



Department
for Environment,
Food & Rural Affairs

Annex One: Individual Summaries of Habitat and Non-bird Species Assessments

Regulation 9a Reporting, The Conservation of
Habitats and Species Regulations 2017 (as
amended).

January 2026

We are responsible for improving and protecting the environment. We aim to grow a green economy and sustain thriving rural communities. We also support our world-leading food, farming and fishing industries.

Defra is a ministerial department, supported by 34 agencies and public bodies.



© Crown copyright 2025

This information is licensed under the Open Government Licence v3.0. To view this licence, visit www.nationalarchives.gov.uk/doc/open-government-licence/

Where we have identified any third party copyright information you will need to obtain permission from the copyright holders concerned.

This report was produced by Natural England on behalf of Defra.

This publication is available at www.gov.uk/defra

Any enquiries regarding this publication should be sent to us at defra.helpline@defra.gov.uk.

Contents

Regulation 9a Reporting, The Conservation of Habitats and Species Regulations 2017 (as amended).....	1
Introduction	10
Assessment of Conservation Status and Trend.....	11
Marine, Coastal and Halophytic Habitats	12
H1110, Sandbanks which are Slightly Covered by Seawater all the Time	13
H1130, Estuaries	14
H1140, Mudflats and Sandflats not Covered by Seawater at Low Tide	15
H1150, Coastal lagoons	16
H1160, Large Shallow Inlets and Bays.....	17
H1170, Reefs.....	18
H1210, Annual Vegetation of Drift Lines.....	19
H1220, Perennial Vegetation of Stony Banks.....	20
H1230, Vegetated Sea Cliffs of the Atlantic and Baltic Coasts.....	21
H1310, <i>Salicornia</i> and other Annuals Colonising Mud and Sand	22
H1320, <i>Spartina</i> Swards (<i>Spartinion maritimae</i>).....	23
H1330, Atlantic Salt Meadows (<i>Glauco-Puccinellietalia maritimae</i>).....	24
H1340, Inland salt meadows	25
H1420, Mediterranean and Thermo-Atlantic Halophilous Scrubs (<i>Sarcocornetea fruticosi</i>).....	26
S1376 to S1377, Maerl including <i>Phymatolithon calcareum</i> and <i>Lithothamnion corallioides</i>	27
Coastal Sand Dunes and Continental Dunes.....	28
H2110, Embryonic Shifting Dunes.....	29
H2120, Shifting dunes along the Shoreline with <i>Ammophila arenaria</i> ('white dunes') ...	30
H2130, Fixed Coastal Dunes with Herbaceous Vegetation ('grey dunes')	31

H2150, Atlantic Decalcified Fixed Dunes (Calluno-Ulicetea)	32
H2160, Dunes with <i>Hippophae rhamnoides</i>	33
H2170, Dunes with <i>Salix repens</i> ssp. <i>argentea</i> (<i>Salicion arenariae</i>)	34
H2190, Humid Dune Slacks	35
H2330, Inland Dunes with Open Corynephorus and Agrostis Grasslands	36
Freshwater Habitats.....	37
H3110, Oligotrophic Waters Containing Very Few Minerals of Sandy Plains (<i>Littorelletalia uniflorae</i>)	38
H3130, Oligotrophic to Mesotrophic Standing Waters with Vegetation of the <i>Littorelletea</i> <i>uniflorae</i> and/or of the <i>Isoëto-Nanojuncetea</i>	39
H3140, Hard Oligo-Mesotrophic Waters with Benthic Vegetation of <i>Chara</i> spp.	40
H3150, Natural Eutrophic Lakes with <i>Magnopotamion</i> or <i>Hydrocharition</i> -type Vegetation	41
H3160, Natural Dystrophic Lakes and Ponds.....	42
H3170, Mediterranean Temporary Ponds	43
H3260, Water courses of Plain to Montane Levels with the Ranunculion fluitantis and Callitriche-Batrachion Vegetation	44
Temperate Heath and Scrub Habitats	45
H4010 and H4020, Northern Atlantic Wet Heaths with <i>Erica tetralix</i> and Temperate Atlantic Wet Heaths with <i>Erica ciliaris</i> and <i>Erica tetralix</i>	46
H4030 and H4040, European Dry Heaths and Dry Atlantic Coastal Heaths with <i>Erica</i> <i>vagans</i>	47
H4060, Alpine and Boreal Heaths	48
H4080, Sub-Arctic <i>Salix</i> spp. Scrub.....	49
Sclerophyllous Scrub (Matorral) Habitats.....	50
H5110, Stable xerothermophilous formations with <i>Buxus sempervirens</i> on rock slopes (<i>Berberidion</i> p.p.).....	51
H5130, <i>Juniperus communis</i> Formations on Heaths or Calcareous Grasslands.....	52
Natural and Semi-Natural Grassland Formations	53

H6130, Calaminarian Grasslands of the <i>Violetalia calaminariae</i>	54
H6150, Siliceous Alpine and Boreal Grasslands	55
H6210, Semi-natural Dry Grasslands and Scrubland Facies: on Calcareous Substrates (Festuco-Brometalia)	56
H6230, Species-rich <i>Nardus</i> Grassland, on Siliceous Substrates in Mountain Areas (and Submountain Areas in Continental Europe)	57
H6410, <i>Molinia</i> meadows on Calcareous, Peaty or Clayey-Silt-Laden Soils (<i>Molinion caeruleae</i>)	58
H6430, Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels	59
H6510, Lowland Hay Meadows (<i>Alopecurus pratensis</i> , <i>Sanguisorba officinalis</i>).....	60
H6520, Mountain Hay Meadows.....	61
Raised bogs, Mires and Fens	62
H7110 and H7120, Active Raised Bogs and Degraded Raised Bogs.....	63
H7130, Blanket Bogs.....	64
H7140, Transition Mires and Quaking Bogs	65
H7150, Depressions on Peat Substrates of the <i>Rhynchosporion</i>	66
H7210, Calcareous Fens with <i>Cladium mariscus</i> and Species of the <i>Caricion davallianae</i>	67
H7220, Petrifying Springs with Tufa Formation (<i>Cratoneurion</i>)	68
H7230, Alkaline Fens	69
H7240, Alpine Pioneer Formations of the <i>Caricion Bicoloris-Atrofuscae</i>	70
Rocky Habitats and Caves.....	71
H8110 and H8120, Siliceous Scree of the Montane to Snow Levels (<i>Androsacetalia alpinae</i> and <i>Galeopsietalia ladani</i>), and Calcareous and Calchist Scree of the Montane to Alpine Levels (<i>Thlaspietea rotundifolii</i>)	72
H8210 and H8220, Calcareous Rocky Slopes with Chasmophytic Vegetation and Siliceous Rocky Slopes with Chasmophytic Vegetation	73
H8240, Limestone Pavements.....	74
H8310, Caves Not Open to the Public.....	75

H8330, Submerged or Partially Submerged Sea Caves.....	76
Forests.....	77
H9120, Atlantic Acidophilous Beech Forests with <i>Ilex</i> and sometimes also <i>Taxus</i> in the Shrublayer (<i>Quercion robori-petraeae</i> or <i>Ilici-Fagenion</i>)	78
H9130, <i>Asperulo-Fagetum</i> Beech Forests	79
H9160, Sub-Atlantic and Medio-European Oak or Oak-Hornbeam Forests of the <i>Carpinion betuli</i>	80
H9180, <i>Tilio-Acerion</i> Forests of Slopes, Scree and Ravines	81
H9190, Old Acidophilous Oak Woods with <i>Quercus robur</i> on Sandy Plains	82
H91A0, Old Sessile Oak Woods with <i>Ilex</i> and <i>Blechnum</i> in the British Isles	83
H91D0, Bog Woodland.....	84
H91E0, Alluvial forests with <i>Alnus glutinosa</i> and <i>Fraxinus excelsior</i> (<i>Alno-Padion</i> , <i>Alnion incanae</i> , <i>Salicion albae</i>)	85
H91J0, <i>Taxus Baccata</i> Woods of the British Isles	86
Invertebrate Species: Annelids	87
S1034, Medicinal Leech, <i>Hirudo medicinalis</i>	88
Invertebrate Species: Molluscs	89
S1013, Geyer's Whorl Snail, <i>Vertigo geyeri</i>	90
S1014, Narrow-mouthed Whorl Snail, <i>Vertigo angustior</i>	91
S1015, Round-mouthed Whorl Snail, <i>Vertigo genesii</i>	92
S1016, Desmoulin's Whorl Snail, <i>Vertigo moulinsiana</i>	93
S1026, Roman Snail, <i>Helix pomatia</i>	94
S1029, Freshwater Pearl Mussel, <i>Margaritifera margaritifera</i>	95
S4056, Little Ram's-Horn Whorled Snail, <i>Anisus vorticulus</i>	96
Invertebrate Species: Arthropods	97
S1044, Southern Damselfly, <i>Coenagrion mercuriale</i>	98
S1058, Large Blue, <i>Maculinea arion</i>	99

S1065, Marsh Fritillary Butterfly, <i>Euphydryas aurinia</i>	100
S4035, Fisher's Estuarine Moth, <i>Gortyna borelii lunata</i>	101
S6199, Jersey Tiger Moth, <i>Euplagia quadripunctaria</i>	102
S1079, Violet Click Beetle, <i>Limoniscus violaceus</i>	103
S1083, Stag Beetle, <i>Lucanus cervus</i>	104
S1092, White-clawed Crayfish, <i>Austropotamobius pallipes</i>	105
Vertebrate Species: Fish	106
S1095, Sea Lamprey, <i>Petromyzon marinus</i>	107
S1096, Brook Lamprey, <i>Lampetra planeri</i>	108
S1099, River Lamprey, <i>Lampetra fluviatilis</i>	109
S1102, Allis Shad, <i>Alosa alosa</i>	110
S1103, Twaite Shad, <i>Alosa fallax</i>	111
S1106, Atlantic Salmon, <i>Salmo salar</i>	112
S1109, Grayling, <i>Thymallus Thymallus</i>	113
S6963, Spined Loach, <i>Cobitis taenia</i>	114
S6965, Bullhead, <i>Cottus gobio</i>	115
S2492, Vendace, <i>Coregonus albula</i>	116
S6353, Whitefish / Schelly, <i>Coregonus lavaretus</i>	117
S5085, Barbel, <i>Barbus barbus</i>	118
Vertebrate Species: Amphibians and Reptiles	119
S1166, Great Crested Newt, <i>Triturus cristatus</i>	120
S6284, Natterjack Toad, <i>Epiladea calamita</i>	121
S6981, Pool frog, <i>Pelophylax lessonae</i>	122
S1213, Common Frog, <i>Rana temporaria</i>	123
S1261, Sand lizard, <i>Coronella austriaca</i>	124
S1283, Smooth snake, <i>Coronella austriaca</i>	125

Vertebrate Species: Marine Mammal.....	126
S1351, Harbour porpoise, <i>Phocoena phocoena</i>	127
S1364, Grey Seal, <i>Halichoerus grypus</i>	128
S1365, Common Seal, <i>Phoca vitulina</i>	129
Vertebrate Species: Terrestrial Mammal.....	130
S1303, Lesser horseshoe bat, <i>Rhinolophus hipposideros</i>	131
S1304, Greater horseshoe bat, <i>Rhinolophus ferrumequinum</i>	132
S1308, Barbastelle, <i>Barbastella barbastellus</i>	133
S1309, Common pipistrelle, <i>Pipistrellus pipistrellus</i>	134
S1312, Noctule bat, <i>Nyctalus noctula</i>	135
S1314, Daubenton's bat, <i>Myotis daubentonii</i>	136
S1317, Nathusius' pipistrelle, <i>Pipistrellus nathusii</i>	137
S1320, Brandt's bat, <i>Myotis brandtii</i>	138
S1322, Natterer's bat, <i>Myotis nattereri</i>	139
S1323, Bechstein's Bat, <i>Myotis bechsteinii</i>	140
S1326, Brown long-eared bat, <i>Plecotus auritus</i>	141
S1327, Serotine bat, <i>Eptesicus serotinus</i>	142
S1329, Grey long-eared bat, <i>Plecotus austriacus</i>	143
S1330, Whiskered bat, <i>Myotis mystacinus</i>	144
S1331, Leisler's bat, <i>Nyctalus leisleri</i>	145
S5003, Alcaethoe Bat, <i>Myotis alcathoe</i>	146
S5009, Soprano pipistrelle, <i>Pipistrellus pygmaeus</i>	147
S1334, Mountain hare, <i>Lepus timidus</i>	148
S1337, Beaver, <i>Caster Fiber</i>	149
S1341, Common dormouse, <i>Muscardinus avellanarius</i>	150
S1355, Otter, <i>Lutra lutra</i>	151

S1357, Pine marten, <i>Martes martes</i>	152
S1358, Polecat, <i>Mustela putorius</i>	153
Lower Plant Species	154
S1378, Cladonia Subgenus of Lichens, <i>Cladonia subgenus Cladina</i>	155
S1390, Western Rustwort, <i>Marsupella profunda</i>	156
S6216, Slender Green Feather-Moss, <i>Hamatocaulis vernicosus</i>	157
S1395, Petalwort, <i>Petalophyllum ralfsii</i>	158
S1400, Large White-Moss, <i>Leucobryum glaucum</i>	159
S1409, Bog-Mosses, <i>Sphagnum spp.</i>	160
Higher Plant Species	161
S1413, Clubmosses, <i>Lycopodium spp.</i>	162
S6985, Killarney Fern, <i>Trichomanes speciosum</i>	163
S1441, Shore Dock, <i>Rumex rupestris</i>	164
S1528, Marsh Saxifrage, <i>Saxifraga hirculus</i>	165
S1614, Creeping Marshwort, <i>Helosciadium repens</i>	166
S1654, Early Gentian, <i>Gentianella amarella</i> subsp. <i>anglica</i>	167
S1831, Floating Water-plantain, <i>Luronium natans</i>	168
S1833, Slender Naiad, <i>Najas flexilis</i>	169
S1849, Butcher's-broom, <i>Ruscus aculeatus</i>	170
S1902, Lady's-slipper Orchid, <i>Cypripedium calceolus</i>	171
S1903, Fen Orchid, <i>Liparis loeselii</i>	172

Introduction

The UK has reported on the progress towards meeting the objectives set out in the Habitats Directive and Wild Birds Directive for over 30 years. These reports were coordinated by the Joint Nature Conservation Committee (JNCC) and submitted to the European Commission. After the UK's exit from the European Union, the reporting requirements were transposed into UK law to ensure continued protection of habitats and species of European importance.

Regulation 9A of the Conservation of Habitats and Species Regulations 2017 requires the 'Authority' (in England, Defra) to undertake an evaluation of the impact of conservation measures delivered under the regulations on the conservation status of habitat types and species listed in Annexes I, II, IV and V of the Habitats Directive for each reporting cycle.

- **Annex I** lists natural habitat types of community interest whose conservation requires the designation of special areas of conservation.
- **Annex II** lists animal and plant species of community interest whose conservation requires the designation of special areas of conservation.
- **Annex IV** lists animal and plant species of community interest that require strict protection.
- **Annex V** lists plant and animal species of community Interest whose taking in the wild and exploitation may be subject to management measures.

Defra commissioned Natural England to undertake an assessment of the conservation status for each of these habitat and species found in the Annexes. Natural England did not assess habitats and species that were beyond 12 nautical miles of the normal tidal limit. JNCC was responsible for the offshore assessments. A detailed explanation of the methodology is provided in the general implementation report to which this annex is attached.

The purpose of this report is to provide an accessible summary of the key findings for each habitat and species for which a full assessment of favourable conservation status was undertaken. The summaries provide a high-level description of the habitat or species, its conservation status and trend, the main pressures impacting on conservation status and where appropriate the key remedial measures. Detail of the full technical assessments conducted for each habitat and species will be published on NE's Access to Evidence. These technical assessments include the data references used to inform the assessments and these summaries, alongside distribution maps showing where in England each feature has been recorded. Both the technical assessments and summaries were produced by Natural England's specialists. We are greatly appreciative of them and thank them for their continuous efforts during the reporting period.

Assessment of Conservation Status and Trend

The assessment of conservation status is based on four key parameter conclusions, each evaluated throughout the technical reports:

- Range
- Population (Species) or Area (Habitats)
- Habitat for the Species (Species) or Structure and Functions (Habitats)
- Future Prospects

A general evaluation matrix was used to determine the overall conservation status, which could be classified as:

- **Favourable:** All four parameters are favourable, or three are favourable and one is unknown.
- **Unfavourable–Inadequate:** One or more parameters are unfavourable–inadequate, but none are unfavourable–bad.
- **Unfavourable–Bad:** One or more parameters are assessed as unfavourable–bad.
- **Unknown:** Either all parameters are unknown, or two or more are unknown alongside one or more favourable assessments.

The overall trend in conservation status was determined by analysing short-term trends for all parameters **except** future prospects. The classification was based on the following criteria:

- **Improving:** All short-term trends were increasing, or a combination of increasing and stable.
- **Stable:** Most trends were increasing, stable, or unknown. One parameter could be declining, but the overall trend was still considered stable if the decline was moderate (less than 1% per year).
- **Deteriorating:** One or more parameters showed a declining trend. Even if one parameter was increasing, the overall trend was considered deteriorating if another showed a decline greater than 1% per year.
- **Unknown:** Assigned when two or more parameter trends were unknown.

[JNCC will also publish](#) a detailed explanation of the methodology used to carry out these assessments, including the matrix.

Marine, Coastal and Halophytic Habitats

H1110, Sandbanks which are Slightly Covered by Seawater all the Time



Seastar resting on sandbank which is slightly covered by water at all times © Natural England

Sandbanks which are slightly covered by sea water all the time are sandy sediments always covered by sea water. These habitats are typically found at depths of less than 20 m but can also be found in channels or other environments deeper than 20 m. The sandy sediments form elongated, rounded, or irregular distinct banks, which are found on sloping or horizontal plains. Although sand characterises these habitats, some can also contain gravel, mud, or even larger materials like cobbles.

The marine life found on or in sandbanks include burrowing animals like bivalves, lugworms, and ragworms, but also surface dwellers like shrimp, crabs and fish (e.g. sand eels).

Sandbanks are widespread in inshore waters and typically found on open coasts and in tide-swept channels. Whilst they are found all around the English coastline, most are found in the North Sea.

The main pressures and risks to sandbanks are human activities (fishing and particularly bottom-towed gear trawling), coastal developments (including energy infrastructure) and climate change effects which are causing sea level rise and changes in temperature.

The conservation measures in place to mitigate the impacts of the pressures include fisheries management with gear restrictions, renewable energy installation mitigation measures and compensation measures, and climate change mitigation and adaptation measures.

The overall status is **unfavourable-inadequate** with the overall trend **improving** due to the change in pressures on these habitats. Progress in recoverability will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, increasing protection of designated sites through, for example, the MMO and IFCA fisheries byelaws programme, but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

H1130, Estuaries



© Natural England

Estuaries are semi-enclosed coastal water bodies where freshwater, from rivers or streams, meets seawater, resulting in various levels of brackish water as the saltwater and freshwater mix. These areas are dynamic ecosystems, influenced by tides and river flow, and are known for high biodiversity.

The geomorphological and hydrographic factors often create a gradient in salinity from freshwater in the river to increasing marine conditions towards the open sea.

The riverine sediment input often leads to extensive intertidal and subtidal sedimentary sand- and mudflats. These support an abundance of fauna and flora and are an important food source for wintering and migrating birds.

In England, estuaries are widely distributed and are found along all of England's coastline, but the most and

largest examples are on the southeastern and western shores. The largest estuaries are The Wash in the east and the Severn Estuary in the southwest.

Estuaries are sensitive to a combination of climate change impacts and human-induced changes, including man-made barriers and development. Climate change is causing rising sea levels, lower river flows, and more frequent storm surges, which squeezes freshwater habitats at the top of estuaries, impacting diverse plant and animal life.

Conservation measures attempting to reduce impacts and threats include managing changes in hydrological and coastal systems, construction and development adaptations to renewable energy installations; and introduction of climate change mitigation and adaptation measures.

The status of estuaries is assessed as **unfavourable-inadequate**, and trend is **stable**. Any progress will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, increasing protection of designated through, for example, the MMO and IFCA fisheries byelaws programme, sites but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

H1140, Mudflats and Sandflats not Covered by Seawater at Low Tide



© Natural England

Mudflats and sandflats not covered by seawater at low tide are intertidal areas, typically found in estuaries, inlets and bays. These areas are exposed during low tide and characterised by fine sediments (mud and sand), often with rich communities of invertebrates. These habitats are important feeding grounds for wildfowl and waders. Those areas not covered by seawater at low tide are a major component of habitats 1130 Estuaries and 1160 Large shallow inlets and bays.

These habitats are widespread in the UK, particularly around the North Sea but can be found along all English coastlines.

Three typical sub-types found are clean sand (with robust amphipod crustaceans and polychaete worms), muddy sands (stable conditions with lugworm and

bivalve molluscs) and mudflats (also with stable conditions with communities dominated by worms and bivalve molluscs).

Pressures and threats to these habitats include coastal development, pollution and eutrophication, fishing activities, and climate change impacts such as sea level rise. These threats can lead to habitat loss, altered sediment structure, reduced biodiversity, and changes in the overall ecosystem.

Conservation measures attempting to reduce these impacts include managing fisheries, controlling pollution and nutrient increases, construction and development adaptations to renewable energy installations; and introducing climate change mitigation and adaptation measures.

The current status is **unfavourable-bad** and the trend is **stable**. Any progress will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, increasing protection of designated sites through, for example, the MMO and IFCA fisheries byelaws programme, but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

H1150, Coastal lagoons



© Natural England / Hull Marine Laboratory

Coastal lagoons are areas of shallow, coastal waterbodies wholly or partially separated from the sea by a barrier (e.g. sea walls, shingle and sandbanks), with a wide range of geographical, physiological and ecological variation. The water in the lagoons can vary in salinity from brackish (seawater diluted by freshwater) to hypersaline (often caused by evaporation) conditions.

The physical and salinity characteristics of a lagoon will shape the types of plant and animal communities present and consequently there are significant differences between sites, with some being unique to lagoon habitats. Species found in lagoons include foxtail stonewort, starlet sea anemone, lagoon sandworm and lagoon sand-shrimp.

Coastal lagoons are a relatively uncommon habitat in the UK, but examples are found along many

coastlines in England. There are five main lagoonal sub-types; isolated, percolation, silled and sluiced lagoons as well as lagoonal inlets. Soft-sediment lagoons occur mainly on the east coast of England.

Coastal lagoons are highly sensitive to the impacts of climate change, especially to relative sea level rise, increased storminess, changes in temperature, salinity and/or seasonal precipitation which can alter the distribution, ecology and functioning of lagoon habitats.

Conservation measures attempting to reduce impacts and threats include managing changes in hydrological and coastal systems and regimes for construction and development (including the restoration of habitats) and introducing climate change mitigation and adaptation measures.

