

Red List of Ecosystem assessment series

Produced by JNCC and NatureScot, supported by Natural Resources Wales, Natural England, and Northern Ireland Environment Agency.

This resource is one in a series/number of Ecosystem Red List assessments developed to accompany the UK Biodiversity Indicator '[Red List of Ecosystems](#)'. The assessments are available at: <https://jncc.gov.uk/resources/7b922dfc-708b-4c8c-9e6a-e2040447fb39>.

Resilient ecosystems are crucial for preventing biodiversity loss and species extinction. Maintaining healthy ecosystems safeguards the essential services they provide, which are fundamental to human well-being and a thriving economy. However, pressures and threats such as deforestation, overfishing, or climate change, can disturb the balance of ecosystems and threaten their health and functioning. Assessing the level of threat facing ecosystems is important in helping us understand the current status of the environment, and on a practical level, assessments can be used to help prioritise conservation funding decisions and where to take conservation management action on the ground.

The 'Red List of Ecosystems' (RLE) is a global assessment approach set out by the International Union on Conservation of Nature (IUCN). The approach includes consideration of a series of criteria, including change in geographic distribution through time; whether the ecosystem distribution is geographically restricted; evidence for any environmental degradation; and disruption to biotic processes or interactions. We have not carried out the quantitative analyses of the probability of ecosystem collapse necessary to assess criterion E as we do not have the data needed to carry out such analyses consistently. The IUCN methodology is widely used as a robust approach to assessing the status of ecosystems. Further details of the criteria used in these assessments are available on the [IUCN portal](#).

This assessment series sets out the RLE assessment conclusions for ecosystems found in the UK, alongside the details of how the assessment was made, including for each IUCN component criterion. The assessments have been peer-reviewed, and source data is referenced. Once complete, the series will cover the full range of natural and seminatural habitats that occur in the UK, throughout marine, terrestrial and freshwater environments.

Assessments are conducted according to the [Global Ecosystem Typology Level 3](#) (Ecosystem Functional Groups). This enables the assessments to feed into the Kunming-Montreal [Global Biodiversity Framework](#) (GBF) headline indicator A.1 Red List of Ecosystems. This indicator, which has been incorporated into the UK Biodiversity Indicator suite, is designed to measure progress against [Goal A](#) ('Protect and restore') and [Target 1](#) ('Plan and manage all areas to reduce biodiversity loss') of the GBF.

Any gridded maps are derived from public sector information licensed under the Open Government Licence v3.0. Coastline boundary is derived from the Oil and Gas Authority's and Lloyds Register SNS Regional Geological Maps (Open Source).

SM1.3 Sea Caves

1. Key facts

Ecosystem description: Sea caves form along weaknesses in the rock, such as faults or fractures, as a result of wave action. The amount of wave surge, scour, sea spray and penetrating light determines the unique community assemblages found in sea caves.



Image credits: (Left to right) Loch Eribol, © Richard Shucksmith/ NatureScot; North Rona, © Richard Shucksmith/ NatureScot; St Kilda, © George Stoye/ NatureScot

Overall assessment conclusion: Least Concern (LC)

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Reviewer(s): Carol Hume (NatureScot)

Corresponding habitat classifications:

The following habitats were considered in the production of this assessment:

EUNIS codes: [MA127](#), [MB127](#), [MC126](#)

UK Marine Habitat Classification:

Littoral caves and overhangs [LR.FLR.CvOv](#),

Infralittoral surge gullies and caves [IR.FIR.SG](#),

Circalittoral caves and overhangs [CR.FCR.Cv](#)

2. Assessment against IUCN criteria

Criterion A: Reduction in geographic distribution

Criterion A considers reduction in geographic distribution over ANY of the defined time periods for criteria A1, A2a, A2b or A3. For details of time periods and criteria see [IUCN Red List of Ecosystems Criteria Summary Sheet 2.2 EN.pdf](#)

Sea caves are physiographic features determined primarily by geomorphological and hydrographic processes occurring over long timescales. The UK has the most varied and extensive inshore sea caves on the Atlantic coast of Europe (Burdon & Boyes, 2009). The majority of the >3000 sea caves in the UK occur in remote areas of the mainland or remote and/or uninhabited islands.

