

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).

M1.8 Subtidal Mud Plains

1. Key facts

Ecosystem description: Subtidal mud plains are low energy, muddy ocean shelf ecosystems. They are found in sheltered locations where reduced influence of wave action and tides allow fine sediments to settle. These habitats are dominated by burrowing deposit feeders such as polychaetes and molluscs, as well as sea-pen and burrowing megafauna. Low oxygen zones can form in areas associated with high bacterial activity and abundant organic matter.

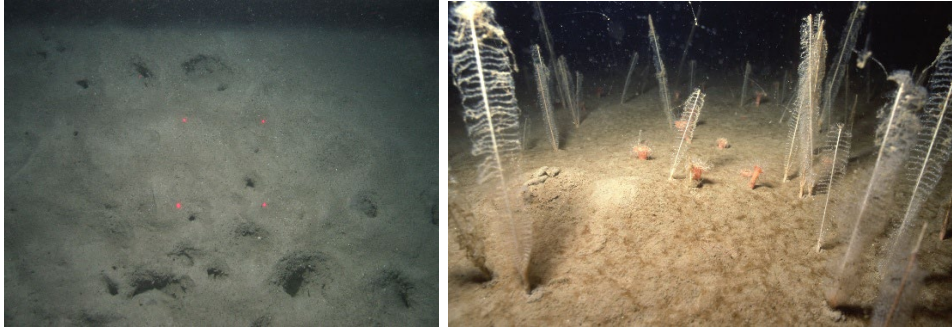


Image credits: (Left to right) Circalittoral fine mud © Joint Nature Conservation Committee and Cefas; Sea-pens in soft mud © JNCC

Overall assessment conclusion: Vulnerable (VU) based on criteria C1.

Date assessment published: 02.12.2025 (Please note a correction to the distribution map was made on 18.02.2026)

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Corresponding habitat classifications:

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

EUNIS codes: [MB62](#); [MC62](#); [MD62](#)

UK Marine Habitat Classification: [Sublittoral cohesive mud and sandy mud communities SS.SMu](#)

2. Assessment against IUCN criteria

Criterion A: Reduction in geographic distribution

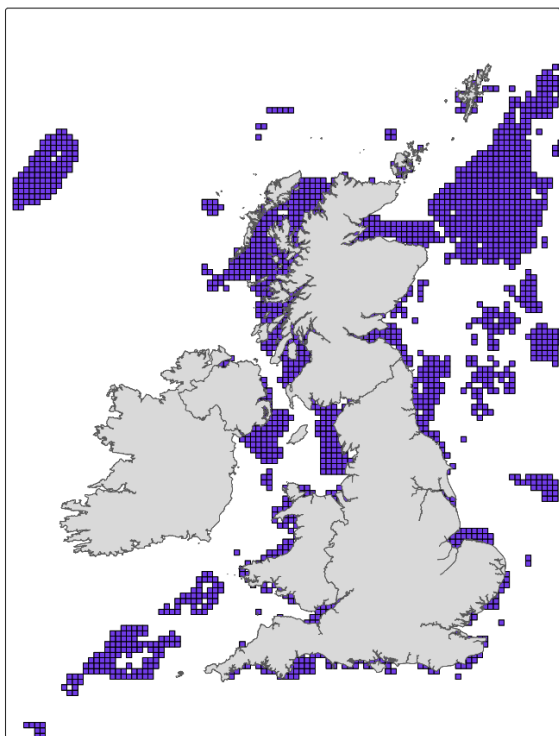
Criterion A considers reduction in geographic distribution over ANY of the defined time periods for criteria A1, A2a, A2b or A3. For details of time periods and criteria see [IUCN Red List of Ecosystems Criteria Summary Sheet 2.2 EN.pdf](#)

Subtidal mud plains are widely distributed in low energy waters (areas of weak turbulence and currents), this includes in estuaries, in sea lochs and on the continental shelf. These areas are defined by their substrate type and hydrodynamic processes. Their distribution is determined by geological and hydromorphological processes occurring over long timescales.

Least Concern (LC) – While localised losses may have occurred, the distribution is unlikely to have changed due to the hydrodynamic processes shaping the distribution of this feature.

Criterion B: Restricted geographic distribution

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



The distribution of this feature is not considered fragmented or restricted as it is widely distributed throughout the UK. Assessments of subtidal mud plains have been undertaken through: UK Marine Strategy Assessments; and OSPAR assessment of Sea-pen and Burrowing Megafauna Communities; (Duncombe-Smith et al., 2025; OSPAR, 2022; Woodcock et al., 2025). Assessments of fishing pressure on circalittoral mud, particularly offshore have not met Good Environmental Status (Woodcock et al., 2025). Furthermore, through assessments of diversity, the status of offshore circalittoral mud is classed as not good (Duncombe-Smith et al., 2025; Wijnhoven et al., 2023). Infralittoral and inshore circalittoral mud broadscale habitats show more of a mixed picture with areas in Northern Celtic Sea, Central North Sea and Channel Regions not achieving Good Environmental Status (Woodcock et al., 2025). Assessments of sea-pen and burrowing megafauna communities

show that the condition of these features is in a declining or modified but stable state over much of their extent (OSPAR, 2022).