The current overall status of coastal lagoons is **unfavourable-inadequate** with the overall trend being **stable** (unfavourable inadequate unlikely to change). Any progress will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, delivering habitat restoration, monitoring, and the protection of designated sites but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

H1160, Large Shallow Inlets and Bays



© Natural England / Kate Jones

Marine large shallow inlets and bays occur along the coast as indentations, often creating sheltered environments protected from wave action. The habitats are often found in shallow depths in areas with typically limited freshwater input. The habitats are often a mix of intertidal and subtidal areas with mudflats, sandflats, and salt marshes but also subtidal sand and gravel, seagrass beds, and potentially salt marshes and reefs. Some of these habitats provide vital feeding and breeding grounds for a variety of marine life and birds (migratory and overwintering).

The soft-bottom habitats are often rich and diverse in invertebrates including scallops, mussels, anemones and sea cucumbers.

The habitat is widespread and found all around the English coastline with the Fal and Helford Estuaries, Morecambe Bay and Plymouth Sound being particularly noteworthy.

Marine shallow inlets and bays are sensitive to a combination of pollution, climate change (e.g. rising temperatures), eutrophication, overfishing and human-induced changes including man-made barriers and development.

Conservation measures attempting to reduce pollution and eutrophication as well as impacts and threats including managing construction and development adaptations to renewable energy installations; and introduce climate change mitigation and adaptation measures.

The current status of large shallow inlets and bays is **unfavourable-inadequate** and trend **stable**. Any progress will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, increasing protection of designated sites through, for example, the MMO and IFCA fisheries byelaws programme, but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

H1170, Reefs



© Natural England

Reefs are complex, diverse and mixed habitats comprising two main types: rocky and biogenic reefs. The former is further divided into bedrock and stony reefs and the latter is formed by animals, such as mussels and worms (e.g. Ross worm). The animals stabilise the seafloor and create complex, often biodiverse habitats.

All types of reefs can support a variety of communities which vary depending on geographical location and local environmental conditions such as tidal action, wave and current energy. The reefs support anemones, sponges, fish, lobsters and crabs, some of which are important for commercial fisheries.

Reefs are found all around the English coastline, from the intertidal to the deeper sections of the subtidal areas. Geogenic (or bedrock) reefs are overall considered stable but some, for example chalk, peat

& clay exposures, are particularly vulnerable to habitat loss.

These habitats are sensitive to pollution, climate change, and some fishing practices, particularly bottom-towed fishing. These activities cause damage to the seafloor and associated habitats and species, preventing these from recovering whilst biogenic reefs can disappear completely.

Conservation measures aim to maintain or restore the favourable conservation status of the reef habitat and its associated species but also reduce these impacts by managing fisheries, adapting and managing renewable energy installation, facilities and operation; controlling pollution, and introducing climate change mitigation and adaptation measures.

The current status of reefs is **unfavourable-bad** with the overall trend **improving**. Progress in recoverability will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, increasing protection of designated sites through, for example, the MMO and IFCA fisheries byelaws programme, but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

H1210, Annual Vegetation of Drift Lines



© Natural England / Marina Pugh

This shingle habitat is characterised by low-growing vegetation, often occurring in discontinuous bands associated with strandline deposits on flat or gently sloping shingle beaches above the mean high-water mark. Natural disturbance by spring and autumn storms re-shapes beaches, keeping the vegetation in a perpetually immature state, whilst also providing conditions for recolonisation and seed dispersal. Salt-tolerant species such as sea sandwort and various species of orache colonise organic tidal debris for nutrients.

Climate change is increasingly a factor affecting community distribution and species range of shingle vegetation. Warmer temperatures also favour invasive species, which threaten many native species. A few specialised plants can survive periodic movement of shingle

beaches, but increasing storm frequency and intensity will destroy most vegetation. Artificial profiling and other flood and erosion risk management interventions, including raising the crest height, may cause direct damage to existing sensitive strandlines in addition to disturbing the sediment structure and supply, modifying future community composition.

Sediment extraction, both onshore and offshore, has had indirect impacts on strandline vegetation leading to a reduction in sediment supply reducing both suitability and area available for strandline vegetation establishment. In many areas, vegetated shingle has been impacted by recreational trampling and vehicle usage breaking up the vegetation and sediment structure of shingle ridges.

The biological diversity and variation of shingle structures are maintained when natural processes are allowed to function without intervention. With no anthropogenic constraints, shingle structures can move and adapt their form in line with changing environmental conditions. With 'room to move' and adequate sediment supply shingle can 'roll-over' in response to sea-level rise, retaining a similar shape and therefore similar sea defence properties.

The overall conservation status is **Unfavourable-bad**, and the **overall trend is Stable**.

H1220, Perennial Vegetation of Stony Banks



©Natural England /Neil Pike

This vegetated shingle habitat develops at the limit of high tide when storm waves throw pebbles high up on the beach, forming permanent ridges from where the backwash cannot remove them. The vegetation comprises species such as sea kale, sea beet, curled dock and sea campion. These communities are uniquely adapted to hostile conditions of high salinity, strong winds and low moisture, developing on stable areas where sea spray is blown over the shingle surface.

On the largest and most stable structures the sequence of vegetation includes grassland, heathland and scrub, notably broom and blackthorn. Natural cycles of degeneration and regeneration of this shrub vegetation influence the sequence of plant communities which occur on the oldest shingle ridges.

Infrastructure development has been a major driver of change for shingle habitats, particularly for facilities requiring remote locations (such as those for military uses) or a nearby source of

cooling water, such as nuclear power stations like Dungeness.

Climate change is increasingly a factor affecting community distribution and species range. Warmer temperatures favour invasive species such as red valerian which threaten many native species. Increasing storm frequency and intensity may destroy most vegetation. This will be particularly significant for mature, stable vegetation on stony banks as these communities can take decades to re-establish.

Artificial profiling including raising the crest height and installation of cross shore structures for flood and erosion risk management purposes may cause direct damage to shingle ridges by disturbing the sediment structure and supply and modifying future community composition. This can reduce both the suitability and area available for vegetation establishment. In many areas, vegetated shingle has been impacted by recreational trampling and vehicle usage.

Maintaining natural dynamics through minimal intervention where possible is key to the sustainable management of shingle vegetation. Under 'natural' conditions, shingle moves in response to sea-level change and storms. With 'room to move' and adequate sediment supply shingle can 'roll-over' in response to sea-level rise, retaining a similar shape and therefore similar sea defence properties.

The overall conservation status is **Unfavourable-bad** and the overall trend is **Deteriorating**.

H1230, Vegetated Sea Cliffs of the Atlantic and Baltic Coasts



Kynance Cove, The Lizard NNR © Louise Denning

Vegetated sea cliffs are described as steep slopes fringing hard or soft coasts, created by past or present marine erosion, and supporting a wide diversity of vegetation types with variable maritime influence.

Their steep and eroding nature can hinder efforts to manage and restore cliffs. In many areas the loss or reduction in grazing has led to poorer habitat quality, with coarse grasses, bracken, and scrub taking over maritime grassland. This is often exacerbated by the addition of nitrogen inputs from fertiliser spray and aerial deposition. The presence and spread of invasive non-native species (INNS) e.g. Hottentot-fig is a particular concern considering difficulties around accessing them on steep/unstable cliffs and how hard INNS are to control. Coastal defences aimed at stabilising cliffs limit natural coastal processes which are key to achieving good condition. Trampling and erosion caused by high visitor numbers can lead to damage and

in extreme cases collapse of vulnerable sections of cliff, especially during heavy rainfall. Increased human usage also discourages farmers from using grazing animals on cliff tops due to issues like dog worrying. Climate change adds further pressure with higher summer temperatures, changes in rainfall, more storms, and rising sea levels.

Health and safety concerns and a lack of access has meant that cliff habitat is often difficult to monitor. New earth observation techniques are being developed to improve cliff monitoring in terms of their species composition, extent and condition.

The 2025 Environmental Land Management scheme includes two new higher tier actions for cliffs. One targets the management and restoration of the sea cliff and slope; the other aims to allow roll-back of habitats (particularly soft cliff) affected by climate change and coastal squeeze so habitats can move into the land behind. The updated National Coastal Erosion Risk Maps (NCERM2) help us to understand where erosion and cliff instability are most severe and how they might respond to climate change. They also identify areas where erosion is rapid and where protected features might move outside their designated boundaries.

The overall conservation status is **Unfavourable-bad** and the overall trend is **Deteriorating**.

H1310, *Salicornia* and other Annuals Colonising Mud and Sand



Salicornia and other annuals on Medway Estuary and Marshes SSSI © Natural England/ Rachael Mills

This is the pioneer stage of saltmarsh development, where a few salt tolerant plants such as glasswort and annual sea-blite colonise intertidal mud and sandflats, creek sides, muddy depressions and pans, and disturbed areas of upper saltmarsh. These plants grow in sheltered, low energy environments that are regularly flooded by the tides, except the lowest neap tides.

Widespread around the English coast, the largest area is in around The Wash and North Norfolk Coast.

The vegetation consists mainly of small patches on large areas of bare ground; this makes it difficult to accurately measure resulting in under recording. As survey techniques improve, so will the data on extent and condition of the

habitat. As sediment accumulates and elevation increases, the habitat matures, leading to denser vegetation and development of a more closed canopy.

The main pressures on these habitats are water pollution - particularly around the south coast – increasing the growth of macroalgae that smothers vegetation; commercial harvesting of glasswort (i.e. samphire); and over and under grazing. Sea-level rise and increased storminess through climate change, limited sediment availability, and offshore wind infrastructure are predicted to become significant factors contributing to the loss and/or damage of this habitat in the future.

Lower areas of soft mud are not suitable for management; the natural processes of waves, tides and sediment movement are sufficient to create and sustain a healthy habitat. Where the upper marsh is grazed the right animals and numbers are required to create suitable conditions.

Conservation actions, such as those delivered through agri-environment schemes, are essential for restoration of natural processes, habitat management, and creation. These measures are vital for halting habitat loss, allowing saltmarshes to move inland and enhancing their resilience to both human and climate pressures. The overall assessment of conservation status is **unfavourable-bad** and its trend **unknown**.

H1320, *Spartina* Swards (*Spartinion maritimae*)



A rare example of *Spartina maritima* growing on the foreshore on the Orwell estuary, East Suffolk. © Natural England/ UKCEH

This represents the first stage of (pioneer) saltmarsh development, where a few salt-tolerant plant species - primarily cord-grasses (*Spartina* spp.) - begin to colonise mud and sandflats. These areas are typically found along seaward, creek edges, as well as in muddy depressions within the upper marsh.

Three cord-grass species are associated with this habitat: small cord-grass, smooth cord-grass - both rare - and Townsend's cord-grass. These are often found alongside common cord-grass, perennial glasswort, annual seablite, saltmarsh grass, and sea aster.

Currently, this habitat is restricted to a few sites in south-east England, notably the Essex Estuaries and Solent Maritime

Special Areas of Conservation, where the climate is warm enough to support growth. Essex hosts the most extensive area of small cord-grass in the UK - and possibly Europe - while The Solent is the only known site where both smooth and Townsend's cord-grass coexist.

Key pressures on this habitat include coastal erosion and land-claim; cessation of traditional grazing; surface and groundwater pollution and nutrient enrichment; sea defences and onshore infrastructure (e.g. wind farm cables); and overgrazing by livestock.

The most significant long-term threat is habitat loss due to sea-level rise and increased storm activity, leading to "coastal squeeze". Since the 1960s, both small and smooth cord-grass populations have declined, largely due to industrial and marine developments.

Conservation actions, such as those delivered through Agri-environment schemes, are essential for habitat management, restoration of natural processes, and creation. These measures are vital for halting habitat loss, allowing saltmarshes to move inland and enhancing their resilience to both human and climate pressures.

The overall conservation status remains **unfavourable-bad**, with a **deteriorating** trend.

H1330, Atlantic Salt Meadows (*Glauco-Puccinellietalia maritimae*)



Saltfleetby-Theddlethorpe Dunes NNR ©
Natural England/Peter Roworth

Atlantic salt meadows represent the most extensive and widespread Annex I saltmarsh habitat in England. These ecosystems play a vital role in supporting biodiversity, mitigating coastal erosion, and storing carbon.

They typically form on soft intertidal mud and sand in sheltered coastal areas, where wave action is limited and tidal inundation is less frequent. Salt meadows cover the lower, middle and upper zones of the saltmarsh, including driftline areas and zones influenced by freshwater. They transition seaward into pioneer saltmarsh and landward into terrestrial habitats such as sand dunes.

A diverse range of plant communities can grow across large expanses, particularly where saltmarshes are not backed by sea walls. Plant diversity generally increases from the frequently flooded lower zones to the more stable upper marsh. These habitats also support invertebrate populations and are important feeding and breeding grounds for wintering and nesting waterfowl.

Vegetation composition varies regionally, influenced by climate, tidal patterns, and grazing practices. In the east and southeast, middle marsh communities dominate due to the historical enclosure of upper marshes. In contrast, the northwest features extensive grazed upper marshes, while swamp communities are more common in the southwest.

The Wash contains the largest single area, while the Essex Estuaries support the most extensive combined area.

These habitats are under pressure from various sources, including coastal development (e.g., sea defences, infrastructure, and residential or commercial buildings), pollution from sewage, agricultural runoff and airborne nitrogen, and over/undergrazing including grazing of unsuitable areas. These contribute to habitat loss and degradation through, for example, “coastal squeeze”, reduced sediment supply, vegetation smothering, and the spread of rank grasses and scrub.

Conservation actions, such as those delivered through agri-environment scheme, are essential for habitat management, restoration of natural processes, and creation. These measures are vital for halting habitat loss, allowing saltmarshes to move inland and enhancing their resilience to both human and climate pressures.

The current conservation status of this saltmarsh habitat is assessed as **unfavourable–bad**, with a **deteriorating trend**.

H1340, Inland salt meadows



Cattle grazing within an Inland Salt Meadow Habitat © Katey Stephen

Inland Salt Meadows are rare, non-coastal habitats that support saltmarsh vegetation similar to that found in grazed coastal marshes. In England, these meadows are man-made and occur only in two locations: Staffordshire and Worcestershire, where they have developed in areas formerly used for salt production. The marshes originate from the percolation of saline surface water derived from subterranean salt-bearing rocks and from collapsed salt works. They are extremely limited in size, with each site no more than 0.5 hectares, and are typically subject to extensive cattle grazing.

The vegetation includes salt tolerant plants such as common saltmarsh-grass, lesser sea spurrey and sea arrowgrass. These sites form a mosaic with other communities, including open water,

swamp and tussocky grassland offering important breeding, wintering and stopover habitats for waders such as snipe, redshank and lapwing.

The ecological health of these meadows is highly sensitive to water level changes. Threats include agricultural land drainage, climate change, and hydrological management practices that alter water levels. Additionally, poor water quality, especially from diffuse agricultural pollution, can reduce the habitat's plant diversity. Atmospheric nitrogen deposition is another key factor in the loss of plant species richness. A decline or cessation of grazing can also lead to the deterioration of these habitats.

In 2025, the new Environmental land Management scheme opened to land managers that includes options for managing species rich grassland, with revised payment rates that will encourage uptake. Given the very specialised conditions under which the habitat occurs and the very limited scope for habitat creation, it is not proposed to set an expansion ambition for this habitat. This habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H1420, Mediterranean and Thermo-Atlantic Halophilous Scrubs (*Sarcocornetea fruticosi*)



Shrubby sea-blite (*Suaeda vera*) bushes growing along the strand line and on the sea defence © Natural England

This perennial vegetation, primarily composed of scrub, is found at the uppermost levels of saltmarshes and drift-line slopes. These areas experience limited tidal inundation but are exposed to wave splash and sea spray. The habitat often occurs at the transition between saltmarsh and dunes, or where dunes overlie shingle. In places where this transition is interrupted - such as by sea walls in the Essex Estuaries - the vegetation may persist in a linear form along the high tide mark or even colonise sea walls.

The plant community most closely resembling Mediterranean scrub in the UK is found along the south and east coasts of England, reaching its northernmost extent on the Lincolnshire coast. It is typically dominated by shrubby sea-blite and sea purslane, with a limited

variety of herbaceous plants and bryophytes. It occurs in significant concentrations - where all characteristic species are present - in only three areas: Chesil Beach, the Essex Estuaries and the Wash/North Norfolk Coast. Due to its limited distribution and coastal location, it is particularly vulnerable to human intervention e.g. flood defence schemes.

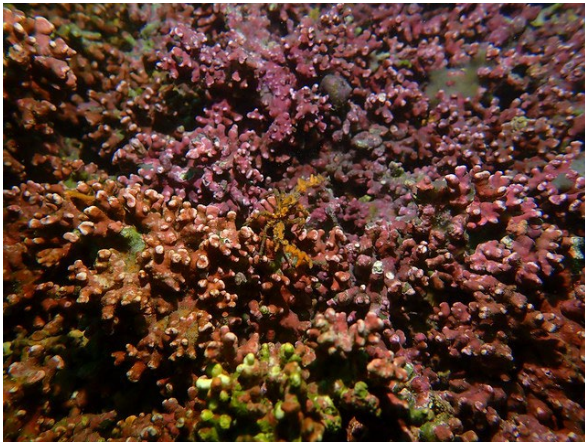
Key pressures include coastal and estuarine modification for development and flood protection (e.g. sea walls); scrub clearance on sea walls - particularly in Essex; habitat loss and “coastal squeeze”; and sea-level rise and increased wave exposure due to climate change.

Without targeted intervention and adaptive management, this habitat is likely to continue declining under the combined pressures of human activity and climate change.

Conservation actions, such as through agri-environment schemes, are essential for habitat management, restoration of natural processes, and creation. These measures are vital for halting habitat loss, allowing saltmarshes to move inland and enhancing their resilience to both human and climatic pressures.

The current conservation status of this saltmarsh habitat is assessed as **unfavourable–bad**, with an **unknown** trend.

S1376 to S1377, Maerl including *Phymatolithon calcareum* and *Lithothamnion corallioides*



© Danielle Agnew/ Natural England

“Maerl” is a collective term for several species of calcified red seaweed which live unattached on sediments. In favourable conditions, these species can form extensive beds, typically 30% cover or more, mostly in coarse clean sediments of gravels and clean sands or muddy mixed sediments, which occur either on the open coast or in tide-swept channels of marine inlets.

Maerl beds have been recorded at depths ranging from the lower shore to around 30m. In England, maerl beds are mostly found in the south and southwest with *Phymatolithon calcareum* and *Lithothamnion corallioides* being the two most recorded species. The beds create highly diverse and important habitats for a variety of other plant and animal taxa including scallops and urchins.

Maerl beds are fragile and slow growing, making these habitats particularly sensitive to damage. Activities such as bottom-towed fishing, maintenance dredging, heavy anchors and mooring chains can cause long-term damage but maerl is also expected to be adversely affected by rising temperatures, eutrophication and ocean acidification caused by climate change.

Maerl beds are protected in four Marine Protected Areas (Fal and Helford SAC, Purbeck Coast MCZ, Bembridge MCZ and The Manacles MCZ) around England. The habitat is furthermore listed as a UK Biodiversity Action Plan habitat and an OSPAR threatened and declining habitat. Progress of recovery will largely be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023 through, for example, the MMO and IFCA fisheries byelaws programme being introduced over the next few years.

The overall assessment of conservation status is **unfavourable-bad** but its trend **improving** as the introduction of The Environmental Targets (Marine Protected Areas) Regulations 2023 has the potential to improve the conservation status of this habitat over the next 20 years.

Coastal Sand Dunes and Continental Dunes

H2110, Embryonic Shifting Dunes



© Natural England/ Paul Glendell

Embryonic sand dunes occur where windblown sand is trapped by tidal debris and accumulates near the tidal limit. These accumulations are colonised by salt tolerant annual herbaceous plants such as saltwort, sea rocket and various oraches and dominated sand-binding perennial grasses, typically sand couch and lyme grass in a band just above the strandline. These ephemeral communities can recolonise after storm events as well as acting as a pioneer community to other dune habitats, specifically marram-dominated shifting dunes. The presence of embryonic dunes is indicative of an active and functional blown sand system.

Management interventions which have reduced or constrained sediment processes and built development which has reduced the ability of dunes to migrate landwards, have contributed to a reduced capacity for adaptation. Dunes are therefore likely to be more susceptible to climate change where space and sediment are limited.

Coastal defences are more likely to affect the development of embryo dunes by

interrupting the sediment supply. Beach cleaning and recreational activities are another cause of reduced habitat quality or prevent the establishment of foredune habitats particularly on beaches used for tourism. Problems are exacerbated in many regions due to nitrogen deposition leading to eutrophication, stabilisation and loss of diversity. Climate change is expected to result in increased frequency and magnitude of major storms which may accelerate the rate of frontal dune erosion. Embryo dunes are naturally restricted to locations where the coastal sediment processes lead to accumulation of blown sand and subsequent colonisation by dune-building vegetation. It is not possible to artificially create new dune systems in other places, although local restoration of dune types to expand extent and improve quality is possible through reinstating dynamic processes within existing dune systems and addressing causes of unfavourable condition.

The highly dynamic state of embryo dune vegetation communities is dependent on the fine balance of geomorphological processes and highlights that their management and restoration involve supporting natural formation and dynamics, which includes encouraging sand mobility, promoting pioneer vegetation, maintaining bare ground and preventing human interference that could hinder dune development e.g. trampling, vehicle use.

The overall conservation status is **Unfavourable-bad** and the overall trend is **Stable**.

H2120, Shifting dunes along the Shoreline with *Ammophila arenaria* (`white dunes`)



Braunton Burrows © Louise Denning

Shifting dunes along the shoreline with Marram typically encompasses young unstable dunes where there is active sand movement and bare sand. Marram grass is the main dune building plant-species, which, with its deep roots binds the sand and can form high dune ridges. Shifting dunes require a dynamic coast, growing in both eroding and accreting systems. Its species composition is constrained by the harsh conditions and varies according to the degree of sand mobility and instability. Although widespread they are generally restricted to a narrow strip.

For shifting dunes one of the key concerns is a lack of available sediments and poor coastal management resulting in a constrained dune system with a lack of dune mobility. This combined with a changing climate (e.g. increased storminess, sea level rise, changing levels of rainfall and higher annual temperatures) means coastal dynamics

will change. Although shifting dunes have the potential to adapt to some of these impacts as they have evolved to grow in this already dynamic environment, this ability has been reduced by past interventions. Other pressures include beach cleaning and recreational use, which can damage and limit the growth and quality of the frontal dunes. Invasive species are also a major problem.

Over the last few years, conservation measures have been undertaken in the shifting dunes as part of the Dynamic Dunescape project. E.g. notches have been created in three main dune systems on the west coast i.e. in Cornwall, Devon and along the Sefton coast, which has focused on remobilising over-stabilised sands and increasing bare sand (which will benefit early successional species).