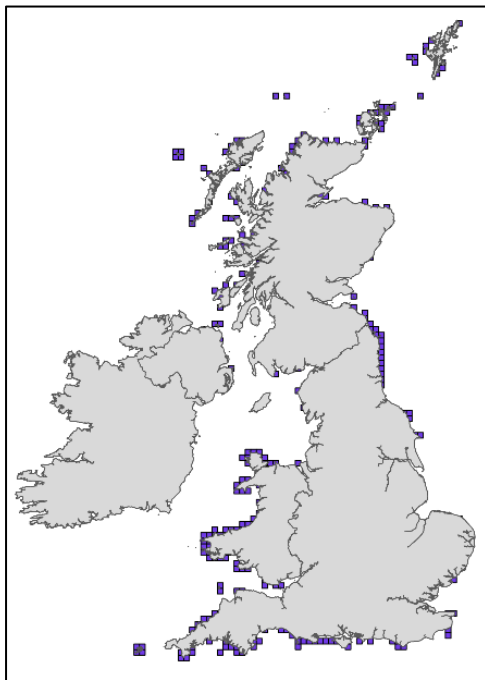
Whilst there is some historic loss of sea caves linked to coastal defence works and infrastructure protection (Burdon & Boyes, 2009), the number of records of confirmed and qualifying sea caves on the UK coastline has increased (e.g. NatureScot, 2025). Due to their physical structure and inaccessible nature, sea caves tend to be mostly affected by natural processes such as storms and rock structural weaknesses. The geographic distribution

around the UK is poorly understood, based on a limited amount of data, with the focus mostly on sea caves in protected areas.

Least Concern (LC) – there is no evidence of a reduction in geographic distribution of sea caves.

Criterion B: Restricted geographic distribution

Criterion B considers restricted geographic distribution indicated by ANY of the time periods for criteria B1, B2 or B3. For details of time periods and criteria see [IUCN Red List of Ecosystems Criteria Summary Sheet 2.2 EN.pdf](#).



Sea caves are restricted to rock habitats. As a physiographic feature they are not considered to be fragmented. They cover an area estimated at around 0.05 km² (Mountford et al., 2025). Whilst the extent of occurrence of sea caves cannot be accurately assessed (since they occur around much of the UK coast) the condition of sea caves within protected areas is monitored and there is no evidence of processes likely to cause declines. Where assessments have been carried out, these indicate that sea caves are in a favourable condition (e.g. Harries et al., 2018, 2019, 2024; Stewart-Moore, 2019; DAERA, 2024) or unknown condition (Hatton-Ellis et al., 2025).

Least Concern (LC) – The extent of occupancy of sea caves cannot be accurately estimated. There is however no indication or evidence of fragmentation or loss of condition of sea cave habitat.

Criterion C: Environmental degradation

Criterion C considers environmental degradation over ANY of the time periods for criteria C1, C2a, C2b or C3. For details of time periods and criteria see [IUCN Red List of Ecosystems Criteria Summary Sheet 2.2 EN.pdf](#).

Due to their generally remote and inaccessible locations, sea caves face a limited number of direct anthropogenic pressures. Whilst tourism and leisure activities, and marine pollution, (e.g. oil spills, litter), can affect sea caves negatively, impacts are likely to be extremely low. Aspects of climate change such as increased storminess is likely to be the main issue in terms of sea cave physical structure degradation. Sea level rise and changes in water temperatures are potentially concerns in relation to the biological features within sea caves (Natural England, 2019; Hatton-Ellis et al., 2025; NatureScot, 2025).

Least concern (LC) – No loss of condition of sea cave habitat has been recorded.

Criterion D. Disruption of biotic processes or interactions

Criterion D considers Disruption of biotic processes or interactions over ANY of the time periods for criteria D1, D2a, D2b or D3. For details of time periods and criteria see [IUCN Red List of Ecosystems Criteria Summary Sheet 2.2_EN.pdf](#)

As physiographic features, biotic processes and interactions are not a relevant consideration for sea caves. The biological communities present in sea caves are linked to the amount of wave surge, scour, sea spray and light penetration. If these environmental variables change, then the communities present will also change.

Not Assessed (NA) – This aspect of the assessment is not relevant.

Conservation measures in place

The majority of known sea caves are located within Marine Protected Areas (MPAs), many of which have multiple sea caves as a designated feature. Site-specific Conservation Objectives, information on pressures and threats, and details of the habitats and species are contained within the Conservation and Management Advice packages for each MPA. From the point of designation, most human activities with the potential to have adverse effects are managed through a licensing and consents process.

Overall assessment conclusion

Sea caves in the UK are assessed as being Least Concern (LC).

3. Literature references

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