Near Threatened – These habitats are widely distributed with 60,811 km² in the UK (Mountford et al., 2025), however assessments pressures related to fishing indicate that >70% mud habitats are highly disturbed (Woodcock et al., 2025)

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](#).

The main pressures impacting subtidal mud plains include physical disturbance, as well as some localised habitat loss due to development of infrastructure (OSPAR, 2022; Tillin and Tyler-Walters, 2014). Activities associated with fishing are one of the main factors impacting this habitat, causing abrasion, habitat modification, damage to fragile species, and depletion of biota (Hiddink et al., 2017; OSPAR, 2022; Tillin and Tyler-Walters, 2014). Assessments of key fauna associated with subtidal mud plains consider the use of towed, bottom-contacting fishing gears to be occurring throughout the habitat's extent and distribution, particularly offshore (OSPAR, 2022; Woodcock et al., 2025). Assessments of Margalef diversity indicate that Good Environmental Status has not been achieved in several areas throughout the UK, particularly offshore (Duncombe-Smith et al., 2025; Wijnhoven et al., 2023).

Furthermore, impacts associated with climate change are threatening mud communities and these impacts are predicted to increase (JNCC, 2025; OSPAR, 2022). Benthic habitats are predicted to face increased temperatures and frequency of heatwaves under climatic projections in the future and offshore circalittoral sediments are thought to face a strong effect of increased temperatures in the future (OSPAR, 2023). Impacts include changing distributions, species introductions, potential changes in community structure, and vulnerability caused by ocean acidification (Birchenough et al. 2013; Hoppit & Schmidt, 2022; Moore & Smale, 2020).

C1 Vulnerable (VU) – There are a number of pressures acting on subtidal mud plains and associated communities. UKMS assessments of fishing pressure show that >70% of the extent is in the highest disturbance categories (Woodcock et al., 2025), poor condition is corroborated by assessments of diversity (Duncombe-Smith et al., 2025; Wijnhoven et al., 2023).

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](#)

Subtidal mud plains are sensitive to organic pollution caused by activities such as aquaculture, sewage inputs and other point sources (Tillin and Tyler-Walters, 2014). In areas where organic matter increases it can result in low oxygen or anoxic conditions. Furthermore, activities related to aquaculture lice treatment can result in compounds being found transported to nearby sediments, potentially impacting communities (Bloodsworth *et al.*, 2019). Activities from point sources such as aquaculture tend to have a localised footprint and are unlikely to impact on a regional scale (OSPAR, 2022). Open coasts and offshore areas are less likely than estuaries to be impacted, and within the UK, trends in nutrient loads along open coasts are generally continuing to decrease, except at a small number of reporting regions (Devlin et al., 2025). Non-Native species could also be considered a threat to subtidal mud plains, but evidence is limited (Hill et al., 2023).

Least Concern (LC) – Impacts from these pressures are more likely to be observed in inshore, showing localised effects. It is expected that the wider efforts to reduce nutrient pollution will further minimise impact.

Conservation measures in place

Subtidal mud plains are afforded protections across the network of UK MPAs such as Marine Conservation Zones (e.g. North-East of Haig Fras MPA), Highly Protected Marine Areas (e.g. North East of Farnes Deep MPA). This feature is also afforded protection within Nature Conservation MPAs designated for Priority Marine Features related to subtidal mud habitats (e.g. Central Fladen MPA is designated for burrowed mud). 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 site with designated mud habitats. From the point of designation of MPAs, most human activities with the potential to have adverse effects are managed through a licensing and consents process. In addition, national legislation exists in the UK for the conservation of sea-pen and burrowing megafauna communities, including designation of MPAs that include sea-pen and burrowing megafauna as a conservation priority. This includes prohibition of bottom-set gillnets, entangling nets, and trammel nets at depths greater than 200 m, and fisheries measures to reduce degradation (OSPAR, 2022). Sites benefit from legal protections under the Marine and Coastal Access Act 2009 and the Fisheries Act 2020, with recent byelaws

(e.g. The Canyons MPA) prohibiting damaging fishing activities. In addition, UK fisheries management plans (a requirement of the Fisheries Act 2020) are being developed and should focus on sustainable management and mitigation of marine industries and activities.

Overall assessment conclusion

Subtidal mud plains in the UK are assessed as being Vulnerable (VU) based on criteria (C1).

3. Literature references

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