The 2025 Environmental Land Management scheme includes a sand dune option to improve the condition of dunes. The new scheme will provide funding for both capital works to restore degraded dunes and to fund ongoing habitat management. Funds will also enable feasibility studies to be undertaken which will inform more complex dune restoration projects for example creating dune notches.

The overall conservation status is **Unfavourable-bad**, and the overall trend is **Deteriorating**.

H2130, Fixed Coastal Dunes with Herbaceous Vegetation ('grey dunes')



Harebell (*Campanula rotundifolia*)
Ainsdale and Birkdale Sandhills LNR ©
Natalie Hunt

Fixed dune vegetation mainly occurs on larger dune systems which have the width to allow it to develop. As you move inland, the dunes change in colour from yellow to grey. This is because these dunes are starting to build up more organic matter, which supports more diverse plant communities. Fixed dunes develop a closed sward comprising grasses, herbs, mosses and lichens. The species composition of these swards can vary considerably according to climate and soil type but can be very species rich.

Over-stabilisation of fixed dunes with a lack of bare sand and opportunities for early successional species is the main cause of fixed dune deterioration. Causes include nitrogen pollution from the atmosphere leading to higher levels of nutrients in the soil; changes in grazing (whether through a reduction in grazing levels or the use of inappropriate livestock); the reduction in scrub/ tree clearance particularly of nitrogen-fixing species e.g. Sea Buckthorn; and climate

change, with changes in rainfall and warmer temperatures. In general, these factors all lead to a similar outcome, faster plant growth of certain species, usually those which prefer nutrient-rich conditions, and smothering of slower growing dune species, with a resulting loss in diversity. Invasive species are often a major problem, particularly at sites close to large urban areas where accidental or deliberate release of ornamental plants can become highly invasive.

Conservation measures have been undertaken as part of the Dynamic Dunescapes project focusing on fixed dune grassland. Actions include increased grazing across sites (including using Nofence technologies to graze sites considered un-grazable), removal of invasive species (e.g. Japanese Rose, Japanese Knotweed, and Sea Buckthorn outside its native range), reduction in scrub, and creation of bare sand and remobilising sand through the use of notches and blowouts. These measures are essential for maintaining open conditions amongst areas of grassland and heath. In addition, Shared Nitrogen Action Plans (SNAPs) have been developed for two sand dunes sites (Braunton Burrows and Ainsdale Dunes) to help identify and reduce sources of atmospheric nitrogen pollution affecting these sites.

The **overall conservation status is Unfavourable-bad**, and the **overall trend is Deteriorating**

H2150, Atlantic Decalcified Fixed Dunes (Calluno-Ulicetea)



Studland and Godlington Heath Natural Nature Reserve © Louise Denning

Atlantic decalcified fixed dunes are a form of lowland heath that occurs on coastal sand dunes where the soils are more acidic, either because rain has leached out the lime from the sand or it develops on sites where the sand has little shell content. In England, dune heath is very rare as it has often been lost to plantations or development, but a few locations still remain including Studland in Dorset, Winterton Dunes in Norfolk and along the Sefton and Cumbria Coasts. Here you can find many species of heather, lichens and fine grasses, often with a thin layer of peaty soil.

Over-stabilisation resulting in limited bare sand and poor opportunities for early successional species is the main cause of dune heath deterioration. Lack of site management, in particular under-grazing allows the establishment of scrub and tree seedlings. But dune heath is also sensitive to stocking densities and there are limits above which heather will be lost

resulting in a change to grassland communities. Atmospheric nitrogen deposition also adversely affects species composition and sward structure. Other pressures include issues associated with high visitor numbers causing disturbance and damage and the spread of invasive non-native plant species that outcompete the native dune flora, shading out the bare sand and building up thick layers of organic litter.

Several conservation measures have been undertaken focusing on improving the condition of dune heath as part of the Dynamic Dunescape project. At Studland Dunes, the reintroduction of cattle grazing was possible (for the first time since world war two) due to the use of No Fence technology (the first location to trial it in the UK) and a successful public engagement project. While at The Triangle in Sefton, tree and scrub removal focused on clearing a mix of scrub, primarily overgrown gorse, birch/poplar young coppice and trees (mostly pine) ranging from circa 20-70 years old that had invaded areas of rare dune heath. In addition, at The Triangle a trial comparing the effectiveness of manual raking of the pine needle litter layer was undertaken. The trial showed that heather regrowth in the raked areas was noticeably much higher than in the unraked areas.

The overall conservation status is **Unfavourable-bad**, and the **overall trend is deteriorating**.

H2160, Dunes with *Hippophae rhamnoides*



Picture of Sea Buckthorn © Louise Denning

Dunes with Sea Buckthorn (*Hippophae rhamnoides*) comprises scrub vegetation on more-or-less stable sand dunes in which Sea Buckthorn is abundant. Sea Buckthorn may either form dense thickets, with sparse nitrogen-loving associates such as common nettle, or occur as more scattered bushes interspersed with various grasses, typically Marram and Red Fescue, and associated herbs of dune grassland. There has been much debate as to its native range. Sea-buckthorn was widely planted to stabilise more mobile sand, but due to its vigorous spreading habit, planting led to very extensive areas of scrub developing. Although not now planted on dunes, it is still used in amenity planting in nearby coastal resorts: these can act as a seed reservoir of future recolonisation on dunes.

A key pressure is climate change, specifically the rising sea-levels and

increased temperatures. Frequent flooding has been associated with reduced growth at lower elevations due to inundation or soil water saturation. Defoliation caused by Brown-tail moth outbreaks can impact the species and while this is only a temporary effect now, it is unclear whether repeated defoliation has any longer-term effects.

As part of the Dynamic Dunescapes project significant efforts to clear Sea Buckthorn outside its native range (where it is considered a non-native invasive species) have occurred. This benefits the other Annex I dune habitats particularly dune slacks and fixed dune grassland where it can shade out and outcompete native dune flora. Within its native range on the east coast, management to diversify the age structure has taken place, creating areas of young, mature and over-mature scrub. In addition, the targeted removal of Sea Buckthorn from embryo and shifting dunes has aimed to reduce its dominance. The new Environmental Land Management scheme includes a higher tier sand dune action to improve the condition of dunes. The new scheme will provide funding for both capital works to restore degraded dunes and to fund ongoing habitat management. Funds will also enable feasibility studies to be undertaken which will inform more complex dune projects. Supplementary payments are available to tackle Sea Buckthorn outside its native range.

The overall conservation status is **favourable**, and the **overall trend is improving**.

H2170, Dunes with *Salix repens* ssp. *argentea* (*Salicion arenariae*)



© Dynamic Dunescapes/Emma Brisdion

This dune habitat type occurs where creeping willow is abundant. This type of vegetation is characteristic of calcareous dune slacks. When found with other wetland and dry dune vegetation, it indicates that successional processes are still active and that the structure and function of the dune system are well conserved. Creeping willow is often found in dune slack vegetation and the boundaries between Dunes with *Salix arenaria* and Humid dune slacks are often diffuse and difficult to define on the ground. It may also spread up the drier dune ridges, often referred to as “hedgehog dunes”.

Young dune slacks, which are rare and highly valued for nature conservation, are inherently threatened by natural succession. Climate change and eutrophication may pose problems for restoration of extent and quality of dune slacks as evidence from a re-survey of dune wetlands in England suggests that dune slacks are drying out. Small shifts in water table levels can result in changes to

species composition and in-habitat extent from wetter to drier plant communities. The degradation of dune-slack vegetation is likely to result from changes in hydrology, such as lowering of the water table by abstraction, or from eutrophication of the groundwater by pollution and atmospheric deposition of nitrogen.

In general, this habitat is not actively managed although it may be grazed by rabbits or livestock, particularly in summer. Lack of grazing may be detrimental to community stability and species diversity. A critical factor for dune slack habitats is restoration of hydrological function and infiltration capacity of rainfall to recharge the dune water table. Measures to achieve this include opening the vegetation and removing scrub across the wider dune area, which is beneficial to other dune habitats.

Restoration measures may include removal of sand-stabilising features and constraints on the landward migration of dune systems; identification and remediation of sources of eutrophic, polluted groundwater; reducing water abstraction and land drainage activities that are shown to be lowering dune water tables; removal of coniferous plantations where they are having a harmful effect on dune water tables.

The overall conservation status is **Unfavourable-bad**, and the overall trend is **Deteriorating**.

H2190, Humid Dune Slacks



©Dynamic Dunes/ Lawrence
Eagling

This dune habitat type occurs where creeping willow is abundant. This type of vegetation is characteristic of calcareous dune slacks. When found with other wetland and dry dune vegetation, it indicates that successional processes are still active and that the structure and function of the dune system are well conserved. Creeping willow is often found in dune slack vegetation and the boundaries between Dunes with *Salix arenaria* and Humid dune slacks are often diffuse and difficult to define on the ground. It may also spread up the drier dune ridges, often referred to as “hedgehog dunes”.

Young dune slacks, which are rare and highly valued for nature conservation, are inherently threatened by natural succession. Climate change and eutrophication may pose problems for restoration of extent and quality of dune slacks as evidence from a re-survey of dune wetlands in England suggests that dune slacks are drying out. Dune slack habitat has shown a shift in species

composition and in habitat extent from wetter to drier plant communities. It only takes small shifts in water table levels to result in species changes. The degradation of dune-slack vegetation is likely to result from changes in hydrology, such as lowering of the water table by abstraction, or from eutrophication of the groundwater by pollution and atmospheric deposition of nitrogen.

In general, this habitat is not actively managed, although it may be grazed by rabbits or livestock, particularly in summer. Lack of grazing may be detrimental to community stability and species diversity. A critical factor for dune slack habitats is restoration of hydrological function and infiltration capacity of rainfall to recharge the dune water table. Measures to achieve this include opening up vegetation and removing scrub across the wider dune area, which is beneficial to other dune habitats.

Restoration measures may include removal of sand-stabilising features and constraints on the landward migration of dune systems; identification and remediation of sources of eutrophic, polluted groundwater; reducing water abstraction and land drainage that is shown to be lowering dune water tables; removal of coniferous plantations where they are having a harmful effect on dune water tables.

The **overall conservation status is Unfavourable-bad** and the overall trend is **Deteriorating**.

H2330, Inland Dunes with Open *Corynephorus* and *Agrostis* Grasslands



Grey Hair-Grass on Inland Dunes © Alex Prendergast

Inland dune grassland containing grey hair-grass is an extremely rare habitat in the UK, found in one small part of the Breckland area of East Anglia and in Lincolnshire. The habitat type is associated with open conditions with active sand movement and can show a colonisation sequence from open sand to acidic grass-heath. Areas of most active sand movement can be colonised by only a few plants including the rare grey hair-grass. Initial colonisation of the habitat tends to be by bristly haircap moss, which then gives way to a close turf of mosses and lichens and then short grassland dominated by bents and fescues. This habitat tends to form a mosaic with other habitats, particularly relict fen, damp grassland and carr.

These grasslands are an important habitat for vascular plants, lower plants, lichens and fungi. They are very also important for the diversity of their invertebrates, where many are specialist

species only associated with parched, open habitats with friable soils including solitary bees and wasps. The succession and mosaic nature of these habitats further adds to the importance of these sites for invertebrates.

These dunes tend to be managed by extensive sheep or cattle grazing and sometimes only maintained by rabbits.

Significant areas of grassland, particularly in the wider Breckland, have ceased to be used for grazing and/or have experienced a loss of their rabbit populations, resulting in a loss of habitat quality. The loss of processes which create or maintain bare ground and early successional stages poses a threat to the diversity of these sites. Atmospheric pollution is also a threat, particularly to the mosses and lichens associated with the habitat.

In 2025, the new Environmental land Management scheme opened to land managers that includes options for managing species rich grassland, with revised payment rates that will encourage uptake. Given the very specialised conditions under which the habitat occurs (on fixed inland dunes) and the very limited scope for habitat creation, it is not proposed to set an expansion ambition for this habitat. This habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**

Freshwater Habitats

H3110, Oligotrophic Waters Containing Very Few Minerals of Sandy Plains (*Littorelletalia uniflorae*)



Hatchet Pond (New Forest) © Natural England/Peter Wakely

Oligotrophic waters with very low mineral content of sandy plains are restricted to sandy plains that are acidic and low in nutrients, making them very rare. The water is typically very clear and moderately acid. In England notable examples occur in the New Forest and the Cheshire Plain (within areas of acid lowland heathland).

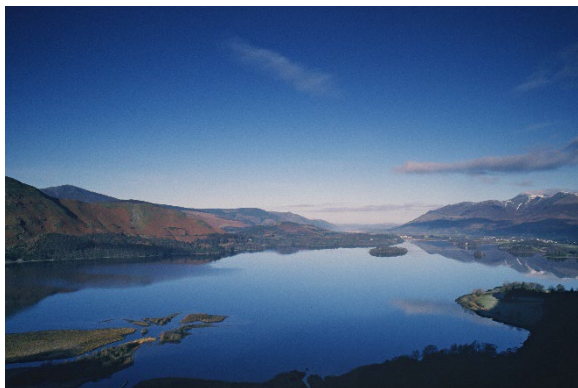
This habitat type is defined by the presence of *Littorelletalia*-type vegetation, which includes water lobelia, shoreweed or quillwort. The presence of any one of these species is sufficient to meet the criteria for this Annex I type. Typically, the vegetation consists of zones in which the individual species form submerged, single species lawns.

Destruction of lowland heaths, land drainage and abstraction as well as nutrient enrichment have contributed to the scarcity of the habitat type. Invasive Non-Native Species, management of fish stocks and other recreational activities present additional pressures.

However, agri-environment actions offer opportunities to restore natural processes, and for the creation and management of ponds, lakes and water edge and surrounding habitats.

The overall assessment of conservation status is **unfavourable bad**; the overall trend is **stable**.

H3130, Oligotrophic to Mesotrophic Standing Waters with Vegetation of the *Littorelletea uniflorae* and/or of the *Isoëto-Nanojuncetea*



Derwent Water © Natural England/Paul Glendell

This habitat type is widespread in England and comprises both oligotrophic and mesotrophic waters, and more rarely may include transitional types. Each supports a characteristic plant community, with the dominant substrates of both being silt, sand, gravel, stones and boulders. They are characterised by clear soft water containing low to moderate levels of nutrients.

These habitats support a distinctive assemblage of aquatic and amphibious short perennial plant species, shoreweed being the key indicator species. It is commonly found in association with water lobelia, bog pondweed, quillwort, bulbous rush, needle spike-rush, alternate water milfoil and floating water bur-reed.

In more mesotrophic conditions species such as yellow water-lily, amphibious bistort, stoneworts, least bur-reed and other pondweeds may be present. Most of these are common components of the aquatic flora of standing waters in the mountainous regions of the north-west. Floating water-plantain and pillwort are nationally scarce plants in this plant assemblage.

Pressures include diffuse and point source pollution and nutrient enrichment, hydrological modification and water abstraction, physical modification, Invasive Non-Native Species, recreational pressure and climate change impacts.

Conservation actions include a number of large-scale infrastructure removal projects and shoreline restoration projects. Agri-environment scheme actions support restoration of natural processes and give opportunities for the creation and management of ponds, lakes and water edge and surrounding habitats.

The overall assessment of conservation status is **unfavourable bad**, the overall trend is **stable**.

H3140, Hard Oligo-Mesotrophic Waters with Benthic Vegetation of *Chara* spp.



Malham Tarn © Dave Ottewell

Hard oligo-mesotrophic waters are characterised by a high base content, predominantly calcium and very rarely, magnesium. The water is very clear and low in nutrients. They are usually confined to areas of limestone and other base-rich substrates, from which the dissolved minerals are derived. In England, these habitats are scarce partly because calcareous rocks are free draining, meaning waterbodies occurring on these surfaces are uncommon. Often found in areas supporting mosaics of semi-natural vegetation. Commonly found

in the northwest with some isolated examples in East Anglia and Cornwall. Defined by the presence of abundant charophytes (stoneworts), which form dense beds over muddy marl deposits, that cover extensive areas of the lakebed.

Pressures include diffuse and point source pollution and nutrient enrichment, drainage of catchments and hydrological modifications and abstractions, Invasive Non-Native Species, management of fisheries and other recreational pressures, and climate change impacts.

Conservation actions include use of agri-environment scheme actions which offer opportunities for restoration of natural processes, and creation and management of ponds, lakes and water edge and surrounding habitats. Large scale initiatives such as Landscape Recovery enable restoration of natural hydrology and nutrient mitigation.

The overall assessment of conservation status is **unfavourable bad**; the overall trend is **stable**.

H3150, Natural Eutrophic Lakes with *Magnopotamion* or *Hydrocharition*-type Vegetation



Crag Lough © Melanie Fletcher

Natural eutrophic lakes and ponds typically occur in areas with easily weathered geology, resulting in water with higher alkalinity and nutrient concentration than mesotrophic and oligotrophic lakes. Availability of these nutrients supports higher natural productivity, although the water should be clear, with a pH range neutral to alkaline. In England, they support aquatic macrophyte communities dominated by pondweeds and yellow waterlily, with occasional populations of stoneworts. Many have extensive stands of fringing emergent vegetation, which can be dominated by species such as common reed or reed mace. Smaller water bodies often support free-floating surface species such as frogbit and bladderwort. The habitat often supports good numbers of macro-invertebrates, such as water beetles, water bugs and molluscs and a coarse fish assemblage (many of which require submerged vegetation for spawning) although some ponds may be naturally fishless. Most of the habitat forms on soft rocks, and wave-washed

rocky shores are a feature of larger lakes. They are typically found in lowland areas sometimes forming wetland mosaics with open water and swamp vegetation e.g. The Broads. Others form in hollows surrounded by wetlands that have gradually infilled over time e.g. the meres and mosses of Shropshire and Cheshire. Associated wetlands and natural transitions provide important habitats for many species. Other types e.g. Slapton Ley, are part of larger coastal systems and may not have continually been freshwater as connections to the sea alter. Some may be naturally groundwater fed e.g. Breckland meres; others may have in/outflows and their connection to the river habitat influences functioning and the biota they support.

Pressures include diffuse and point source pollution and nutrient enrichment, drainage of catchments, hydrological modification and water abstraction, Invasive Non-Native Species, management of fisheries and other recreational pressures, and climate change. Conservation actions include use of agri-environment schemes for restoring natural processes and managing ponds, lakes, water edge and surrounding habitats. Landscape Recovery and other large scale initiatives and schemes could enable removal of sediment, biomanipulation, and nutrient mitigation.

The overall assessment of conservation status is **unfavourable bad**, the overall trend is **stable**.

H3160, Natural Dystrophic Lakes and Ponds



Greenlee Lough © Natural England/Paul Glendell

Dystrophic systems typically occur on blanket bogs and may include isolated seasonal pools, random collections of irregularly shaped more-or-less permanent waters and ordered linear or concentric arrays of pools and small waters. They can also be found on raised bogs situated particularly on plains and valley bottoms. These water bodies are very acidic, nutrient poor, high in humic acid, and the water can be dark brown due to peat exposure. Most dystrophic lakes and ponds are small (less than 5 ha in extent), shallow, and support a limited range of flora and fauna. Some dystrophic lakes have developed very rare habitat called 'schwingmoor' where bog-mosses grow with cottongrass and white water-lily. These pools are naturally species-poor and a littoral zone is often absent. Fringing vegetation is

characteristic of the habitat where the pools occur. Several scarce dragonfly species are associated with dystrophic lakes and ponds.

Additional analysis has indicated a significant potential increase in the overall area of this habitat - it was not possible to incorporate the data in this round of reporting but should be noted that it resulted in a significantly increased estimate of area. Although there are uncertainties associated with the method, it demonstrates that previous assessments have not successfully captured water bodies <1 ha, and that these small water bodies are an important part of England's dystrophic resource.

Pressures include diffuse and point source pollution and nutrient enrichment, drainage of catchments and hydrological modifications, Invasive Non-Native Species, management of fisheries and other recreational pressures, and climate change impacts. Conservation actions include use of agri-environment actions for restoration of natural processes, and creation and management of ponds, lakes and water edge and surrounding habitats, including Landscape Recovery at scale, and nutrient mitigation projects.

Overall assessment of conservation status is **unfavourable bad**; the overall trend is **stable**.

H3170, Mediterranean Temporary Ponds



Mediterranean temporary pond © Edward O'Connor

Mediterranean temporary ponds are areas that fill with water in winter and dry out in summer, supporting a range of plants, particularly annuals and nationally rare species (largely confined to this habitat), such as pygmy rush, pennyroyal, yellow centaury and three-lobed crowfoot. There are two main pool types: a more acid pool community of trampled and grazed areas, often found on flooded trackways, and a basic pool type on serpentine rock found only at The Lizard in Cornwall. A number of these pools support important invertebrate populations, including some water beetles and the recently rediscovered fairy shrimp.

The extent of this habitat type has reduced in many areas due to the disuse of trackways, whose use once ensured

the creation of the pools. Additional pressures include Invasive Non-Native Species, lack of grazing, and climate change (unpredictability and intensity of rainfall/dry spells).

Targeted conservation actions have been possible due to the very specific location of this habitat, and successful partnership working between Natural England's National Nature Reserve and stakeholders. In recent years funding from the Species Recovery Programme (SRP) has supported the recovery of a suite of rare species on the Lizard peninsula through management of microhabitats including Mediterranean temporary ponds, trialling and implementing extensive grazing regimes and delivering management for habitat mosaics to restore resilience at larger scales. Experienced volunteers play a vital role in monitoring these sites, which have shown a good response in characteristic species to conservation management. Agri-environment actions support restoration of natural processes to the site and creation and management of ponds and water edge and surrounding habitats.

The overall assessment of conservation status is **favourable**; the overall trend is **increasing**.

H3260, Water courses of Plain to Montane Levels with the *Ranunculus fluitantis* and *Callitriche-Batrachion* Vegetation



The River Lambourn © Vicki Howden

These watercourses are most recognised for their white water-crowfoot beds that turn the river white with flowers in early summer. The community is widespread and as rivers are neither created or lost the area of habitat is generally stable. However, near-natural examples are quite rare and when assessing the resource, it is appropriate to look at what proportion of the entire habitat network is near-natural, good or in sub-optimal condition.

Recent assessments of the habitat within the designated site network indicates that most are in an unfavourable condition and many are declining. The quality of the wider habitat resource can be inferred by looking at Water Framework Directive classifications and with just 14% of rivers reaching Good Ecological Status it can be assumed the wider resource is impoverished.

The pressures are complex; pollution from agriculture, wastewater discharges,

roads and industry are almost universal pressures that act on the habitat to varying degrees. Physical impacts, such as straightening, dredging, weirs and other modifications, as well as the removal of bankside vegetation are also prevalent across the river network. Land-use change and drainage in the wider catchments are also significant factors in the degraded state of much of the river resource making the habitat less resilient to the impacts of pollution and low flows. The effects of climate change are likely to increase existing impacts. This would suggest that the habitat network is under considerable and increasing pressure.

