainder are all ground-truthed with survey data. We think it is unlikely that more than five 10km squares in Wales contain this habitat but have not been mapped.

4.1: Surface area	This habitat is scarce in Wales and most 10km squares contain only a single lake. This makes this habitat relatively vulnerable to contractions in range.
4.3: Short-term trend; Direction	No known changes in range over this period in Wales. Range extensions are likely to be due to new sites being discovered. However, it is possible that range extensions may occur through abandonment and flooding of limestone quarries. A candidate site was visited in November 2024 but did not contain any typical species.
4.6: Long-term trend; Period	Not assessed. However, it is not thought that any substantial changes to range have occurred over a longer timescale.
5.2: Surface area	Note: This section has not been updated since the previous reporting round, as the area of freshwater habitats does not usually change substantially, and there have been no reports of any habitat being destroyed / filled in. Hatton-Ellis (2014) revised the area of this and other lake habitats in Wales in the light of the most recent data then available.

	An issue with defining habitat loss is the tendency of nutrient enriched H3140 to become H3150 and then fine-leaved pondweed dominated. This habitat is usually termed degraded rather than destroyed, hence changes to surface area tend to underestimate the true extent of loss. See JNCC (2007) for a discussion. The area provided here includes both water bodies in the UK Lakes inventory and the location of other stonewort ponds, where known. The latter category consists of ad hoc records and does not represent a complete dataset. However, due to the small size of most such ponds it is unlikely that missing records account for more than about 5% of the total area.
5.4: Surface area; Method used	Hatton-Ellis (2014) revised the area of this and other lake habitats in Wales in the light of the most recent data then available, using data from the UK Lakes inventory combined with available survey data. It is unlikely that any significant undiscovered examples of this habitat occur in Wales and thus the surface area estimate is considered reasonably complete. Monitoring since 2012 has occurred in all protected sites supporting this habitat plus Ysceifiog Lake, which was suspected of supporting H3140. This represents just over 90% of the Welsh favourable reference area of this habitat type.
5.6: Short-term trend; Direction	There has been no change to the estimated area of the habitat. There has been no change in the distribution pattern within range since the previous reporting round.
5.7: Short-term trend; Magnitude	Not Applicable as no trend in area is evident.
5.8: Short-term trend; Method used	Based primarily on SAC monitoring. However, more than 70% of the area of the habitat within Wales is a designated SAC feature.

5.11: Long-term trend; Magnitude	Not Applicable as no trend in area is evident.
5.12: Long-term trend; Method used	Accurate estimates of the extent of this habitat in Wales were not available prior to 2014.
6.2: Condition of habitat; Method used	A monitoring method for typical species, structure and function of this habitat is identified in the updated Common Standards Monitoring Guidance (IAFG 2015). Monitoring has been carried out since 2012 in all protected sites supporting this habitat plus Ysceifiog Lake, which was suspected of supporting H3140. This represents just over 90% of the Welsh favourable reference area of this habitat type. Monitoring has primarily consisted of plant surveys and assessment of water quality status against relevant targets.
6.4: Short-term trend of habitat area in good condition; Direction	The status of Kenfig Pool, Wales's largest site for this habitat type, has deteriorated since the last reporting round, resulting in a reduction in overall status.
6.7: Typical species; Method used	There were minor changes to the typical species list in the JNCC Common Standards Monitoring Guidance (IAFG 2015), mainly the removal of a series of associate species with consequent greater focus on Chara spp. This is not thought likely to have a material effect on the result of Welsh monitoring. In Wales, the most important typical species for this habitat type are Chara aspera and C. hispida. C. aculeolata, C. curta and C. rudis also occur in this habitat in Wales but have either only been recorded from small fen pools or occur in only very restricted areas. A recent review of the status of charophytes in Wales (Stewart & Hatton-Ellis 2020) concluded that all of the various Chara species critical for the favourable structure and function of this habitat in Wales are threatened.
7.1: Characterisation of pressures	Pressures:

The most widespread problem with this habitat is nutrient pollution from phosphates and nitrates (PA17, PK01). Although these are primarily from agricultural sources, there is also historic phosphorus pollution of lake sediments originating from now diverted sewage treatment works at one large site (Bosherston Lakes Eastern Arm).

On Anglesey, two small kettle-hole lakes have been affected by changes to drainage patterns resulting in polluted and relatively low alkalinity water entering the lakes. This has resulted in major changes to lake ecology.

Invasive species (PI02), notably the non-native Elodea canadensis, frequently reach high cover in these water bodies. At Kenfig Pool, increasing Canada goose Branta canadensis numbers are causing nutrient problems.

Fishery management (PG09) is a pressure at Bosherston Lakes and Kenfig Pool. At Kenfig, illegal or possibly accidental stocking of common carp Cyprinus carpio is a serious threat to the ecology of the lake.

Threats:

The threats are considered to be largely the same as the pressures, though fishery management issues are likely to intensify as warmer temperatures will result in increased recruitment of coarse fish. Bosherston, which is only just above sea level, is at risk from sea level rise.

The invasive killer shrimp Dikerogammarus villosus is established at Eglwys Nunnydd Reservoir, close to Kenfig Pool. Although biosecurity measures are in place at Eglwys Nunnydd, there is a risk that it may spread to Kenfig Pool by natural means. The highly invasive Lagarosiphon major also occurs in Bosherston Quarry, close to the Lakes.