Restoration efforts have focussed on water industry improvements and through voluntary agricultural incentive schemes which in many cases have been insufficient to reverse declines in habitat quality. New scheme options are encouraging but will have greatest impact when linked to holistic catchment plans. These are crucial to delivering the step-changes in river condition and wider catchment resilience required, especially in the face of climate change, and could also deliver benefits in addition to river habitat recovery. However, given the scale of measures needed and the increasing impacts of climate change the current overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

Temperate Heath and Scrub Habitats

H4010 and H4020, Northern Atlantic Wet Heaths with *Erica tetralix* and Temperate Atlantic Wet Heaths with *Erica ciliaris* and *Erica tetralix*



Wet heath with pool, Roydon Common ©
P. Wakely

Northern Atlantic wet heaths are widespread in England, in both upland and lowland situations. They are found on acidic, nutrient-poor substrates such as shallow peat or wet sandy soils. Typical vegetation includes cross-leaved heath with heather, grasses, sedges and bog-mosses.

Temperate Atlantic wet heaths are distinguished from other wet heaths by the frequency of key species like Dorset heath.

Wet heaths vary with climate, altitude, aspect, soil conditions, maritime influence and management intensity. They are relatively unmodified compared to much of England's landscape, with natural environmental gradients. This results in diversity, with mosaics of wet and dry heath, mire, open water and scrub. Heaths need extensive grazing, ideally, with a mix of large herbivores, to halt succession to woodland.

Wet heath is important for a range of rare and threatened vascular plants and bryophytes, many of an oceanic or Atlantic distribution in Europe. Wet heath mosaics support important assemblages of invertebrates, birds and reptiles.

Although the overall range has remained stable, the extent of wet heath declined significantly over the last 300 years, due to conversion to agricultural land, forestry and built development. Heathlands have fragmented into smaller blocks, making them harder to manage and causing localised species losses.

Significant pressures include drainage, managed burning, water and air pollution, visitor disturbance and wildfire. In the uplands, heavy grazing is a concern while in the lowlands securing grazing can be a challenge. The condition of wet heath is often poor. Vulnerability to climate change has been assessed as medium.

Agri-environment schemes offer options for managing, restoring and creating heathland, along with hydrological restoration. However additional measures are needed to tackle wider landscape issues like air and water pollution.

Wet heaths remain susceptible to the pressures listed and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H4030 and H4040, European Dry Heaths and Dry Atlantic Coastal Heaths with *Erica vagans*



Dry heath, Lazonby Fell © Frances McCullagh

Dry heaths are widespread across England, both upland and lowland, normally being found on free-draining, acid to near neutral soils with low fertility. The vegetation is dominated by a mix of dwarf-shrubs, usually heather with gorse, bilberry or bell heather. Other dwarf-shrubs can be important locally. In the UK Dry Atlantic coastal heath with Cornish heath is only found on the Lizard on well-drained, moderately base-rich soils with a warm oceanic climate. These differ from other dry heaths having the rare species Cornish heath along with European and western gorse and bell heather.

Dry heaths vary according to climate, altitude, aspect, soil conditions, maritime influence and management intensity. They are relatively unmodified compared

to much of England's landscape, with natural environmental gradients. This results in mosaics of wet and dry heath, acid grassland, mires, open water and scrub. Dry heaths are managed extensively with grazing, ideally with a mix of large herbivores, plus cutting to halt succession to woodland. Dry heath is important for a range of rare and threatened plant, moss and lichen species and supports characteristic assemblages of invertebrates, birds and reptiles. Although the range is stable, the extent has declined significantly over the last 300 years, with losses to agricultural land, forestry and built development.

Significant pressures include fragmentation, particularly in the lowlands, which makes grazing challenging. In contrast in the uplands, intensive grazing and burning can result in a shift from heath to grassland. Other significant pressures include air pollution, visitor disturbance and wildfire. Vulnerability to climate change has been assessed as medium.

Agri-Environment schemes offer options for managing, restoring and creating heathland but the condition of many heaths is poor and additional measures are needed to tackle wider landscape pressures like air pollution. The overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H4060, Alpine and Boreal Heaths



© Adam Rodgers

Alpine and boreal heaths form above and below the altitudinal tree line (alpine), naturally in gaps amongst scrubby high-altitude wood (boreal). In England, the wooded component is absent and heather can be extensive, as subalpine woods have been lost to upland land management practices. The habitat has a characteristic dwarf shrub component, with the dominant species being Heather or Bilberry. A characteristic of this habitat is low-growing and prostrate shrubs, due to exposure to harsh environmental factors at high altitudes.

This habitat occurs over siliceous parent material, and has shallow, acidic, nutrient-poor soil which can be skeletal and rocky on exposed summits and ridges. Some forms of this habitat support rare species of arctic-alpine plants, and Atlantic mosses and liverworts with restricted world distribution. Furthermore, certain sub-types of this habitat are known only from the UK or are best-developed here. These include types

found in more exposed conditions which contain prostrate Heather and Juniper.

This habitat is scarce in England, occupying around 12.3 km² with fragments remaining in the Lake District High Fells and Moor House-Upper Teesdale. The Cross Fell area of the latter forms the most extensive area of this habitat south of Scotland.

This habitat is sensitive to disturbance, especially by fire and grazing due to the diversity of vulnerable lichens and mosses. Due to the high altitude, exposed aspect and impoverished soil, specialised species are sensitive to climate change and air pollution. Furthermore, wild and farmed herbivores pose a risk of trampling and over-grazing, as well as infrastructure associated with management. Increased tourism to areas where this habitat is present, including recreational activities such as rock climbing and hiking, may have an indirect impact due to disturbance and the creation and improvement of trails.

Efforts which will indirectly benefit this habitat include policy targets regarding climate change and air pollution, the cessation of burning and reduction in grazing. None of the current habitat extent is in 'good' condition and additional measures are likely to be required to tackle the pressures this habitat faces. The conservation status is **unfavourable** and short term trend is **stable** with long term prospects **poor**.

H4080, Sub-Arctic *Salix* spp. Scrub



© Simon Webb

This is the highest altitude shrubby vegetation found in England and the wider UK. Due to the harsh climate at high elevation, succession into wooded habitat is prevented and this habitat is predominantly natural. It occurs on base-rich moist soils in rocky mountain situations and tends to be associated with sheltered areas of upper subalpine and low alpine zones of mountains, generally above the treeline. A distinctive characteristic of this habitat is stunted, prostrate shrubs, resulting from high altitude and associated harsh climate.

This habitat consists of a mix of Willow species (*Salix* spp.) which may vary greatly between sites and have arctic-alpine and arctic-subarctic distributions in Europe. Sub-arctic species and arctic-alpine and northern species grow amongst a mixture of dwarf shrubs, grasses, rushes and broad-leaved herbs such as Bilberry, tufted hair-grass, and great wood-rush. The great variation in willow species is thought to be influenced

by base-rich soil, and factors such as grazing, which is thought to have reduced and restricted this habitats occurrence.

This is one of the UK's rarest and most endangered habitats, in England confined to The Lake District High Fells, where it occupies only 0.005km². Habitat fragmentation, potentially linked to overgrazing, is a key issue. It is particularly sensitive to grazing as the characteristic Willow species are readily removed by herbivory. Due to altitude, exposed aspect and impoverished soil, key species are particularly sensitive to climate change and air pollution (Nitrogen deposition). Furthermore, these habitats occur on rocky slopes and ledges and are susceptible to natural processes such as rockslides.

This habitat and key Willow species such as Downy Willow have become a focus of conservation in recent years, and there have been reintroductions of Willow tree species in suitable areas such as the Lake District High Fells, where grazing levels have been much reduced in recent decades. While this is beneficial, air pollution and climate change remain of concern. The habitat's status is largely **unknown** due to a lack of recent monitoring but **stable**. It occupies 0.005km² in England, of which the majority is not in good condition. Additional measures are therefore likely to be required to tackle these wider issues.

Sclerophyllous Scrub (Matorral) Habitats

H5110, Stable xerothermophilous formations with *Buxus sempervirens* on rock slopes (*Berberidion* p.p.)



© Peter Trimming

This habitat type comprises scrub dominated by box *Buxus sempervirens* on calcareous soils. Semi-natural and natural box scrub is extremely rare in the UK. At only one site, Box Hill in Surrey, does the scrub form a stable (i.e. persistent) natural or near-natural community, as it is developed on steep, chalk slopes, where other tree species are unable to grow to mature size.

The habitat is limited to a single location covering approximately 20 ha, where box is native, where soil conditions are suitably dry and calcareous, where grazing is limited, and where box scrub appears to have formed stable formations for many decades. There are no other sites where this is or could be the case in the absence of direct intervention. Box is found as a native species at a handful of other sites, but at these locations, usually box scrub would revert to woodland (due to tree invasion) or be converted to grassland

(where grazing was sufficient intense). There is, of course, concern about the long-term vulnerability of this habitat on this account. The habitat area could be increased if box stands were perpetuated by removing invading trees and excluding grazing animals. However, under such circumstances the habitat cannot be regarded as stable and therefore falls outside the scope of the Annex I habitat H5110.

One of the key pressures on this habitat is pests and pathogens: 'Box blight' is caused by at least two fungal pathogens. It results in bare patches and dieback of box. It is a relatively new disease in the UK and its effects on native wild box vegetation is not yet known. Box is also susceptible to the box tree moth, a native of south east Asia that has accidentally spread to Europe where it is invasive and damaging. Box tree moth has been found in the London and Surrey areas but its effects on native wild box are not yet clear. Deer numbers are very high in the range of this habitat and box is considered to be palatable to deer. In addition the habitat is considered to be sensitive to air pollution and critical load thresholds are currently exceeded.

The habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H5130, *Juniperus communis* Formations on Heaths or Calcareous Grasslands



© Peter Wakely / Natural England

Juniper formations occur in England across a range of substrates. The main ecological variation is between stands on calcareous substrates (principally chalk and limestone but sometimes calcareous drift) and those found on acid substrates. Calcareous types are mainly found in the southern part of the UK, while acid types are mainly found in northern areas. However, both calcareous and acid types can be found on the same sites in northern England.

In northern England, juniper is found on a wide range of acidic substrates supporting acidophilous plant communities. In many instances these are simply stands of heathland or acidic grassland that have become invaded by juniper. However, at sites where the juniper has been established for longer, the vegetation is typically dominated by juniper, with downy birch and rowan. The understorey is rich in acidophilous species, such as bilberry, wood-sorrel,

heath bedstraw and hairy wood-rush. Species with a northern distribution, including chickweed wintergreen, twinflower and lesser twayblade occur locally. There is usually a well-developed layer of pleurocarpous mosses and ferns.

In southern England juniper scrub may develop on a range of calcareous grassland types on thin chalk soils. Where juniper is not dominant the scrub contains a rich assemblage of other shrubs. Further north, at higher altitude on limestone, juniper scrub is often associated with limestone pavements and calcareous cliffs and screes.

One of the key pressures on this habitat is pests and pathogens: Juniper populations are at risk from the introduction of a fungus-like organism, *Phytophthora austrocedri*, which has been identified as the causal agent of significant juniper dieback and death in wider-environment populations. In addition, deer numbers and livestock (mainly sheep) are very high in the range of this habitat and consequently can operate as a high pressure on regeneration.

There is ongoing work to conserve and expand the habitat on some sites, however, the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

Natural and Semi-Natural Grassland Formations

H6130, Calaminarian Grasslands of the *Violetalia calaminariae*



Unit 7&8 Ox Close SSSI, Yorkshire. Anne Goodenough © Natural England

Calaminarian grassland is a short, open, sometimes sparsely vegetated habitat characterised by the presence of metal-tolerant vascular plants, mosses and/or lichens. It is associated with soils and substrates containing high levels of heavy metals such as lead, zinc, cadmium and copper and is now largely restricted to relicts of mining such as spoil heaps, tailings and metal enriched river shingles. They vary considerably in species-richness depending on the nature of the substrate, heavy metal concentrations and the age and stability of the artificial substrate. Metal tolerant species that are found here include spring sandwort, alpine pennycress and lead-moss and where habitats are undisturbed, diverse populations of lichens develop. The main concentrations occur in the North Pennines, Cumbria and Derbyshire with more limited examples in the Mendips and in Cornwall, in both lowland and

upland landscapes. They can be grazed by livestock or ungrazed.

Significant areas of Calaminarian grassland have been lost during the last 60 years, driven by a range of pressures, with only around 200 hectares remaining. Factors such as mine spoil reclamation or re-working, deposition of atmospheric nitrogen, decline in the toxicity of the surface soil leading to successional change, cessation of or decline in grazing including by rabbits, tree planting and possibly agricultural improvement using fertilisers. Increasing fragmentation and isolation of sites is an ongoing threat, with many sites now small in extent.

Climate change impacts have not been assessed for this habitat, however increased flooding from higher rainfall and more frequent extreme weather events can remobilise heavy metal deposits originally released during historic mining activity which might benefit these grasslands, although will be a challenge in terms of pollution control. Conversely, it could lead to more leaching of heavy metals resulting in their depletion from Calaminarian soils.

Agri-environment schemes include options for managing species rich grassland and revised payment rates will encourage uptake. But even in agricultural settings, small sites may not be included unless part of a wider grassland. The overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H6150, Siliceous Alpine and Boreal Grasslands



© Martin Furness

This habitat characteristically forms continuous tracts covering summit plateaux, and the tops of summits and mountain ridges above 700-750m altitude. It comprises a range of grassland community types with differing composition due to factors such as exposure, erosion, and snow-lie. For example, late-lie snow-bed communities can be dominated by dwarf-herbs and bryophytes (mosses and liverworts). The flora can be rich and include montane species and national rarities such as alpine Lady's Mantle, dwarf willow and mountain everlasting. Rare and characteristic mosses and montane lichens are also key components of these habitats.

As a montane habitat shaped by altitude and harsh climate it has a limited

distribution in England, occupying approximately 11km² and existing only in areas such as the Lake District High Fells and Moor House-Upper Teesdale, the latter of which retains the best-developed and most extensive area of this habitat in England.

The habitat is sensitive to disturbance, particularly over-grazing and burning, which is exacerbated in communities with rich montane moss and lichens present. Changing climate and increased air pollution pose a particular threat, as the communities are specialised, relying on harsh climate and low nutrient inputs, which also prevents encroachment by more competitive species. Due to its inaccessible nature, direct conservation efforts are uncertain, however efforts which will indirectly benefit this habitat include policy targets regarding climate change and air pollution, reducing game stock, the cessation of burning and reduction in grazing. Projects are underway aiming to restore landscape scale natural processes in mountain catchments.

Given uncertainties around the condition of a significant proportion of the habitat, the overall status is **unknown** but overall trend **stable**.

H6210, Semi-natural Dry Grasslands and Scrubland Facies: on Calcareous Substrates (Festuco-Brometalia)



Calcareous Grassland © Katey Stephen

Calcareous grasslands are a widespread but localised habitat of high biodiversity value occurring throughout the English lowlands and along the upland fringe. They occur on shallow, free-draining, infertile soils over chalk and limestone bedrock and tend to be associated with land that has been less modified by intensive land management. Much of this habitat is confined to steep valley slopes, escarpments, and coastal cliffs and headlands. More rarely, they occur on relatively level ground, notably in Breckland and on Salisbury Plain. They are usually managed by extensive sheep or cattle grazing but more rarely maintained by rabbit grazing.

These habitats can be botanically rich and are associated with a large number of rare and threatened plants including orchids. They support a range of mosses and lichens and have a noteworthy

invertebrate interest including rarities such as the adonis blue butterfly.

The extent of calcareous grassland has declined significantly over the last 100 years due to agricultural improvement and abandonment, although its overall range remains stable. The main pressure on these grasslands is undergrazing which leads to coarse grasses and scrubby plants outcompeting the rich variety of grassland species.

Other significant pressures include negative impacts from nutrient enrichment (nitrogen) from atmospheric sources, agricultural intensification including ploughing and grassland improvement through use of fertilisers. Vulnerability to climate change has been assessed as low but recent work has highlighted potential negative impacts on vegetation composition and soil seed banks from long-term drought which is predicted to occur with climate change.

The latest agri-environment schemes include options for managing species rich grassland with revised payment rates that will encourage uptake. A number of landscape scale restoration projects, including 'Big Chalk' aim to restore arable and species poor grassland to species-rich calcareous grassland. However, the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H6230, Species-rich *Nardus* Grassland, on Siliceous Substrates in Mountain Areas (and Submountain Areas in Continental Europe)



© Simon Webb

This habitat consists of closely grazed swards containing a complex mix of grasses, small herbs and bryophytes. It supports a wide range of species including Atlantic and arctic-alpine plants and invertebrates. The range of species varies mainly due to altitude, soil moisture and the extent of base-rich flushing. For example, at higher altitude, arctic-alpine species are present. The habitat develops over siliceous bedrock with flushing through base-rich strata, mainly metamorphic and igneous rock, providing a neutral to slightly acid soil.

The altitudinal range is variable; in parts of western Scotland it can be found at or near sea level. However, in England it only occurs in the Lake District High Fells.

Furthermore, the habitat tends to transition into other grassland types, especially where higher concentrations of base-rich conditions occur and can be readily misidentified.

A key threat to the habitat is overgrazing, which has degraded it through much of its natural range in England. The current restricted range is likely a reflection of the inaccessible nature of mountains and steep-sloped fells for grazing animals, and the number of livestock in such areas. Erosion by increased footfall from leisure activities may also pose a threat to this habitat, along with air pollution. Climate change may see a reduction in the arctic-alpine species component of this habitat.

Conservation opportunities include reducing and adapting grazing regimes by using different stock at reduced densities and at limited times of year. Public engagement and management of visitor numbers may also aid in conserving habitat and preventing erosion.

Though the overall trend is **stable**, the current status of this habitat in England is **unknown**, with the majority of known habitat in unfavourable condition. Additional measures are therefore required to address the key issues this habitat is facing, chiefly overgrazing in upland areas.

H6410, *Molinia* meadows on Calcareous, Peaty or Clayey-Silt-Laden Soils (*Molinion caeruleae*)



© Katey Stephen

Molinia meadows are a widespread but localised habitat of high biodiversity value occurring throughout the English lowlands and along the upland fringe wherever there are suitable substrates and hydrological regimes. They are found on mainly infertile, moist, moderately to strongly base-rich, peats and peaty gley soils, often with fluctuating water tables. There are concentrations below the moorland line in the south-west, East Anglia and northern England. They tend to be dominated by purple moor-grass and/or rush species with various sedges and tall herbs and often form mosaics with other habitats such as heath, mire, grassland and scrub. They are normally maintained by extensive livestock grazing.

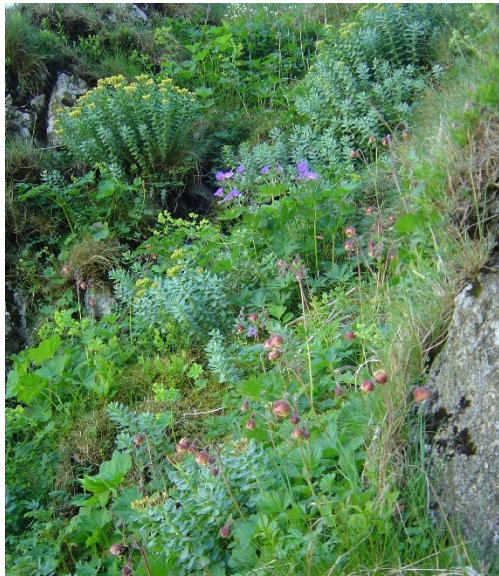
Threatened species associated with this habitat include the marsh fritillary butterfly and lesser butterfly orchid. The habitat is used by a range of species including otter and lapwing.

A key pressure on this habitat is lack of, or insufficient livestock grazing which results in dominance by purple moor-grass, loss of species diversity and gradual succession by woody species. Conversely, over grazing is also a threat. Pollution from diffuse sources and from atmospheric nitrogen deposition is a pressure on the habitat, causing negative changes in plant species composition through nutrient enrichment and soil acidification. This habitat is sensitive to direct impacts of climate change being dependant on wet or waterlogged soils and sensitive to changes in the water table and flooding. Reduced summer rainfall is likely to promote a transition to drier habitats. Conversely, should hydrological conditions become too wet, there is potential for change to wetter swamp or fen communities to develop. Restoring natural hydrological processes on and around sites is likely to improve the resilience of features.

The latest agri-environment schemes include options for managing species rich grassland, with revised payment rates that will encourage uptake. A number of landscape scale restoration projects are also committed to restoring, re-creating and linking this habitat.

However, the habitat is still susceptible to the pressures listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H6430, Hydrophilous Tall Herb Fringe Communities of Plains and of the Montane to Alpine Levels



© Simon Webb

This is one of the few near-natural habitats remaining in Britain, providing a refuge for rare, grazing-sensitive montane plants that are now absent from much of their historic range. Typically found on ungrazed cliff ledges at high altitudes, this habitat would likely have been more extensive historically but has been fragmented and reduced by grazing pressure. Environmental factors influencing species composition are mainly altitude, soil conditions, geology, and geographical location, populations further north having more arctic-alpine plants. It can occasionally extend onto open ground and is restricted to base-rich substrates and relatively sheltered situations.

This is a species rich habitat consisting of tall, broad-leaved herbs, the majority of

which are rare in the uplands. Species include roseroot, water avens, wood cranesbill and globe-flower. Some of these species can be observed as impoverished, non-flowering specimens in pastures adjacent to cliff refuges, demonstrating the potential for this habitat to expand.

This habitat is very rare in England, with a total of 0.92km² in the Lake District High Fells and North Pennines. It is particularly sensitive to grazing due to its characteristic tall herb species and would likely have a greater range if grazing were reduced. Due to the high altitude, exposed aspect and impoverished soil, the arctic-alpine components of this habitat are particularly sensitive to climate change and air pollution. Furthermore, as it occurs on rocky slopes and ledges it may be susceptible to natural processes such as rockslides and erosion.

Conservation efforts would include reduction in grazing but to expand beyond confined ledges, these may need to be significant. Measures which indirectly benefit this habitat include policy targets for climate change and air pollution.

Though overall trend is **stable** in recent reporting years, this habitat is scarce in England and its condition status is largely **unknown**.

H6510, Lowland Hay Meadows (*Alopecurus pratensis*, *Sanguisorba officinalis*)



Floodplain Meadow Grassland © Katey Stephen

The Lowland Hay Meadows reported here are limited to a particular floodplain, species-rich grassland on moderately fertile soils that are largely confined to alluvial soils in river valleys. They are characterised by periodic winter flooding or seasonally high water-tables and are often of great antiquity and associated with low-input agriculture, where seasonal flooding maintains an input of nutrients. They tend to be cut annually for hay, with light aftermath grazing. The habitat can be botanically rich and includes species such as meadow foxtail, great burnet, meadowsweet and meadow buttercup. Some rare and threatened plant species are associated with them including the snake's head fritillary.

The habitat is found in scattered sites from the Thames Valley through the Midlands and Welsh borders to Yorkshire with some outliers further north. Examples include well-known but now

very rare Lammas meadows, such as North Meadow, Cricklade, and Pixey and Yarnton Meads near Oxford.

Losses of habitat appear to have slowed, but there is a continued decline in the condition of high-quality examples. Most habitat loss is due to conversion to intensively managed grassland or arable cultivation. Pressures arise from nutrient inputs, including high levels of phosphorus in enriched floodwaters and deposition of atmospheric nitrogen leading to loss of plant species richness. The switch to silage rather than hay means meadow species rarely set seed to renew populations, fewer pollen and seed sources are available for invertebrates and birds and structural elements of meadows required by ground nesting birds are reduced. Climate change is predicted to bring increased winter rainfall which leads to extended and more frequent floods, especially in spring which is already impacting on the diversity of these communities.

The latest agri-environment schemes include options for managing species rich grassland, with revised payment rates that will encourage uptake. Several landscape scale restoration projects are restoring arable and species poor grassland back to Lowland Hay Meadow. However, the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H6520, Mountain Hay Meadows



Moor House- Upper Teesdale, National Nature Reserve © Natural England

Mountain Hay Meadows are species-rich, upland meadows on brown earth soils, where low intensity hay-meadow management has been applied in a sub-montane climate. They are restricted to moderately sloping ground between 200 and 400 metres altitude in northern England and are typically found in isolated fields, or groups of fields, where many are still managed as hay meadows. They also occur as remnants in otherwise agriculturally improved fields on banks and other steep areas and on riverbanks, road verges and in woodland glades.

They are characterised by plants such as wood crane's-bill, great burnet and pignut and support several endangered and rare plants including a variety of lady's-mantles. These enclosed hay meadows together with the adjacent upland landscape provide important nesting and feeding habitat for wading and passerine

birds of conservation concern, including lapwing, snipe, redshank, yellow wagtail and curlew.

The extent of this habitat has declined steeply over the last 70 years, and the remainder is still under threat from agricultural intensification and climate change. Climate change is a significant threat with plants characteristic of this habitat likely to be lost with increased temperatures and the composition of the grasslands degraded by changes in rainfall patterns. There is potential for a significant climate impact, with warmer springs leading to later grazing which will have an impact on plants as they begin to grow. Atmospheric nitrogen deposition may be having a detrimental impact especially where this occurs in conjunction with farmyard manure applications.

The latest agri-environment schemes include options for managing species rich grassland, with revised payment rates that will encourage uptake. Several landscape scale restoration projects also include actions to restore semi-improved grassland to mountain hay meadows and improve connectivity of this habitat. However, the habitat is still susceptible to the pressures described above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

Raised bogs, Mires and Fens

H7110 and H7120, Active Raised Bogs and Degraded Raised Bogs



© Iain Diack

Raised bogs are accumulations of deep peat (3-12m) originating in shallow lake basins, topographic depressions, floodplains and coastal plains. They have a characteristic elevated surface, which develops as the peatland grows upwards from the surface. The surface is primarily rainwater-fed (ombrotrophic), giving rise to acidic conditions low in plant nutrients, which supports distinctive vegetation dominated by Sphagnum mosses. The bog surface in good condition supports a patterned microtopography of pools, hummocks and lawns creating a range of water regimes that provides niches for different species.

Active raised bog is characterised by the presence of an acrotelm, which is the living, actively peat-forming upper layer whose surface is composed mainly of Sphagnum mosses which are accompanied by ericaceous shrubs including cross-leaved heath, bog rosemary and cranberry, with cotton-

grasses and carnivorous sundews.

Degraded raised bog is characterised by the continued presence of a deep peat deposit but the complete absence (or patchy thin cover) of an acrotelm.

Definition as DRB is not determined by the surface vegetation, but by its capacity to be restored to a peat-forming state within 30 years.

Raised bogs occur(ed) across much of England, but active bogs are now largely restricted to the north and west. No raised bogs are wholly active, due to damage. Recent survey has, however, recorded many bogs in the upland fringe particularly in Northumberland that have only minor modifications, and which in some cases retain elements of lagg – the mire that in intact sites develops where water draining from the bog meets water draining from the surrounding landscape, lost from the vast majority of sites.

Common to all English peatlands, the major pressures are drainage, nutrient enrichment (water and airborne), the legacy of peat extraction, forestry and development. Conservation action has largely focused on SAC sites, where the priority is restoring water levels compatible with acrotelm recovery. While this has been successful on some sites, a major constraint is the lack of protection of whole peat bodies – many protected sites comprise only the centre of peat body - which significantly limits the effectiveness of works.

Overall Status of the habitat is
Unfavourable-Bad but improving.

H7130, Blanket Bogs



© Martin Furness

The most common form of peatland in England, blanket bog is extensive in the uplands, forming in areas of high rainfall and low evapotranspiration. These conditions allow peat to develop, in places to a depth of several metres. This 'blanketing' of ground gives the habitat its name.

In good condition the habitat is associated with high cover of *Sphagnum* mosses and bogs are considered 'active' when supporting a significant area of such peat-forming vegetation. Other typical species include dwarf shrubs, cottongrasses, deergrass and other mosses. Specialist plants include the carnivorous sundews.

Blanket bogs are primarily found in the north and west of England, including Devon, the length of the Pennine chain and the Cheviots, with less extensive

areas in the North York Moors and Lake District.

Much of England's blanket bog has been degraded and modified by intensive land management, air pollution and afforestation. Historically, industrial air pollution severely damaged blanket bogs in the South Pennines. Drainage was undertaken to improve grazing, and burning to support game management and grazing. These practices are considered damaging and remain an ongoing threat, although regulation now protects designated blanket bogs. Development of onshore windfarms and associated infrastructure also remains a threat.

In recent years the role of blanket bogs in storing carbon has been recognised and significant effort made to reverse historic damage and restore the natural functioning of peatlands. This is primarily through action to block artificial drainage channels or 'grips', reprofile erosion features and revegetate bare peat. Government grants, private finance, and charitable action all play a role in restoring English peatlands, but further long-term action is needed to restore them to favourable conservation status.

Overall status of Blanket Bog is assessed as **unfavourable inadequate** and overall trend is **deteriorating**.

H7140, Transition Mires and Quaking Bogs



Transition mire with bogbean,
Mungrisdale, Cumbria. © Iain Diack

These are peat-forming ecosystems that occur in very wet and often quaking conditions, with pH and base status intermediate between bogs and calcareous fens. They encompass a wide range of vegetation types occurring in oligotrophic and mesotrophic conditions and can be transitional between pH extremes in both temporal, i.e. successional, and spatial contexts, e.g. where base-rich water drains into a bog margin. In England, to better characterise TMQB and adequately protect the range of different types, it has been sub-divided into five units of greater ecohydrological integrity and clearer floristic definition.

TMQB vegetation is typically dominated by short or slender sedges, and 'brown' mosses and/or Sphagnum mosses, including those typical of bogs, e.g. *Sphagnum magellanicum*, through to those of more base-rich conditions such as *S. contortum* and *S. warnstorffii*. The habitat supports many declining and rare plant species, including bog sedge, crested buckler-fern and great sundew, all listed as Endangered in England. It is also rich in uncommon invertebrates

including white-faced darter, ten-spot pill beetle and marsh fritillary.

It is relatively widespread in various hydrogeological settings with concentrations in the basin wetlands of the West Midlands, the valley mires of southern England (the New Forest supporting an exceptional range and quality), the hummocky hill land of south Cumbria, between and around raised bogs in the Border Mires, and the Norfolk Broads. Although widespread, it is now lost from many parts of its historical range, and those sites that remain, particularly in lowland England, are almost universally damaged and degraded. The major pressures are drainage and nutrient enrichment, with many sites receiving water from intensively farmed catchments. Additional pressures include groundwater abstraction, forestry, atmospheric Nitrogen deposition and grazing, with both under and over-grazing occurring.

Conservation efforts generally seek to remove the pressures and restore natural background conditions including very high-water tables, place-appropriate hydrochemistry and low nutrient status, which generally depends on reducing nutrient losses from catchments. While some positive changes have been made on some sites, overall progress has been very slow, with few successful examples of hydrological re-naturalisation or restoration of low nutrient environments.

Consequently, overall status is **Unfavourable-Bad**, and trend is **Stable**.

H7150, Depressions on Peat Substrates of the *Rhynchosporion*



Rhynchosporion vegetation in a sloping mire in the New Forest, Hampshire. ©
Iain Diack

This feature occurs in complex mosaics with wet heath and valley mire vegetation, in transition mires, and on the margins of bog pools and hollows in raised, blanket and quaking bogs. It usually occurs as a small-scale component of the vegetation in very wet, generally high-quality mires. The vegetation is typically very open and characterised by an abundance of white beak-sedge, often with well-developed algal mats, the bog moss *Sphagnum denticulatum*, sundew species (*Drosera* spp.), and, in more base-rich sites, brown mosses such as *Scorpidium revolvens* and *Scorpidium scorpioides*. The Nationally Scarce species brown beak-sedge and marsh clubmoss also occur in this habitat.

This is now a rare habitat type in the UK that has declined as a result of damage to

the mire ecosystems in which it occurs. It is likely to be the first feature that is lost when peatlands are drained. This habitat type is found in largest quantity on wet heaths and valley mires in southern England, and now rarely on blanket and raised bogs (where it would once have been much commoner) in the north and west, but also on relatively intact SAC mire systems elsewhere, e.g. the basin mires of the West Midlands Mosses, and valley mires at Roydon Common and Dersingham Bog, and Fen Bog in North Yorkshire.

Conservation measures for the habitat are almost entirely necessary at the scale of the whole mire ecosystem, rather than at the scale of this feature. The major conservation measure needed is restoration of natural hydrological function and mire integrity, including morphological and hydrological integrity and release from nutrient and other pressures. Ongoing hydrological restoration on blanket and raised bogs should be improving prospects for the feature, however, there is currently limited evidence of increase in extent or quality. Species reintroduction is likely to be necessary where typical species have been lost at regional scale. Introductions to date have been moderately successful for some but not all species.

Overall status is **Unfavourable-Bad**, and overall trend is **Deteriorating**.

H7210, Calcareous Fens with *Cladium mariscus* and Species of the *Caricion davallianae*



Cladium fen, Hawes Water, Lancashire.
© Phil Eades

This comprises the more species-rich stands of great fen-sedge *Cladium mariscus* fen, particularly those enriched with elements of small-sedge fen with open low-growing mossy vegetation. These occur in sites with a mixture of closed, species-poor *Cladium* beds, which at their margins have transitions to species-rich small-sedge mire vegetation; in sites where *Cladium* beds retain their species-richness owing to management; and where *Cladium* fen is inherently species-rich, possibly because conditions do not allow *Cladium* to grow vigorously and dominate the vegetation.

Cladium fen is associated with wetlands that are irrigated by base-rich water (pH >6), especially (but not exclusively) in topogenous landscape situations. It is particularly a feature of floodplains, but patches (often small) occur widely in basins and troughs and fringing open water. It occurs mainly in the lowlands,

being widespread and extensive in East Anglia, elsewhere being found in more fragmentary patches, e.g. in the Somerset Levels and West Midlands Meres.

Major pressures are dehydration caused by drainage and/or groundwater abstraction, nutrient enrichment from both water and air, and succession to taller and woodier vegetation, which is often initiated and accelerated by enrichment and dehydration. Very often these pressures act together. Coastal sites may be at longer-term risk of saline incursion.

Conservation efforts have sought to remove pressures and restore conditions of high-water tables and low nutrient status, including through groundwater abstraction reform and better catchment management. Re-instatement of cutting management has successfully restored habitat in the Norfolk Broads, although establishing long-term sustainable management remains challenging, as these fens are at least in part a product of cultural management (cutting for reed and sedge). In the absence of natural floodplain processes, wetter elements of the habitat have been periodically restored by excavating pits within the wider fen area.

The overall status is assessed as **unfavourable bad** with a **deteriorating** trend due to losses of area and habitat quality, as well as the pressures and threats faced by the habitat.

H7220, Petrifying Springs with Tufa Formation (*Cratoneurion*)



Tufa-forming Spring with abundant *Palustriella commutata*, Glos. © Iain Diack

Tufa formation is associated with hard-water springs, where groundwater rich in calcium bicarbonate comes to the surface. On contact with the air, carbon dioxide is lost from the water, and a hard deposit of calcium carbonate (tufa) is formed. These conditions occur most often in areas underlain by limestone or other calcareous rocks, including Carboniferous limestones of northern England and the Mendips, and the Jurassic limestones of the Cotswold escarpment. This is the most poorly understood of all the mire Annex 1 habitats, and requires further study, particularly those examples that occur in woodland, where many of the least damaged examples survive.

Tufa-forming spring-heads are characterised by the swelling yellow-orange mats of the mosses *Palustriella commutata* and *Cratoneuron filicinum*. Many rare, lime-loving (calcicole) species

live in the moss carpet, particularly arctic-alpine species, such as bird's-eye primrose, Scottish asphodel, alpine bartsia and false sedge, however, many moss-dominated tufa-forming springheads occur further south and at lower altitudes, and these have more recently been recognised as conforming to this type. In addition to the characteristic range of plants, this habitat supports a distinctive invertebrate fauna including rare craneflies and snails.

Major pressures on lowland sites are dehydration caused by drainage and/or pressures on groundwater aquifers, nutrient enrichment from both water and air, and direct destruction, often because these features are poorly recorded and not recognised. Very often all these pressures are acting together. Upland sites have historically been affected by heavy stock grazing and drainage, the latter to a much lesser extent than the lowlands, although upland fringe sites are still being lost to agricultural intensification.

Few conservation efforts have been taken for this habitat, but where they have, they generally comprise restoration of natural hydrological processes through reversal of artificial drainage and improvements in aquifer health through abstraction reform or changes to quarry dewatering regimes.

Overall status is **Unfavourable-Bad**, and the overall trend is **Deteriorating**.

H7230, Alkaline Fens



Alkaline fen with bird's-eye primrose, Ha Mire, N Yorkshire. © Iain Diack

Alkaline fens are associated with wetlands that are irrigated by base-rich water ($\text{pH} > 6$) from springs and seepages and are often found on hillslopes and valley heads. The water supply may not always be strictly alkaline (that is, $\text{pH} > 7$), nor even weakly so, but in other cases it is sufficiently 'calcareous' to permit the precipitation of calcite and large tufaceous spring mounds can form. The habitat also occurs in topogenous situations, e.g. in basins, where base-rich water is retained due to impeded drainage.

They are often very small in extent but are typically very species-rich and support many rare species. The vegetation is characterised by a permanently saturated carpet of brown mosses and short sedges with a rich array of species including grass of Parnassus, common butterwort and bog pimpernel. Many rare invertebrates are associated with alkaline fen, including Geyer's whorl snail. The feature occurs in upland and lowland contexts wherever

there is upwelling of base-rich, low nutrient water. Key areas include the Norfolk Valley Fens, the Corallian limestones in Oxfordshire and the North York Moors, and the Craven limestone in North Yorkshire. The main lowland type is now very scarce and extinct in many counties, with less than 40 hectares remaining. Many surviving lowland fens are damaged and at risk of complete loss. Upland sites, where the majority of the resource is now found, are in a healthier state with damage less severe and fewer pressures.

Major pressures on lowland sites are dehydration caused by drainage and/or groundwater abstraction, nutrient enrichment from both water and air, and succession to taller or woodier vegetation, often initiated and accelerated by enrichment and dehydration. Very often these pressures are acting together. Upland sites have been affected by grazing and drainage, although the latter to a much lesser extent than the lowlands. However, upland fringe sites are still being lost to agricultural intensification.

Conservation efforts generally seek to remove pressures and restore the natural background conditions of high-water tables and low nutrient status, with measures including groundwater abstraction reform, better catchment management, and re-introduction of vegetation management if necessary.

Overall status is **Unfavourable-Bad**, trend is **deteriorating**.

H7240, Alpine Pioneer Formations of the *Caricion Bicoloris-Atrofuscae*



© Iain Diack

This is a type of flushed mire that occurs only at high altitude, in which cold, base-rich water seeps over the surface of the ground. This results in characteristic plant communities colonising these open substrates, typically consisting of a mixture of small sedges, rushes, herbs and bryophytes alongside a range of calcicolous mosses. Arctic-alpine species enrich this habitat, including some of the rarest plant species in the UK. Moor House-Upper Teesdale contains a unique glacial relict flora, including Teesdale sandwort and a host of other rare and characteristic vegetation.

There is variation in this habitat due to altitude, geographic location, substrate and the hydrological conditions. It is skeletal in appearance, with large areas of bare ground being commonplace amongst a mosaic with complex transitions to other upland habitat types. Common species characteristic of this habitat include yellow sedge, carnation

sedge, flea sedge and the moss *Blindia acuta*. Of particular significance is the presence of a number of rare species, including alpine rush, false sedge and Scottish asphodel.

This habitat is amongst the few remaining natural plant communities in the UK and has a very limited range in England due to the environmental conditions in which it occurs. It is sensitive to grazing pressure, air pollution and particularly climate change, the latter posing a particular threat to the arctic-alpine species remaining in England.

Local flora groups provide invaluable information and effort to protect these habitats in England, through experimenting with and implementing changes to grazing pressure and timing and other land management techniques, along with research into characteristic species. Wider policy targets regarding climate change and air pollution will aid the conservation of this habitat.

This habitat occupies only about 0.06 km² in England and the overall status is **unknown**. It is vulnerable, with overall trend **deteriorating** by an unknown degree. It is therefore key that conservation efforts focus on detailed survey, mapping and subsequent monitoring of the extent and condition of this habitat.

Rocky Habitats and Caves

H8110 and H8120, Siliceous Scree of the Montane to Snow Levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*), and Calcareous and Calchist Scree of the Montane to Alpine Levels (*Thlaspietea rotundifolii*)



Photo of Siliceous scree of the montane
© Simon Webb

Scree habitats consist of rock fragments covering frost-shattered summits of mountains, or accumulating below cliffs. Siliceous screes are made up of siliceous rocks such as quartzite, granite and sandstone. Calcareous and calchist screes are made up of base-rich rock such as limestone, calcareous-schists, serpentine and basalt. Although they can occur at any altitude, lowland screes are excluded from this definition. The screes are colonised by a range of pioneer species, providing shelter for many species sensitive to frost or grazing. Both habitats are important for their rich fern flora and act as refugia for a number of rare species. For example, H8110

provides shelter for parsley fern, Wilson's filmy-fern and stone bramble. H8120 is heavily influenced by altitude, containing calcicole and basiphilous species such as purple saxifrage, holly-fern, herb Robert and alpine meadow-grass.

In England, these habitats occur mainly in the uplands, however H8120 occurs in lower screes in the Peak District. In the uplands, both habitats are largely confined to the Lake District High Fells and Moor House Upper-Teesdale, with the aforementioned outlier for H8120, and some H8110 habitat in The Cheviot Hills.

These habitats historically have been protected due to their inaccessible location, however grazing, leisure activities such as rock climbing and scrambling, and mixed source air pollution pose a threat to these habitats. Measures include adapting grazing practices and reducing the impact of outdoor sports whilst commissioning research and monitoring into extent and condition may inform development of further actions to protect these habitats.

Overall conservation status for these two habitats are **unknown** and the overall trend is **deteriorating**.

H8210 and H8220, Calcareous Rocky Slopes with Chasmophytic Vegetation and Siliceous Rocky Slopes with Chasmophytic Vegetation

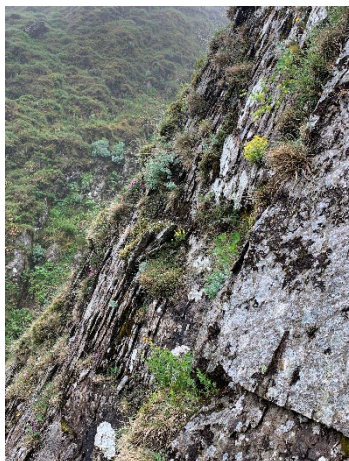


Photo of H8210 © Simon Webb

Chasmophytic vegetation consists of plant communities which colonise the cracks and fissures of rock faces. The type of community which develops is determined mainly by the base-status of the rock face. Siliceous communities develop on acidic rock, and calcareous communities develop on lime-rich rock such as limestone. The two communities can sometimes occur in close proximity where calcareous bands of rock run through siliceous strata. These habitats are not strictly limited to upland environments; however lowland examples are only included in Annex I where they include cliffs supporting distinctive crevice communities.

As they are rock fissure communities with very little, if any, soil and limited space for growth, bryophytes and mosses make up a characteristic component of these habitats. H8210 is characterised by bryophytes such as *Tortella tortuosa*,

Anoetangium aestivum and *Ctenidium molluscum*. Associated vascular plants include brittle bladder-fern, green spleenwort and glaucous meadow-grass. Typical bryophytes of H8220 include *Amphidium mougeotii* and *Racomitrium spp.*, with vascular plants such as wavy hair-grass and fir clubmoss. In western localities oceanic species can occur in this habitat, and in England and Wales the northern species are reduced, although dwarf willow has its most southerly occurrence.

In England these habitats are limited in range, typically occurring in areas with steep topography and rock outcrops. The Lake District High Fells, North Pennines, Moor House-Upper Teesdale, and Ingleborough exhibit both habitats. The Peak District contains good examples of H8210, while The Cheviot Hills have H8220 in steeper sided valleys.

These habitats historically have been protected due to their inaccessible location, however grazing, leisure activities such as rock climbing and scrambling, and mixed source air pollution all pose a threat. Adapting grazing practices, reducing the impact of outdoor sports, and commissioning research and monitoring into extent and condition may inform actions to protect these habitats.

Overall status for both is **unknown** and overall trend **deteriorating**.

H8240, Limestone Pavements



© Robert Goodison

Limestone pavements are natural exposures of rock, typically level or gently inclining, with surfaces divided into 'blocks', known as clints, and crevices, known as grikes. They were created by long-term geomorphological processes; including dissolution of limestone by rainwater and freeze-thaw weathering. The variety of microclimates results in distinctive, complex and floristically diverse mosaics of vegetation.

A range of calcareous rock, heath, grassland, scrub and woodland communities can develop on pavement. The combination of these elements varies. Woodland plants such as hart's tongue and dog's mercury grow alongside rock loving plants such as wall-rue and maidenhair spleenwort in shady, humid grikes. Woodland and scrub may be present to varying degrees depending on grazing. More heavily grazed pavements may only have vegetation in deep grikes which are inaccessible to herbivores. Particularly rare species include rigid

buckler-fern, dark-red helleborine and angular solomon's-seal which flourish in lower altitude pavements. More montane pavements can host rare species such as baneberry and green spleenwort.

The natural range and distribution is determined by underlying geology and historic exposure to geomorphological processes. In England they are found where limestone seams are near the surface, mainly in the Yorkshire Dales, Cumbria and Lancashire.