8.1: Status of measures	Measures needed are in a relatively small number of sites. However, it has not been possible to identify staff resource

	or suitable projects to deliver necessary measures such as reductions in nutrient levels and invasive species control.
8.2: Main purpose of the measures taken	Insufficient actions have been taken to arrest the continuing decline of this highly threatened habitat. Actions are needed to restore structure and function, specifically to remove invasive non native species and restore the low nutrient, groundwater fed conditions required for charophyte dominance.
8.3: Location of the measures taken	Almost all actions are required in or adjacent to the existing protected site network.
8.4: Response to the measures	As effective measures have not been implemented, positive outcomes are not expected in the short or medium term.
8.5: List of main conservation measures	At Bosherston Lakes, action is needed to control the nutrient impacts in the Eastern Arm. This large section of the lakes has suffered significantly from nutrient pollution, and although the main sources are under control, large amounts of phosphorus remain in the bottom muds. It is possible that mud pumping or treatment with a product such as Phoslock may be needed to restore natural processes.

Agricultural impacts are partly controlled via a Nitrate Vulnerable Zone covering the catchment, but it is not certain that NVZ measures can deliver sufficient nutrient reductions to reach favourable status. It is possible that further measures may be needed.

Tidal flaps need to be installed in the outflow dam to lessen the risk of storm surges causing seawater to overtop it.

Control measures for E. canadensis at Bosherston should be investigated: however, reductions to nutrient levels should also help to achieve higher Chara cover. An attempt should be made to eradicate invasive Lagarosiphon major from Bosherston Quarry.

At the Anglesey Fens, action is required to restore hydrological conditions so far as possible. By ensuring that |

these lakes are mainly or entirely groundwater-fed, the pH and alkalinity can be increased to levels where marl precipitation again occurs, and ingress of nutrient-rich silt can be prevented.

At Kenfig Pool, carp removal and control of Canada geese and Canadian pondweed need to be investigated. In addition, monitoring for killer shrimp should take place. Biosecurity measures at Eglwys Nunnydd have already been implemented.

Ponds could be created in Glastir, the recent Welsh agri-environment scheme, but it is not clear if any were H3140. The creation of ponds suitable for supporting stonewort dominated habitats in limestone areas should be encouraged by future agri-environment schemes.

The rare starry stonewort Nitellopsis obtusa recently colonised Cosmeston Lakes, the first Welsh record. This species probably favours more eutrophic waters than is typical for H3140, and its arrival may reflect climate change.

| 9.1:Future trends and prospects of parameters | 9.1a

The future range of this habitat in Wales is fragile. Many grid squares contain extremely small patches of habitat and even the few larger areas are whole lakes that are vulnerable to an increasing number of pressures and threats (see section 7). Although there has been no reduction in range over the current reporting period, a substantial reduction in range could result from the loss of a few relatively small ponds.

9.1b

There is no reason to expect major area losses of open water habitat in the foreseeable future. However, the problems in terms of structure and function mean that large areas of this habitat are at risk of becoming different lake |

types such as 3150.

9.1c

In Wales, only 4% of this habitat is in Good condition.

86% is not in Good Condition, and the remainder is unknown.

Although management of catchments and fisheries has improved, long-term pressures and threats such as nutrient enrichment, invasive species and climate change mean that improving structure and function is a major challenge.

The parlous state of this habitat type is a serious cause for concern and requires urgent action.

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 stable; (ii) the current Area is approximately equal to the Favourable Reference Area; and iii) there has been no significant change in distribution pattern within range.
10.3: Specific structure and functions	Conclusion on Structure and function reached because: i) habitat condition data indicates that more than 25% of the habitat is in unfavourable (not good) condition; ii) short-term trend in area of habitat in good condition is decreasing; and iii) expert opinion determines that there are significant issues for this habitat.
10.4: Future prospects	Conclusion on Future prospects reached because: (i) the Future prospects for Range are bad; (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	The area within SACs amounts to 78% of the total habitat area within Wales. Three SACs are included:

This value includes (i) water bodies >1ha in extent, based on data from the UK Lakes inventory and; (ii) the digitised area of known stonewort ponds within the Natura 2000 network (4.74ha).

It should be noted that although individually small in area, many small water bodies have high charophyte cover and are therefore disproportionately important for diversity and connectivity. |
11.3: Surface area of the habitat type inside the network; Method used	Sites have been regularly monitored as part of CSM. These data indicate no loss of habitat area. The area of this habitat within the SAC network is reasonably well known. The main area of uncertainty relates to small water bodies, but collectively these make up a small proportion of habitat area.
11.4: Short-term trend of habitat area within the network; Direction	The area is considered to be unchanged since the last reporting round.
11.5: Short-term trend of habitat area within the network; Method used	All relevant SACs have been monitored.
11.6: Short-term trend of habitat area in good condition within the network; Direction	Kenfig Pool, the largest site for this habitat in Wales, has deteriorated in condition since 2019.
11.7: Short-term trend of habitat area in good condition within the network; Method used	All relevant SACs have been monitored.
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.