The area of habitat has been significantly reduced by removal of pavement clints for garden use. It is estimated that around 40% of the original habitat was destroyed, with no prospect of recovery. In England, intensive grazing has often led to simplified vegetation structure and function, with loss of grazing-susceptible species such as emergent and clint-top vegetation and woody cover.

Limestone Pavement Orders have addressed the issue of rock removal. Conservation efforts now focus on grazing strategies with use of cattle and periods of exclusion important elements. As pavements are unique and highly variable, achieving optimal grazing can be challenging, often needing to balance objectives for the pavement with the requirements of adjacent habitats.

Overall conservation status is **unfavourable inadequate** and the overall trend is **stable**.

H8310, Caves Not Open to the Public



© Natural England/ Michael Murphy

This habitat comprises natural caves which are not routinely exploited for tourism (show caves), and which host specialist or native cave species or support populations of Annex II species, such as bats. Caves are formed by the erosion of soluble rocks; they are found in limestone areas in the North Pennines, the Peak District, the Mendips and Devon. Caves form the underground aspects of karst landscapes and are often associated with limestone pavements (H8240). Cave passages lack natural light, so support species adapted to darkness. Some are permanent residents; others visit seasonally or use caves for part of their life cycle.

Agriculture and quarrying impact upon cave processes and groundwater systems through water abstraction, pollution, and changes to sediment loads. Abstraction licencing and actions under the Water Framework Directive to improve water quality mitigate these problems to some extent.

Surface organic and inorganic pollution can have a direct effect on cave-dwelling species, but also often washes in surface-dwelling species which may out-compete cave species, at least temporarily. Protecting water courses and prevent run-off through Catchment Sensitive Farming can help partially mitigate this issue.

Most of the important cave discoveries and extensions to existing cave systems have occurred due to excavations which can result in passages having their sediment fill partially or totally removed. Although this activity has increased the known cave resource, the impact on cave ecology is largely unknown. Guidelines have been developed to facilitate the exploration, sustainable development and conservation of cave environments.

The potential impacts of climate change are not fully understood, although changing temperatures, changing rainfall or prolonged drought all have potential to alter dissolution rates in caves and impact cave habitats. Addressing climate change at all scales would benefit this habitat. As caves are only found where there is suitable geology and due to the long timescale for cave formation there is no scope to increase the natural range or extent of this habitat through human intervention. Conservation measures focus on maintaining the current habitat. The overall assessment of conservation status is **unknown**, and its trend is **unknown**.

H8330, Submerged or Partially Submerged Sea Caves



© Natural England

The sea cave habitat includes submerged sea caves and partially submerged caves, the latter of which are only exposed to the sea at high tide. Caves range in size from a few metres to extensive, large systems that can be several hundred metres long with multiple openings and caverns.

The considerable variation in cave structure, extent and complexity as well as different levels of submergence, exposure (e.g. wave and light), inclination and sedimentary scour, all shape the communities present. Changing conditions with distance from the cave entrance often results in a gradation of community structure into the cave.

Submerged or partially submerged sea caves are mostly found in the intertidal zone or in shallow water. They are widely distributed in inshore waters along coastlines with suitable geology,

particularly chalk, limestone, and volcanic rock.

Sea caves in England face several threats, with climate change being one of the major threats with pollution and various human activities also impacting on condition. The changes induced by climate change have been identified to be erosion, flooding, and weathering, which can all damage cave structures and alter ecosystems. Pollution threats include human waste and agricultural runoff impacting biodiversity whilst human activities like infrastructure developments, and recreational pressure can also cause physical damage and disturbance to cave environments.

Conservation measures attempting to reduce impacts and threats include reducing point or diffuse source pollution to surface waters, adapting and managing renewable energy installation, facilities and operation; and introducing climate change mitigation and adaptation measures.

The current status and trend for Submerged or partially submerged sea caves are **unknown** and stable. Any progress will be driven by The Environmental Targets (Marine Protected Areas) Regulations 2023, delivering monitoring and the protection of designated sites but also through international treaties developed through the IPCC (Intergovernmental Panel on Climate Change) and national programmes.

Forests

H9120, Atlantic Acidophilous Beech Forests with Ilex and sometimes also Taxus in the Shrublayer (*Quercion robori-petraeae* or *Ilici-Fagenion*)



© Dan Abrahams

Atlantic acidophilous beech forests comprise beech *Fagus sylvatica* forests with holly *Ilex*, growing on acid soils, in a humid Atlantic climate. Sites of this habitat type often are, or were, managed as wood-pasture, in which pollarding of beech and oak species was common. In England this includes key wood-pasture sites such as Epping Forest, Burnham Beeches and the New Forest.

The current distribution includes most of the native range of British beechwood, though some former outlying populations and recent naturally regenerating stands of beech exist further north and west.

Some surviving beech stands are relatively extensive (e.g. Cotswold Commons Beechwoods); some form part of major wood-pasture complexes (e.g. the New Forest, Epping Forest); and a substantial number exist in areas where survival of ancient, semi-natural or other woodland is high (e.g. Lower Wye Valley).

In England, this woodland type tends to contain a higher proportion of veteran and ancient trees than examples found in other parts of Europe. The biodiversity of many sites is enriched by the presence of assemblages of epiphytic lichens or saproxylic invertebrates. Notable species include lichens such as *Agonimia octospora* and invertebrates such as the beetle *Diplocoelus fagi*. The moss *Zygodon forsteri* is also strongly associated with this habitat in the UK.

Key pressures on the habitat include poor management or removal of old, dead and decaying trees. Other significant pressures include impacts from nutrient enrichment (nitrogen) from atmospheric sources affecting epiphytic lichens and bryophytes in particular. Beech is sensitive to drought and is likely to be particularly vulnerable to the projected changes in rainfall and temperature in the south-east of England. Impacts from deer and grey squirrel are also a constant pressure affecting tree regeneration and health.

Effective management is ongoing on a number of the key sites to manage the habitat sustainably and prolong longevity of ancient and veteran trees.

However, the habitat is still susceptible to the pressures listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H9130, *Asperulo-Fagetum* Beech Forests



© Dan Abrahams

Asperulo-Fagetum beech forests are dominated by beech (*Fagus sylvatica*) and are relatively widespread on circumneutral to calcareous soils along slopes of major hill systems of the chalk and southern limestones.

This habitat type can be quite variable. As slopes become steeper, there is a shift from relatively deep, moist and moderately base-rich soils to thin, dry and strongly base-rich profiles. There is an associated floristic gradient in the woodland understorey, with dense cover of bramble on the shallowest slopes gradually being replaced by frequent dog's mercury as the gradient increases, and then by sanicle, wall lettuce and wood melick.

The New Forest is the largest area of mature semi-natural beech woodland in England, much of which conforms to the *Asperulo-Fagetum* Annex I type. There

are also other relatively extensive examples in the Chilterns and Cotswolds Beechwoods, East Hampshire Hangers, and some important examples in the Wye Valley. This habitat type can be particularly important for a series of helleborine species characteristic of shady beech woodlands e.g. white, violet, green-flowered, red and narrow-lipped helleborine.

Key pressures on the habitat include impacts from significant numbers of deer affecting woodland structure, ground flora and tree regeneration. In addition, grey squirrel can impact the health of beech trees. Other significant pressures include negative impacts from nutrient enrichment (nitrogen) from atmospheric sources affecting epiphytic lichens and bryophytes in particular. Beech is sensitive to drought and is likely to be particularly vulnerable to the projected changes in rainfall and temperature in the south-east of England. The habitat type was assessed by Natural England as Medium risk in the climate change adaptation manual.

Effective management is ongoing on a number of the key sites to manage the habitat sustainably. However, the habitat is still susceptible to the pressures listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H9160, Sub-Atlantic and Medio-European Oak or Oak-Hornbeam Forests of the *Carpinion betuli*



© Dan Abrahams

This is a nationally rare habitat type in the UK occurring only in the south of England, where it is at the edge of its European range. Hornbeam stands themselves are somewhat more widespread, but normally with abundant bluebell, which is unusually rare in this Annex I type. Therefore, much of the oak-hornbeam forest in England falls outside the Annex I type because climatic conditions allow bluebell to predominate on the forest floor.

Typical species include great wood-rush, hairy wood-rush and, locally, southern wood-rush, with greater stitchwort, ivy and honeysuckle.

Key pressures on the habitat are in common with most woodlands in southern England: Impacts from significant numbers of deer affecting woodland structure, ground flora and tree regeneration. Other significant pressures include negative impacts from nutrient enrichment (nitrogen) from atmospheric sources affecting epiphytic lichens and bryophytes in particular.

The habitat type was assessed by Natural England as Low risk in the climate change adaptation manual. The greatest threat to these woodlands from climate change is likely to be an increase in the frequency and severity of summer drought. There is a high likelihood that there will be impacts on drought-sensitive tree species, particularly on some soil types (e.g. shallow, freely draining soils and clay soils), predominantly in southern and eastern England.

Effective management is ongoing on some key sites to manage the habitat sustainably. However, the habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H9180, Tilio-Acerion Forests of Slopes, Scree and Ravines



© Dan Abrahams

Tilio-Acerion ravine forests are woods of ash, wych elm and lime (mainly small-leaved lime; more rarely large-leaved lime). The habitat type typically occurs on nutrient-rich soils that accumulate in the shady micro-climates towards the bases of slopes and ravines. Hence it is found on calcareous substrates associated with coarse scree, cliffs, steep rocky slopes and ravines, where inaccessibility has reduced human impact.

These forests are not extensive in England, although fragmentary stands are widespread with notable examples on limestone in The Peak District, Cumbria, Wye Valley and in more lowland locations in south-west and south-east England. These woodlands may contain rare, endemic and threatened species, including whitebeams and whorled Solomon's seal. They also support a rich invertebrate and bird fauna and the alkaline bark of old ash (and elm where it

still survives) supports important lichen species.

The main pressures are from tree disease and deer browsing. This woodland type is being severely affected by Ash Dieback. Loss of ash and replacement by other tree and shrub species will change the character of these woods with species more strongly associated with ash likely to decline in abundance. Despite considerable efforts, impact from deer numbers is an ongoing pressure compounding impacts of ash dieback. Livestock grazing, particularly in the uplands, can have a similar impact but is more easily controlled. There is increasing concern about the impact of annual pheasant releases. This could result in long-term nutrient enrichment of soil, leading to changes in ground flora and potentially inhibiting tree regeneration. Other significant pressures include nutrient enrichment (nitrogen) from atmospheric sources affecting epiphytic lichens and bryophytes.

Several projects are being undertaken at the landscape scale to mitigate the impacts of both ash dieback and deer browsing. The 2025 Environmental land management scheme includes actions to help with this with revised payment rates. The habitat remains susceptible to the threats above, with an overall conservation status assessed as **unfavourable-bad** and its trend **deteriorating**.

H9190, Old Acidophilous Oak Woods with *Quercus robur* on Sandy Plains



© Des Sussex

This habitat type comprises ancient lowland oak woodland on acidic, sandy or gravelly substrates. Veteran trees are relatively abundant compared to examples in continental Europe, and are often associated with assemblages of notable lichens, fungi and invertebrates.

The ground flora is generally species-poor and comprises calcifuge sub-shrubs such as bilberry and heather, grasses such as wavy hair-grass and creeping soft-grass; herbs such as heath bedstraw and common cow-wheat; and acidophilous bryophytes. Bracken can become dense where the sands are deep and loose.

This habitat type includes some key wood-pasture sites in England such as Sherwood, Windsor Great Park and New Forest. The distribution of this habitat type is the south and east of England with Sherwood being a more northerly outlier.

Key pressures on the habitat include poor management or removal of old, dead and

decaying trees. In old growth sites, loss and deterioration in the health of veteran trees is a particular problem. This is compounded by neglect and loss of expertise in traditional tree management techniques such as pollarding. Both under grazing and over grazing can also be an issue, and a lack of replacement trees in old growth sites causes a break in the continuity of dead wood habitat and subsequent loss of specialised species. Other significant pressures include negative impacts from nutrient enrichment (nitrogen) from atmospheric sources affecting epiphytic lichens and bryophytes in particular. High deer numbers also affect woodland structure, ground flora and tree regeneration. Agricultural intensification and changes to land management have resulted in the loss of hedges, trees and small patches of scrub in fields, which increases fragmentation and isolation amongst the remaining woodlands; In the lowlands of England, and particularly in the southeast, development pressure is high, and likely to increase.

Effective management is ongoing on several of the key sites aiming to manage the habitat sustainably and prolong longevity of ancient and veteran trees. However, it is still susceptible to the pressures listed above and the overall assessment of the conservation status is **unfavourable-bad** and its **trend deteriorating**.

H91A0, Old Sessile Oak Woods with *Ilex* and *Blechnum* in the British Isles



Troutdale Woods © Natural England / Peter Wakely

This habitat type comprises a range of woodland types dominated by mixtures of oak and birch species. It is characteristic of base-poor soils in areas of at least moderately high rainfall in northern and western parts of the UK.

The habitat shows considerable variation across its range, in terms of the associated ground flora and the richness of bryophyte communities. There is also a continuous spectrum of variation between oak-dominated and birch-dominated stands. Often these local variations reflect factors such as rainfall, slope, aspect, soil depth, and past and present woodland management (e.g. coppicing, planting, grazing). The most distinctive forms of the habitat have a ground flora dominated by bryophytes. Other variants include stands in which the ground flora is characterised by the prominence of dwarf shrubs such as bilberry; grasses, such as wavy hair-grass, common bent and sweet vernal-grass; and plants indicative of more

mesophytic conditions, including bluebell, bramble and scaly male-fern.

Key pressures on the habitat include Deer numbers and livestock (mainly sheep) are very high in the range of this habitat and consequently this is a high pressure on regeneration; lack of natural regeneration is a problem for this habitat; particularly old growth stands where continuity of habitat can only be achieved by having overlapping generations. Invasive conifers, rhododendron, sycamore, Turkey oak and cherry laurel alter the structure of the woodland and change the soil. This habitat contains important lichen populations which are particularly sensitive to air pollution, with critical loads exceeded across this habitat type. The presence of tree diseases and pathogens such as Acute Oak Decline and Sudden Oak Death are having an impact on the health of the oak tree population in England.

Recently there has been increased interest in this habitat being the closest Annex I type to “Temperate Rainforest” in England. Effective management is ongoing on a number of key sites to manage the habitat sustainably. However, the habitat is still susceptible to the pressures listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H91D0, Bog Woodland



© Dan Abrahams

Bog Woodland is a very rare habitat in England. Scattered trees can occur across the surface of a bog in a relatively stable ecological relationship as open woodland, without the loss of bog species. This true Bog woodland is a much rarer condition than the progressive invasion of bogs by trees, through natural colonisation or afforestation following changes in the drainage pattern which leads eventually to the loss of the bog community.

The habitat type has not previously been well described in the UK, and consequently knowledge of its ecological characteristics is limited. In England, a birch *Betula* spp.-dominated variant of Bog woodland occurs where birch or willow *Salix* spp. occur in long-term stable combinations with bog vegetation. Very small fragments occur on New Forest valley bogs and on the fringes of some peat bogs and mere sites in hollows within oakwoods.

At Morden Bog in Dorset, a Bog woodland stand is of ancient origin, as shown by its pollen record and old maps. The woodland is dominated by downy

birch with a ground flora consisting of greater tussock sedge and purple moor-grass. There is a rich epiphytic lichen assemblage, again indicating the persistence of this area of bog woodland.

Within the New Forest, birch – willow stands occur over valley bog vegetation, with fringing alder *Alnus* – *Sphagnum* stands where there is some water movement. These stands appear to have persisted for long periods in stable association with the underlying *Sphagnum* bog-moss communities. The rich epiphytic lichen communities and pollen record provide evidence for the persistence of this association.

Key pressures arise from the habitat being very rare and restricted to very small patches; fragmentation is a significant problem. Air and water pollution has a significant impact and the critical load threshold is exceeded throughout its range. Artificial drainage of the habitat and surrounding land via agriculture or development, and resultant changes to hydrology, significantly impacts the habitat and there is a risk of drying out. Decreasing precipitation particularly during summer drought as a result of climate change is likely to exacerbate these threats.

Recent increased impetus for rewetting bogs is likely to benefit Bog woodland also. However, the habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its **trend deteriorating**.

H91E0, Alluvial forests with *Alnus glutinosa* and *Fraxinus excelsior* (*Alno-Padion*, *Alnion incanae*, *Salicion albae*)



© Dan Abrahams

Alluvial forests comprise woods dominated by alder and willow on flood plains in a range of situations from islands in river channels to low-lying wetlands alongside the channels. The habitat typically occurs on moderately base-rich, eutrophic soils subject to periodic inundation.

Clearance of riverine woodland has almost eliminated true alluvial forests in England. It is a scarce resource, spread very thinly.

Many surviving fragments are often of recent origin. Residual alder woods frequently occur in association with other woodland types or with other wetland habitats such as fens. Alluvial forests are important for a wide range of invertebrates, including several rare

species. The habitat is also of principal importance for Otter and Eurasian Beaver, which is re-establishing at several sites, particularly as a result of re-introductions.

Where this habitat occurs, the associated hydrology is often very modified. Water abstraction and wholesale drainage of land has affected water availability and ground water tables. Poor water quality and agricultural run-off has compounded this issue. With ash being a component of the canopy, this woodland type is affected by Ash Dieback, and by *Phytophthora alni* on Alder. Other significant pressures include non-native plant species, high levels of deer browsing and negative impacts from nutrient enrichment (nitrogen) from atmospheric sources affecting epiphytic lichens and bryophytes in particular. Vulnerability to climate change has been assessed as Medium. There is a particular risk in relation to drier summers and drought.

There are efforts to ameliorate impacts and expand alluvial woodlands, particularly as part of river restoration, through the Landscape Recovery Scheme and other funding sources. However, the habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

H91J0, *Taxus Baccata* Woods of the British Isles



© Peter Wakely

Yew (*Taxus baccata*) woodland occurs on shallow, dry soils usually on chalk or limestone slopes, but in a few areas stands on more mesotrophic soils are found. Yew tends to be overwhelmingly dominant and is usually associated with a very sparse shrub and tree layer. Only a few species, such as dog's mercury can survive beneath the dense shade cast by the canopy of mature yew trees. Association with beech and holly is less common than in mainland Europe.

Ecological variation arises according to the nature of the yew wood. In the south this type may be either the senescent phase of beech woodland supporting clusters of yew after the fall of beech, or primary woodland developing on unstable slopes. Very locally, box may occur below the yew. Eventually individual ash or beech trees may grow through in gaps to recreate an overstorey. More northerly examples tend to be associated with ash

and elm species, and in these situations, yew is more likely to remain as the main overstorey species.

Yew woodland is scattered, predominantly on calcareous substrates, in the south, and to a lesser degree in northern England. On some sites, such as Kingley Vale in Sussex, the yew trees can be a few centuries old, existing as a cohort of veteran and ancient trees.

Key pressures on the habitat are that the critical load thresholds are exceeded throughout its range. Deer numbers are very high in the range of this habitat and yew is highly palatable to deer, which has acted as a high pressure on regeneration. This habitat is typically associated with thin dry soils, but increased precipitation events and related storms are likely to have a negative impact. Tree disease is an ongoing concern, and many new pathogens are appearing in the UK. Yew has been shown to be susceptible to *Phytophthora* species in nursery situations, but less so in the wider environment.

Deer management has been patchy but has had some success on some sites. However, the habitat is still susceptible to the threats listed above and the overall assessment of the conservation status is **unfavourable-bad** and its trend **deteriorating**.

Invertebrate Species: Annelids

S1034, Medicinal Leech, *Hirudo medicinalis*



© ajott / Wikimedia Commons

The Medicinal Leech is the largest leech in Britain, with adults reaching 20cm long – they would comfortably extend from your wrist to your fingertips. The species feeds on the blood of amphibians, fish, birds and mammals; individuals can live for many years.

It thrives in shallow ponds and ditches that warm up sufficiently in summer for it to complete its development. Egg cocoons are deposited above the waterline, in well vegetated fringes or within the nests of water birds.

Historically, the Medicinal Leech occurred widely throughout Britain, when it was exploited in medicine for bloodletting. In the 20th Century, however, the species declined drastically, and it is now Nationally Rare and globally Near Threatened. The species is fully protected under the Wildlife and Countryside Act.

The loss from the wider countryside of farm ponds and mixed farming systems, with grazing animals, are likely causes of decline; toxic impacts from veterinary worming products are also suspected. Invasive, non-native plants could shade some waterbodies and make them too cool.

The Medicinal Leech survives in Wales, Scotland and England, though here in just two population strongholds: upland tarns in Cumbria and at Dungeness in Kent; elsewhere, it occurs in the New Forest. It is a notified feature in some SSSIs, though, as an Annex V species 'exploited in the wild', it is not a feature of SACs.

The overall assessment of conservation status is **Unknown**, with the trend also **Unknown**, largely due to insufficient monitoring during the reporting period, e.g. the Covid-19 outbreak hampered surveys at Dungeness. Range, Population and Habitat are presumed to be relatively stable on protected sites, and sufficient for population persistence, although there is not adequate information to confirm this. An ongoing project by the Freshwater Habitats Trust should update knowledge by 2026. In 2018, the Medicinal Leech's range and population were judged to be stable, with habitat sufficient to support the species.

Invertebrate Species: Molluscs

S1013, Geyer's Whorl Snail, *Vertigo geyeri*



© Amgueddfa Cymru - National Museum Wales

Geyer's Whorl Snail is tiny, no bigger than the tip of a ballpoint pen. It is found in relatively exposed, constantly humid calcareous flush-fens that are fed by tufa-depositing springs. These flushes are often only a few square metres in extent. It requires dense cover of low-growing vegetation with brown mosses, grasses and sedges, free from *Sphagnum* and other mosses.

Geyer's Whorl Snail is a rare species, found in England, Wales and Scotland. In England, it occurs in: Cumbria, at Asby Complex SAC (Sunbiggin Tarn and Moors and Little Asby Scar SSSI); North Yorkshire, at Eller's Wood & Sand Dale SSSI / SAC; and in Norfolk, in the Norfolk Valley Fens SAC (Potter & Scarning Fens, East Dereham SSSI, though not a notified feature).

The species is vulnerable to drainage at the sites where it survives and, like all Annex II *Vertigo* species, it is highly dependent on the maintenance of existing, local hydrological conditions. Light grazing helps to keep swards open, but cattle may cause too much disturbance to the small patches of habitat.

The overall assessment of conservation status is **Unknown**. While the species' range was considered favourable, there was insufficient, up-to-date information on both its population and habitat quality.

S1014, Narrow-mouthed Whorl Snail, *Vertigo angustior*



© O Gargominy, Muséum National D'histoire Naturelle

The Narrow-mouthed Whorl Snail is tiny, no bigger than the tip of a ballpoint pen. It is found in open, damp habitats with high, even humidity, but it does not tolerate flooding or drying out. The vegetation may be grazed.

The species is rare in the UK, but occurs in England, Scotland, Wales and Northern Ireland. In England, it is found, unusually, in mossy depressions on the surface of limestone pavement (Gait Barrows SSSI, Cumbria – part of

Morecombe Bay Limestones SAC), at the partially shaded transition of open pavement to closed canopy.

It is more widespread in East Anglia, where it occupies sea walls and estuaries in Norfolk and Suffolk, as well as calcareous fens (e.g. Flordon Common SSSI, part of the Norfolk Valley Fens SAC). Because of its specific microhabitat requirements, the species is often restricted to a narrow zone around wetlands, only a few metres wide.

In its coastal habitats, the snail is at risk from sea level rise, tidal surges and sea wall repairs – particularly in rivers and estuaries compared to grassland. In balance to these threats, it is likely that the species occurs more widely in East Anglia than currently recorded, and the Environment Agency is taking its needs into account during sea defence works. On limestone pavement, bramble and scrub encroachment may pose a risk to the open conditions it requires.

The overall assessment of conservation status is **Favourable**, with a **stable** trend, because range and population are meeting expected levels, although there is insufficient information on its habitat.

S1015, Round-mouthed Whorl Snail, *Vertigo genesii*



© Amgueddfa Cymru - National Museum Wales

The Round-mouthed Whorl Snail is a tiny species of boreal and alpine regions. It's no bigger than the tip of a ballpoint pen. It is very rare in the UK, occurring in Scotland and northern England.

The snail is found at scattered locations, at altitudes of around 400-500m, within the Upper Teesdale SSSI (part of the Moor House – Upper Teesdale SAC). It lives in calcareous, spring-fed flushes amongst moss, low-growing sedges and a rich assemblage of rare and local arctic-alpine plants, such as Bird's-Eye Primrose.

Discovered more recently in the Malham-Arncliffe SSSI (part of Craven Limestone Complex SAC, though not a notified feature), the snail occurs in a larger area than found in Upper Teesdale. An

analysis of the occurrence of alkaline fen above 350m, overlying Carboniferous limestone, suggests other populations may exist.

The small, isolated nature of sites - varying in size from a few tens of square metres to more than 1ha - makes populations vulnerable to accidental damage or natural events, such as prolonged drought.

In general, sites supporting *Vertigo genesii* are subject to light grazing, but heavy grazing is harmful to the species: trampling by cattle was previously identified as a possible problem at Great Close Mire, Malham. Like all Annex II *Vertigo* species, it is highly dependent on the maintenance of existing, local hydrological conditions. UK populations are probably at the southern edge of the species' range. Upland flushes are moderately susceptible to climate change, by which changes in rainfall could cause drying. Nutrient enrichment is a potential additional pressure.

The Round-mouthed Whorl Snail is in Favourable overall condition, with a stable trend. There is uncertainty over the extent of habitat that could be occupied, as the snail usually only occurs in a subset of apparently suitable flushes.

S1016, Desmoulin's Whorl Snail, *Vertigo moulinsiana*



© Gilles San Martin

Desmoulin's Whorl Snail is the largest of the Annex II *Vertigo* species, though still no bigger than the tip of a ballpoint pen! It is restricted to calcareous wetlands but can be found in a wide range of lowland habitats. High humidity appears to be important in determining local distribution within sites.

It normally lives on reed-grasses and sedges, where it feeds on the microflora, and in autumn it may ascend taller reeds and scrub. Unlike some of the Arctic-alpine *Vertigo* species, this snail is on its northern range margin in Britain.

In the UK, the snail occurs principally in England, with a few outlying sites in Wales. It is not as rare as previously thought, being associated with chalk stream margins and ditches in central, southern England (e.g., Kennet and Lambourn SAC, River Avon SAC); standing and flowing waters and ditches in East Anglia (e.g., Norfolk Valley Fens SAC, The Broads SAC); and meres in the West Midlands (e.g., Aqualate Mere SSSI, Fenemere SSSI).

Water abstraction and low rainfall are combined pressures on this snail, which depends on the maintenance of existing, local hydrological conditions. Drying due to climate change is therefore probably a greater concern than declining water quality. This is particularly worrying in river systems and associated habitats, compared to isolated water bodies.

The overall conservation assessment is **Unfavourable – Bad** because the population remains much below historic levels, even if the range is maintained and relatively stable. The conservation trend is **Unknown** because of insufficient information on both the current quality of habitat and its trend.

S1026, Roman Snail, *Helix pomatia*



© Joachim S. Müller/ Flickr

The Roman Snail is believed to have been introduced to England by the Romans. This generalist vegetarian species is the largest land snail in Britain, with a shell growing just larger than a golf ball.

It tends to occur in colonies, only on well drained and friable, chalk or limestone soils. It is found in relatively undisturbed grassy and scrubby habitats, both semi-natural and man-made. The snails need habitat mosaics that afford both shaded and damp conditions, for shelter, and open ones for egg-laying and hibernation.

Roman Snails hibernate from mid-autumn until spring, thereafter, emerging to feed at night. Late frosts can cause mass mortality of colonies. The species can also enter dormancy, when they burrow into the soil, if conditions are hot and dry.

The species' distribution is concentrated in the Chilterns, the North Downs and on the fringes of the Cotswolds and the Mendip Hills.

The Roman Snail is currently not scarce or threatened, though it is listed on Annex V as an exploited, managed species. It was added to Schedule 5 of the Wildlife and Countryside Act in 2008 to protect it from both amateur and restaurant consumption (levels of which are unknown, though farmed snails are allowed). The species is vulnerable to local collection because populations are site faithful and grow slowly, with individuals living up to 20 years.

This protection also helps the species in the planning system, as it is affected by works on transport infrastructure (where it favours warm and free-draining cuttings and slopes) and by building (Natural England has a Technical Information Note for developers). The species could be lost from sites that scrub over and become too shaded.

The overall assessment of conservation status is **Favourable**, as Roman Snail's range, population and habitat are judged favourable. Overall trend is **Stable** as the aforementioned parameters are also Stable.

S1029, Freshwater Pearl Mussel, *Margaritifera margaritifera*



© Gavin Measures, Natural England

The freshwater pearl mussel is a large, long-lived, bivalve mollusc found in clean fast-flowing rivers where they are found half buried in sand or gravel, often between boulders. Its life cycle requires the presence of salmonid fish hosts (e.g. salmon or trout) upon which their larvae, known as glochidia, attach.

The species declined dramatically during the 20th century. Populations are now found in a handful of rivers across northern England with outlying populations in Shropshire and Devon. Most remaining populations are small and face extinction unless action is taken.

The main reason for declines is the low level of survival of juvenile mussels, which are very sensitive to slight changes in environmental conditions. This is leading to ageing populations, not capable of replenishing themselves.

Activities that result in changes in river flow, increased levels of silt and nutrients contribute to declines. Land drainage, water abstraction, changes to river channel morphology and intensification of land use in river catchments all contribute to inadequate conditions for their survival. The future impacts of climate change on river habitat conditions are uncertain.

Ensuring the long-term future of the species requires integrated catchment management to prevent direct impacts. Measures to restore natural hydrological regimes and reduce losses of fine sediment and nutrients from catchment sources should continue. Proactive, targeted reintroduction and reinforcement is also key to the long-term conservation strategy.

The overall assessment of conservation status and trend is determined as **unfavourable bad, deteriorating**. Range and population are significantly below levels that would be considered favourable. There are sustained efforts to increase the size of populations, e.g. through reintroducing captive bred mussels, but these efforts are at their very early stages. Further losses of populations are likely in the short term and there are uncertainties around the outcomes of listed conservation measures.

S4056, Little Ram's-Horn Whorled Snail, *Anisus vorticulus*



© Alex Hyde/ Back from the Brink

The Little Whirlpool Ram's-horn Snail is a tiny fresh-water mollusc, with a flattened spiral shell. It rarely grows more than 5 mm wide – smaller than a watch battery. It occurs in unpolluted, calcareous waters in the drains and ditches of floodplain grazing marshes, favouring those with a rich, dense, aquatic flora but little emergent vegetation. It often floats on the surface amongst duckweed. Ditches that are either completely cleared of vegetation or are choked with weed and silt are unsuitable. Winter flooding may be important in enabling young snails to colonise unoccupied ditches.

This Nationally Rare species is confined to England and formerly occurred at around 15 sites in the south-east. It now persists mainly in Special Areas of Conservation: the Arun Valley (Pulborough Brooks SSSI and Amberley

Wild Brooks SSSI – West Sussex), the Pevensey Levels (same named SSSI – East Sussex) and The Broads (multiple SSSIs – Norfolk, edging into Suffolk).

The species suffers a wide range of pressures, typical of those in wetland habitats: water management in the catchment and seasonal drying of ditches; poor water quality, resulting from elevated nitrogen and phosphorus; impacts on the aquatic habitat from invasive plants, molluscs and fish; and inappropriate ditch management.

Ditch management is perhaps the most crucial pressure that can be alleviated for the species, using a rotational and staggered regime. Ditches should be cleared to reset vegetation succession, but on a frequency bespoke to the size of ditches on a site. Leaving staggered, unmanaged lengths of ditch allows the snail to colonise cleared sections from refuges. Five types of ditch management were evaluated during RSPB's 'Back from the Brink' (Natural England and Heritage Lottery Fund) funded project (2016-20). No single method indicated a consistently best approach.

The overall assessment of conservation status is **Unfavourable – Bad** and trend **unknown**, as both range and population don't reach levels considered favourable for the species (although there were uncertainties in the information used).

Invertebrate Species: Arthropods

S1044, Southern Damselfly, *Coenagrion mercuriale*



© Simon Curson

Southern Damselfly is a delicate damselfly that has always been restricted to localised areas of southern England and Wales. It is found where clean base-rich water flows, often through acid heathy areas supporting mire-stream complexes. At known sites appropriate management work is usually carried out and recent small-scale translocations have been shown to be successful. Increases in population and range since the last assessment are probably due to more accurate survey data given by local enthusiasts and compiled by British Dragonfly Society.

This species is found in mires and streams in heathy areas such as the New Forest, East Dorset and parts of Dartmoor. It is also found along chalk rivers in Hampshire and there are a few outlying colonies. Southern Damselfly

also has strong colonies in southwest Wales.

The Southern Damselfly lays eggs inside the soft tissue of wetland plants growing in clean streams. The aquatic larvae develop over 2 years within detritus and plant roots on the stream bed. They then crawl up a waterside plant stem to the open air and the adult emerges. This takes place at any time between late May and late July and adults can be seen flying up to mid-September.

The habitat requirements are small, open slow-flowing streams that have a fairly stable temperature through the year. It prefers streams with only a little emergent vegetation and little or no overhanging, shading vegetation.

The main pressures and threats consist of inappropriate management or grazing on their sites resulting in streams becoming shaded by trees or scrub. It is likely that pollution from pesticides used in the vicinity of breeding streams is also a threat.

The overall status is **favourable** because the number of colonies appears to have increased since the previous assessment. It is unknown whether this is a real change or is due to more detailed recording and surveying. The overall trend has been recorded as **stable** because the population is not decreasing, but there is uncertainty over any increase.

S1058, Large Blue, *Maculinea arion*



© Simon Duffield/ Natural England

Large Blue has always been a rare butterfly restricted to certain grasslands in southern England with the right habitat and species of host ant. Recent increases in population and range are due to conservation efforts involving captive breeding and release, habitat management and translocation. It was once found in several locations in southern England, including the Cotswolds and north Devon and Cornwall. It decreased due to agricultural change and by 1979 was extinct in the UK. Reintroduction began in 1983, initially to the Polden Hills of Somerset and later the Cotswolds.

It has a complex life history. Females lay eggs on Wild Thyme and Marjoram where they hatch and feed for the first few weeks. They then drop to the ground and wait to be found by a specific species of ant. Once found the caterpillar releases a small drop of sweet honeydew from a special gland, which the ants find irresistible. The ants “milk” the caterpillar

and then the caterpillar adopts a position that tricks the ants into thinking it is one of their own grubs. They take it to their nest where it eats ant grubs through the autumn and again in spring after hibernating. The caterpillar pupates in the spring, still producing honeydew for the ants. When it is ready to emerge as an adult the pupae produces a rasping song from a special organ that encourages the ants to accompany it through the ant nest and above ground. Here the adult will climb up, dry its wings and fly.

Habitat requirements are very specific: areas of hot, chalk grassland where the favoured species of ant and foodplants Thyme and Marjoram can thrive. With climate change and hotter summers, Large Blues are using areas with more tussocks, scattered scrub and other shadier areas where ant nests do not overheat in the more intense heat waves.

Conditions are maintained by careful targeted management. Specific sward conditions are required at the right times of year. Failure to manage sites correctly is now the main pressure and since reintroduction a working group has worked tirelessly to advise landowners, encourage correct management and conduct translocations. The medium-term future is secure, and the UK may now hold the greatest concentration of Large Blues in the world. The conservation status is judged to be **favourable** with an **improving** trend.

S1065, Marsh Fritillary Butterfly, *Euphydryas aurinia*



© Simon Curson

Marsh Fritillary has a scattered distribution in damp grasslands throughout western UK where the larval foodplant, Devil's-bit Scabious grows. Much conservation effort has been targeted at Marsh Fritillary and colonies are increasing in some areas but still being lost in others.

This beautiful species was once more widespread, found on damp and calcareous grasslands across much of England. Due to habitat loss and changes to grassland management, colonies were lost from many areas and the species retreated westwards. The main English populations are now on the Culm grasslands of Devon and North Cornwall, with a few colonies remaining on dry

chalk grasslands in Wiltshire that still support the foodplant.

It requires low nutrient grasslands containing the larval foodplant devil's bit scabious. Eggs are laid on the underside of scabious leaves, and after hatching the caterpillars feed collectively before spinning a web in a tussock of grass where they overwinter. This means that grasslands need to be uncut or lightly grazed so that there are plenty of tussocks. Hay meadows that are cut in the autumn and pastures that are more heavily grazed are unsuitable.

The main pressures facing Marsh Fritillary are adverse management and habitat destruction. Grassland areas that are either grazed too hard or receive little or no management soon become unsuitable, and the colonies die out. Much advice has been given to land managers and areas brought into appropriate management. Some translocations have taken place, including ongoing conservation effort to reintroduce and restore lost populations in Cumbria.

The current assessment has been limited by a lack of access to comprehensive recent data on distribution and population of the species, especially around the reintroduction effort. As a result, the assessment for this reporting cycle is that the overall status and trend are both **unknown**.

S4035, Fisher's Estuarine Moth, *Gortyna borelii lunata*



© Simon Curson

Fisher's Estuarine Moth is a large moth that has always been restricted to small parts of the southeast coast in south Essex and north Kent where its larval foodplant, Hog's Fennel, grows. Recent increases in population and range are due to conservation efforts of captive breeding and release, habitat management and translocation.

This charismatic and attractive species was first discovered in UK when a Mr Fisher caught one at his kitchen window in Essex one evening in 1968. It was soon found to be breeding at several close by spots on the Essex coast. In the 1990s it was discovered breeding on the north Kent coast.

Fisher's Estuarine Moth has a fascinating life history. The females lay eggs on grasses where they overwinter. In spring

the larvae hatch out and crawl off to a nearby Hog's Fennel stem. It then bores into the stem and spends the next few months eating the internal parts of the stem and the roots. At this time occupied plants can be found by a characteristic "volcano" of frass (larval poo) that is pushed out of the stem / root by the larvae. It pupates underground in late summer, and the adults fly in September and October.

This means that the habitat requirements are areas of rough ground where there are coarse grasses intermingled with scattered Hog's Fennel plants. So, the moth is restricted to the distribution of Hog's Fennel.

With all the UK colonies being coastal and low lying, the species is clearly vulnerable to sea level rise. After extensive research to detail its life history and exact habitat requirements work began to safeguard its future. Fisher's Estuarine moths were captively bred, plants of Hog's Fennel planted in more elevated areas, and the moth was translocated to some of those areas of planting. Since then, it has colonised further areas of planting and thus extended the range, albeit slightly.

Overall, Fisher's Estuarine Moth can be regarded as a conservation success and its current overall status is **favourable** with an **improving** trend.

S6199, Jersey Tiger Moth, *Euplagia quadripunctaria*



© Simon Curson

Jersey Tiger is an attractively marked moth that is often seen flying in sunshine in July and August. It has had a restricted and scattered distribution in Europe. It can gather in huge numbers to undergo a summer hibernation to avoid the hottest parts of the year. These huge roosts are very vulnerable to disturbance. For these reasons it is protected throughout Europe. Recent increases in UK population and range are thought to be due to climate change.

This species was restricted to a small area of the south Devon coast until about 1990. At this time, it started to spread along the coast in both directions and populations appeared around London and Sussex. Now it is commonly found in

many areas south of a line from the River Severn to The Wash, but mostly along the south coast and in and around London.

Jersey Tiger is now found in almost any open habitats but particularly favours rough ground, gardens and hedgerows, so areas that appear unkempt are important spots for it. It is found in rural countryside and into city centres. The caterpillars feed on a wide variety of low plants, especially Nettles, Ground Ivy and other common wayside plants.

This means that Jersey Tiger has no habitat requirements other than open, sunny, unpolluted areas where unsprayed wild plants are left to grow.

Jersey Tiger has been rapidly increasing its range and abundance in southern UK for 30 or so years and there do not appear to be any particular threats or pressures on it. The latest data is likely not to show the full extent of present distribution due to the speed of expansion and the availability of recent data

Since the last assessment Jersey Tiger has further increased in range and abundance, and it is likely that this will continue. For this reporting period, the Jersey Tiger has been assessed as overall status **favourable** and overall trend is **improving**.

S1079, Violet Click Beetle, *Limoniscus violaceus*



© Roger Key/ Natural England

The Violet Click Beetle is very rare and extremely elusive. An adult could sit comfortably on a 5 pence coin, but that's not the reason it's difficult to find.

The beetle spends most of its life – up to 2 years - as a 'wireworm' larva in the basal hollows and cavities of large, veteran trees, which are typically over 250 years old. The right kind of hollow contains a nutrient-rich mixture of composting wood decay, bird droppings and other invertebrates; this type of hollow is rare in itself. The species is found at ancient, park woodland sites, where a sufficient density of suitable trees occurs. Adults can be found on the blossom of shrubs and trees in spring.

This Nationally Rare beetle is known from only 3 sites in Britain, all of which are designated as SACs for its presence: Windsor Forest and Great Park, in Berkshire; Bredon Hill, in Worcestershire; and Dixton Wood, in Gloucestershire. It is fully protected under the 1981 Wildlife and Countryside Act. Its IUCN conservation status is Endangered, globally and in Europe.

There is a long-term risk, at the beetle's haunts, of gaps in the continuity of trees supporting the required breeding habitat. For the existing trees, arboricultural maintenance, which stabilises trees, aims to balance the loss of trees from storm damage. Ongoing research, to attract adults with synthesised pheromones and detect larvae by specific odours, aims to improve monitoring for the species.

The overall assessment of conservation status is **Unfavourable–Bad**, as both population and habitat don't reach levels considered favourable for the species (although there were uncertainties in the information used). The overall trend is **stable**.

S1083, Stag Beetle, *Lucanus cervus*



© Dave (Wolf 359)/ Flickr

The spectacular Stag Beetle is Britain's largest, terrestrial beetle, about the length of a credit card. Only the males sport the 'antlers', using them in duels to decide the strongest suitor.

The adults are generally only found in late spring and summer, when males may fly in search of mates before dusk. It spends most of its lifetime as a larva (grub), feeding underground in decaying logs and stumps, on a range of deciduous trees. It can also develop in sunken timber, such as fence posts. The larva can spend up to seven years completing its development.

Stag beetle is found in many habitats over light soils, wherever its breeding sites are available: woodland edges, hedgerows, traditional orchards, parks and gardens. Consequently, it is found in suburban environments as well as the wider countryside. It is quite widespread in southern England and occurs in the Severn Valley and the south-west.

Having an English distribution overlapping the densely populated south-

east of England poses opportunities and challenges: habitat loss, via development, and perhaps more seriously, tidying of the dead wood resource from parks and gardens. This includes grinding out stumps as well as moving logs off site. Such pressures likely lead to the fragmentation and isolation of local populations. Adults are potentially vulnerable to suburban birds and mammals, including pets.

More positively, recent education campaigns have probably resulted in better management of the dead wood resource. The Stag Beetle is protected under the Wildlife and Countryside Act, for sale only. While there is no current conservation concern in England, support for the species assists its European status, which is Near Threatened.

The overall assessment of conservation status is **Favourable**, as the Stag Beetle's range, population and habitat are judged favourable. Overall trend is **Improving** as the same parameters are either Improving or Stable. Prospects for the species are considered Good. In 2018, Stag Beetle's English trend was assessed as Stable for all parameters, although there was uncertainty in the data, which were reliant on unsystematic recording effort (despite organised campaigns at the time). Similarly, in the current period, increased population levels may have resulted from more recording following the Covid-19 outbreak in 2020 and greater use of citizen science apps.

S1092, White-clawed Crayfish, *Austropotamobius pallipes*



© Jenny Wheeldon / Natural England
(Flickr)

The White-clawed Crayfish is the only native crayfish in Britain. It is one of the largest, aquatic invertebrates in England, and at 6-12cm long, roughly the size of a computer mouse. It can live for around 10 years, in a range of clean habitats - especially hard-water streams and rivers - but it can also occur in canals, lakes, reservoirs and water-filled quarries.

The White-clawed Crayfish plays an important role in freshwater ecosystems. Typically nocturnal and omnivorous, it feeds on a variety of invertebrates, small fish, plants and algae. The species is preyed upon by mammals, birds and, in the juvenile stages, other invertebrates. Its foraging and grazing activities boost primary productivity by promoting nutrient and energy cycling.

Colonisation by invasive, non-native crayfish, particularly the North American

Signal Crayfish (*Pacifastacus lenisculus*), has rendered much of the species' former habitat unsuitable. These non-native species outcompete White-clawed Crayfish. They land a double-blow by carrying a fungus-like disease, Crayfish Plague (*Aphanomyces astaci*), which is lethal to the native and causes mass mortality. This disease can also be spread between water bodies by human activities, via wet footwear, clothing and equipment.

The White-clawed Crayfish is a Priority Species and protected under the Wildlife and Countryside Act from taking, possession, transport and selling. A representative selection of high-quality rivers is designated as SAC for the species. Effective conservation measures include translocation to isolated, disease-free 'Ark' sites and application of strict biosecurity. However, long-term solutions are urgently needed for developing disease resistance and eradicating non-native crayfish, without which prospects are poor.

The overall assessment of conservation status is **Unfavourable – Bad**, with trend **deteriorating**. Range and Population don't reach levels considered favourable for the species (with uncertainties in the information used). Habitat is currently sufficient for population persistence but declining in condition.

Vertebrate Species: Fish

S1095, Sea Lamprey, *Petromyzon marinus*



© Jack Perks Wildlife Media

The sea lamprey is the largest English lamprey. Adults reach up to 100cm and can weigh 2.5kg. They spawn in late May-July forming 'nests' in river gravels. Larvae drift downstream and take refuge in silty substrates as ammocoetes (juveniles) for around 5–8 years, after which they metamorphosise to adult form and migrate to the sea for up to 3 years. They feed parasitically via an oval sucker which they attach to host fish. They are not thought to return to their natal rivers but are attracted to rivers where sea lamprey ammocoetes are present. After spawning they die.

Sea lamprey runs are associated with medium to large rivers and they may swim a considerable distance upstream. Populations are relatively widespread within coastal river systems of East Anglia, the South-West and the Severn Estuary. Numbers have increased in the Yorkshire Ouse and Derwent since the

1990's and they were recorded in the Thames in 2000. Although records from the North-West are fewer, they are regularly recorded from rivers draining into the Solway Firth, such as the Eden.

Complex habitat requirements, in combination with widespread distribution, make a detailed assessment of habitat quality and population trends challenging. Populations are reduced across England compared to natural levels with declines attributed to historical reductions in habitat quality due to pollution, physical modification and the introduction of barriers preventing access to spawning areas. However, there is still likely to be sufficient habitat, of a suitable quality, for the species to persist in the long term. In addition, progress with reducing pollution concentrations in many English rivers and increased adoption of suitable fish passage solutions will benefit the future sea lamprey populations, allowing recolonisation of areas within its natural range.

Set in opposition to this positive outlook are the threats posed to sea lamprey by the spread of non-native species, increases in energy production infrastructure and climate change effects.

For this reporting round, Sea Lamprey has an overall status of **Favourable** and an overall trend of **Stable**.

S1096, Brook Lamprey, *Lampetra planeri*



A Brook Lamprey in River Derwent ©
Jack Perks Wildlife Media

The brook lamprey is the smallest of the three English lamprey species with an adult length of 13 – 17cm. The larvae of brook lamprey are virtually indistinguishable from those of the closely related river lamprey. Spawning takes place between March – June when water temperatures reach 10 – 11°C. A depression is excavated in loose gravel, often by multiple adults, and eggs are deposited in to a 'nest'. Adult brook lamprey then die. After hatching the larvae drift downstream and burrow into silty substrates. The larvae remain buried for around six years before undergoing metamorphosis between July - September and becoming adults. The adults do not feed and commence their upstream migration.

The brook lamprey is widespread throughout Britain's river network. Its range frequently overlaps with that of the river lamprey and potentially sea lamprey.

Brook lamprey may move a considerable distance upstream to find suitable spawning habitats.

Brook lamprey have complex habitat requirements. These factors, combined with the widespread distribution of brook lamprey within England, make a detailed assessment of habitat quality and population trends challenging at the present time. Populations are reduced across England when compared with their natural levels. This decline is attributed to historical poor water quality, physical modification and the introduction of barriers which stop brook lamprey reaching spawning areas. However, there is still likely to be sufficient habitat, of a suitable quality, for the species to persist in the long term. In addition, progress has been made with reducing pollution levels in many rivers across England and there is increasing delivery of suitable fish passage solutions. This will benefit the current and future dispersal of brook lamprey, allowing recolonisation of its natural range. Set in opposition to this positive outlook are the unknowns of climate change effects, increases in energy production infrastructure and the continued spread of non-native species which may directly predate or compete with brook lamprey.

For this reporting round, brook lamprey has an overall status of **Favourable** and an overall trend of **Stable**.

S1099, River Lamprey, *Lampetra fluviatilis*



A group of River Lamprey in the River Dee © Jack Perks Wildlife Media

The river lamprey is intermediate in size between the larger sea lamprey and the smaller brook lamprey, with adults normally in the range of 30 – 40cm. Spawning takes place from March to April when water temperatures reach 10-11°C and they excavate a depression in the gravel to form a nest into which they deposit their eggs. After 15-30 days the larvae hatch, drift downstream and burrow into silty substrates. Here they feed on fine particulate matter and remain for 3 – 5 years before downstream migration to the estuarine and marine environment. River lamprey spend 1-2 years, mainly in estuaries, feeding on the flesh of fish hosts before they stop feeding and migrate into freshwater rivers in October - December. The homing behaviour of anadromous lampreys is poorly understood, however, studies indicate that they may not return to their natal rivers but instead locate rivers with lamprey ammocoetes present.

The river lamprey is widespread throughout Britain's river network. Its

range frequently overlaps with that of the sea lamprey and potentially brook lamprey. River lamprey runs are associated with medium to large rivers and may penetrate a considerable distance upstream.

River lamprey have complex habitat requirements. These factors, combined with the widespread distribution of river lamprey within England, make a detailed assessment of habitat quality and population trends challenging. Populations are reduced across England compared with their natural levels. This decline is attributed to historical reductions in habitat quality due to pollution, physical modification and the introduction of barriers to migration. However, there is still likely to be sufficient habitat, of a suitable quality, for the species to persist in the long term. Progress has been made with reducing pollution levels in many rivers across England and there is increasing delivery of suitable fish passage solutions. This will benefit future river lamprey by allowing the recolonisation of areas within its natural range. Set in opposition to this positive outlook are the potential threats of climate change effects, the spread of non-native crayfish species and increases in energy production infrastructure.

For this reporting round, River Lamprey has an overall status of **Favourable** and an overall trend of **Stable**.

S1102, Allis Shad, *Alosa alosa*



© Jack Perks Wildlife Media

Allis shad are one of two shad species that live in England, the other species is twaite shad. The two species have a similar general appearance and biology. Allis shad are anadromous, living in coastal habitats and migrating to freshwater to spawn. They spawn between May and July when water temperatures reach 10 – 12 °C, in shallow areas of unconsolidated gravels. Spawning takes place at night with eggs being broadcast into the water and sinking to the riverbed. Juvenile fish then migrate seaward in the autumn. The marine habitat requirements are poorly understood; however, they are thought to remain in coastal areas at depths between 10-150m. Most allis shad only spawn once, although approximately 5% may spawn again. Genetic studies have indicated high levels of hybridization between twaite and allis shad in some populations.

Allis shad occur throughout Europe, however, the upper River Tamar estuary in England represents the only currently known spawning location in the UK, although there is growing evidence for

other spawning locations within southwest rivers. Allis shad do not have the swimming and jumping capabilities of salmonid fish and are more likely to be impacted by artificial barriers to migration. Where barriers are absent allis shad may migrate large distances upstream.

Allis shad are widely distributed and have complex habitat requirements as they require migratory passage, with relatively low flow velocities and turbulence. In addition, the habitat required during the marine/estuarine phase of their lifecycle is poorly understood. These factors, combined with sporadic survey effort make a detailed assessment of habitat quality trends challenging at the present time. However, progress has been made with reducing nutrient and organic pollution levels in many rivers across England which may have a beneficial effect on the quality of shad habitat.

There has been a significant improvement in accessibility / passage efficiency for the River Severn ([Unlocking the Severn Project](#)) and other potential allis shad sites in England but physical barriers to migration and physical habitat degradation are still significant pressures on shad populations. Future threats include energy production infrastructure associated with run of river hydropower, tidal barrages or lagoons and nuclear power.

For this reporting round, Allis shad has an overall status of **Unfavourable-inadequate** and an overall trend of **stable**.

S1103, Twaite Shad, *Alosa fallax*



© Jack Perks Wildlife Media

Twaite shad are one of two shad species in England, the other species being allis shad. The two species have a similar appearance and biology. Twaite shad are anadromous, living in coastal habitats and migrating to freshwater to spawn. They spawn between May and July when water temperatures reach 10 – 12 °C. Spawning takes place at night with eggs being broadcast into the water and sinking to the riverbed. Juvenile fish migrate seaward, with the majority of twaite shad leaving the estuary by the end of October. The marine habitat requirements are poorly understood; however, they are thought to remain in coastal areas at depths between 10-150m. Recent studies have demonstrated that while many individuals remain within estuarine and coastal areas some individuals can move large distances. Individual fish may return to spawn over multiple years. Genetic studies have indicated high levels of hybridisation between twaite and allis shad in some populations.

Twaite shad occur throughout the west coast of Europe and have been recorded from many coastal areas of England, however, the River Severn and its tributaries represent the major spawning locations in the UK. Twaite shad may migrate significant distances upstream to reach suitable spawning habitats.

Twaite shad are widely distributed and have complex habitat requirements as they are anadromous and require migratory passage, with relatively low flow velocities and turbulence. These factors, combined with sporadic survey effort, make a detailed assessment of habitat quality and population trends challenging. However, progress has been made with reducing pollution levels in many rivers across England which may have been beneficial for shad. There has been a significant improvement in accessibility within the River Severn (Unlocking the Severn Project) and other potential twaite shad sites in England, but physical barriers and habitat degradation are still significant pressures. In addition, the threats of increased energy production infrastructure, the spread of non-native species and climate change effects may present a risk to future twaite shad populations in England.

For this reporting round, Twaite Shad has an overall status of **Unfavourable-inadequate** and an overall trend of **Stable**.

S1106, Atlantic Salmon, *Salmo salar*



© Jack Perks Wildlife Media

The Atlantic salmon is a species of cool, swift-flowing, gravel-bed streams and rivers, with good water quality. They require a diversity of river habitats and an unimpeded river corridor for adult and smolt migrations. Spawning takes place in shallow, gravelly areas and eggs are deposited in a redd. Juveniles emerge and disperse within the river. After a period of 1-6 years the young salmon migrate downstream to the sea as 'smolts'. If they survive at sea, most salmon return to spawn in the river of their birth after 1-3 years. A small percentage of individuals do not return to their natal river and instead choose a different river to spawn.

Salmon is a widespread species in England. Records for Atlantic salmon are common throughout the assessment period and although survey effort is not consistent, it is relatively high across the species range when compared with other fish species. Due to improvements in water quality in certain river catchments and the removal of physical barriers to upstream migration, there has been a

gradual recolonisation of some areas from which salmon had previously been extirpated. However, the recent IUCN red list GB level assessment classified the species as Endangered in Britain due to its continuing population reduction. Annual stock assessments have continued to record declines within many salmon rivers throughout the assessment period.

Progress has been made with reducing physical barriers and pollution levels in many rivers across England, however, climate change effects such as increased water temperatures and extreme flow variations represent an increasing pressure on the species, particularly in the southern English range. The continued reduction in marine survival and poor juvenile recruitment present serious challenges to English salmon populations. Restoration measures to maximise the resilience of river ecosystems are becoming ever more important, however, the continued expansion of energy production infrastructure may hamper restoration actions at some sites. In addition, non-native species are likely to continue to spread and impact on salmon. The risk of introduction of the parasite *Gyrodactylus salaris*, which could have catastrophic consequences for English salmon populations, remains high.

For this reporting round, Atlantic salmon has an overall status of **Unfavourable-bad** and an overall trend of **deteriorating**.

S1109, Grayling, *Thymallus Thymallus*



© Jack Perks Wildlife Media

The grayling is a streamlined fish which can grow to 50cm long and over 1kg in weight. Grayling are characterised by their very large dorsal fin. They require clean, well oxygenated water, with a combination of shallow, fast-flowing areas dominated by pebble substrates during summer months and deeper, slower flowing water in winter. Grayling spawn early in the year when water temperatures reach approximately 4°C in February to April. Eggs are deposited in a redd excavated in clean gravels. Larvae and fry use slow flowing marginal areas and submerged macrophytes for refuge. Adult grayling feed on drifting prey items during daylight and rest in deeper, slower flowing areas at night. If high quality spawning habitat is not present within their river reach, they may undertake long upstream migrations. Although widespread within England, native populations are thought to be restricted to the Rivers Ouse, Trent, Hampshire Avon

and possibly the rivers Severn, Wye, Thames and Ribble. Their range has been artificially increased for angling purposes over possibly 200 years. Stocking has also been undertaken within their native range. The effect of such extensive stocking has made the natural distribution of grayling unclear.

Due to varying levels of survey effort, it is not possible to accurately assess population trends for this period. However, as the species has been consistently recorded across much of its range the population is considered at least stable. As improvements continue to be made regarding water quality and habitat restoration in England, the area of freshwater habitat suitable for grayling may be expected to increase. Improved understanding of genetic differentiation between grayling stocks has led to changes in stocking policy and current angling practices have reduced direct pressure on grayling populations. However, grayling is particularly intolerant of pollution and habitat connectivity must be maintained. The unknown threats of climate change effects, the spread of non-native crayfish and increases in energy production infrastructure may all increase pressure on future grayling populations.

For this reporting round, Grayling has an overall status of **Favourable** and an overall trend of **Stable**.

S6963, Spined Loach, *Cobitis taenia*



© Jack Perks Wildlife Media

The spined loach is a small fish, normally between 5 – 10 cm long. They spawn between April and June and eggs are shed among stones or vegetation. Once hatched, juveniles adopt a benthic existence in or on the substrate which continues throughout their life. Adults are adapted to tolerate the low oxygen conditions associated with burrowing and feeding within fine silty substrates. Although distributed across a number of river types, spined loach have specific habitat mosaic requirements with fine silty or sandy substrates for feeding and refuge and coarse substrates or vegetation for spawning and egg deposition.

Spined loach are widely distributed across Europe and Asia, however, in England they are only thought to occur naturally in five river catchments in the east of England: the Rivers Trent, Welland, Witham, Nene and Great Ouse. Genetic studies have demonstrated significant differences between the populations of spined loach in these

catchments. The historic distribution has remained relatively stable, however, water transfer schemes have led to minor range expansions into the River Stour catchment (Essex/Suffolk) and the River Ancholme (Lincolnshire).

Records for spined loach are common throughout the assessment period. Due to varying levels of survey effort across the spined loach range and a lack of specific spined loach surveys, it is not possible to accurately assess population trends for this period. However, as the species has been consistently recorded across much of its natural range the species is at least stable. However, access restrictions to river habitat due to pollution is thought to have been responsible for the historical reduction in spined loach within English rivers. Progress has been made with improving water quality in many English rivers, which may in turn benefit adult and juvenile survival. However, the rapid expansion of non-native signal crayfish may negatively impact on benthic fish species and climate change effects may lead to more extreme flow variations and the potential to exacerbate habitat pressures on future spined loach populations. In addition, new water supply infrastructure may lead to a mixing of previously isolated spined loach populations, with unpredictable genetic impacts.

For this reporting round, Spined Loach has an overall status of **Favourable** and an overall trend of **Stable**.

S6965, Bullhead, *Cottus gobio*



Bullhead fish in River Wye © Jack Perks
Wildlife Media

The bullhead is a small fish species which rarely exceeds 15cm in length and is the only freshwater representative of the Cottidae family found in UK freshwaters. Bullheads are adapted to a benthic lifestyle with a flattened body, eyes located high on the head, no swim bladder and broad pectoral fins with which to rest on the substrate. They seek refuge during daylight to avoid predation and become more active at night, feeding on invertebrates. They spawn from March to April, with the males excavating a nest beneath stones. The male defends this nest and eggs hatch after 20-30 days. The young will then drift within the current.

Bullheads are widely distributed and common in England. Its present distribution is thought to have been the result of a largely natural expansion of remnant populations which survived glacial periods. However, the relatively recent appearance of bullhead in areas of

Wales, Scotland and catchments such as the Yorkshire Esk indicate that anthropogenic range expansion is occurring. Its favoured habitat consists of interstitial spaces between cobbles and large gravel or woody debris, tree roots and leaf litter in both running waters and lake margins. They require high dissolved oxygen concentrations but may be relatively tolerant of nutrient enrichment, provided clean gravels are maintained.

Sporadic survey effort, a lack of specific surveys targeting bullhead and the widespread distribution of bullhead within England, make a detailed assessment of population trends challenging at the present time. However, the species is being regularly recorded across its natural range and progress has been made with reducing pollution levels in many rivers across England. This indicates that the population is at least stable. In opposition to this generally positive picture, physical barriers to movement, physical habitat degradation, the continued expansion of non-native crayfish species and the degraded state of many English lakes are still significant stressors for bullhead populations within England. In addition, the unknowns of climate change effects and increases in energy production infrastructure have the potential to increase pressure on future bullhead populations.

For this reporting round, Bullhead has an overall status of **Favourable** and an overall trend of **Stable**.

S2492, Vendace, *Coregonus albula*



© Jack Perks Wildlife Media

The vendace grows to approximately 25cm long and 150g in weight. It has a life span of 5-6 years and matures at 2-3 years of age. In the late autumn they spawn on coarse substrates, usually in water less than 5m deep, producing many small eggs. The eggs hatch in the spring and juveniles remain close to the lake shore. Later in its lifecycle the vendace moves to deeper water, feeding extensively on zooplankton. During daylight vendace form shoals and move to deeper areas of the lake, before returning to the surface at night.

In England vendace are found in Bassenthwaite Lake and Derwent Water. These lakes are connected by the River Derwent. Conservation efforts have been made to establish refuge populations using fish from both Derwent Water and Bassenthwaite Lake. This has included attempts to establish populations at Sprinkling Tarn in the Lake District, however, there is currently no evidence of vendace becoming established at the site. Progeny from fish collected from

Bassenthwaite Lake have successfully become established in Loch Skeen, Scotland. These translocation sites have not been used for this reporting round.

Derwent Water has consistently supported vendace, however, none were found in Bassenthwaite Lake from 2001-2013 despite specific searches. Since 2013 a small number of individuals have been recorded in Bassenthwaite Lake. Surveys in 2024 demonstrated that the abundance of vendace was higher than the baseline established by previous monitoring and there was no evidence to suggest that the species had a restricted distribution within its habitat, or of failed recruitment, therefore, the population may be considered stable. However, both Derwent Water and Bassenthwaite Lake populations are impacted by non-native and locally non-native species, including competition from fish species such as roach and ruffe, and the smothering of spawning areas by *Crassula helmsii*. In addition, vendace spawning areas within Bassenthwaite are impacted by excessive siltation. The Bassenthwaite vendace population is especially sensitive to climate change effects, particularly increases in water temperature. Warming effects are likely to be more severe in Bassenthwaite, when compared with Derwent Water, due to its shallower depth.

For this reporting round, Vendace has an overall status of **Unfavourable-inadequate** and an overall trend of **Stable**.

S6353, Whitefish / Schelly, *Coregonus lavaretus*



© Jack Perks Wildlife Media

The whitefish exists as seven native populations in the UK and is referred to as Schelly in England. It grows to approximately 35cm long and 0.5kg in weight. Schelly inhabits deep lakes with cool, well oxygenated water and shallow gravelly areas free from fine sediment for spawning. Spawning takes place from December to February in shallow gravelly areas of lake margins. The eggs sink and lodge in the gravel. The larvae emerge after 90-100 days and immediately move to deeper water where they will remain as adults, unless spawning.

Four of the seven whitefish sites are in England, all within the Cumbrian Lake District, and include the lakes of Brothers Water, Haweswater, Red Tarn and Ullswater. Due to the vulnerability of these whitefish populations, successful translocations have been made to Blea Water and Small Water in England. However, although these sites are located within a similar geographic area, these translocation sites are not known to

have been naturally colonised by schelly and have not been used for this reporting.

Haweswater is subject to rapid water level fluctuations due to use as a water supply reservoir. This is thought to be the primary reason for the decline in the lake's schelly population. Ullswater schelly populations may be impacted locally by lead ore washings from Greenside mine but phosphorus concentrations have remained relatively stable with high dissolved oxygen concentrations, indicating good water quality at the site. However, spawning areas may be increasingly covered by fine sediment and the introduction of roach, which are not native to Ullswater, may result in competition with resident schelly. In 2015 the schelly population within Brotherswater was in favourable condition, however, dissolved oxygen fluctuations at the site may be a threat to the population. At the current time the status of the schelly population within Red Tarn is unknown.

The future prospects for schelly are uncertain due to catchment restoration projects delivering positive benefits, set against the potential for impacts from non-native species, inputs of fine sediment (including contaminated sediments) and climate change effects.

For this reporting round, Schelly has an overall status of **Unfavourable-inadequate** and an overall trend of **Stable**.

S5085, Barbel, *Barbus barbus*



© Jack Perks Wildlife Media

The barbel is a streamlined fish which may reach 90cm in length and over 7kg in weight. It frequents fast flowing rivers and streams with well oxygenated water, clean gravels and abundant aquatic macrophyte growth. Males mature after approximately 3 years and females in 5 years, with a normal life expectancy of around 10 years but occasionally much longer in optimal conditions. Barbel spawn between June – July in shallow, gravel dominated riffles and may migrate large distances to find suitable spawning habitats if none are available locally.

The barbel is a widespread and common species in England. The species' natural distribution is limited to rivers in the east of England that now run into the North Sea and/or English Channel including the Yorkshire Ouse, Derwent, Wharfe, Aire, Swale, Don, Trent, Witham, Welland, Great Ouse, Thames and their associated tributaries. The northern and western expansion of barbel is limited by natural barriers and climatic conditions resulting in sub-optimal water temperatures. However, barbel now have a much wider distribution in river systems such as the

River Severn due to stocking for recreational angling purposes. Records related to artificial expansions of range due to stocking for recreational angling have been excluded from the assessment as they are outside the natural range of the species and solely a result of human intervention.

Due to varying levels of survey effort throughout the barbel range and the difficulties of carrying out detailed surveys within typical barbel habitat, it is not possible to accurately assess population trends for this period. However, the species is being regularly recorded across its natural range indicating that the population has remained viable over time and is recruiting successfully. As improvements continue to be made regarding water quality, migratory passage and the re-establishment of natural riverine processes in England, the area of freshwater habitat suitable for barbel may be expected to increase.

Although current barbel populations appear relatively stable, access restrictions to historical river habitat due to poor water quality and barriers to migration may still exclude barbel from some areas of English rivers within their natural range. In addition, the rapid expansion of the invasive, non-native signal crayfish population, together with climate change effects may have the potential to negatively impact barbel in the future.

For this reporting round, Barbel has an overall status of **Favourable** and an overall trend of **Stable**.

Vertebrate Species: Amphibians and Reptiles

S1166, Great Crested Newt, *Triturus cristatus*



© Tim Bernhard/ Natural England

Great crested newts are widely distributed throughout lowland Great Britain, where they use a wide range of habitats, including woodland and grassland. Aquatic habitats include ponds, ditches, and pools in sand dune slacks. The species typically prefers medium to large ponds, devoid of fish, with large amounts of aquatic vegetation.

In the last century great crested newts have declined across Europe, mainly as a result of pond loss and deterioration. Great crested newts are the largest of the UK's three native species growing up to 17cm in length. Breeding takes place from around March to June and each female lays around 200 eggs, individually laid and wrapped inside the leaves of pond plants.

The main pressures encountered by this species continue to be habitat loss and fragmentation, predominantly through land being converted for development and agricultural activities. Pond senescence is also an important cause of

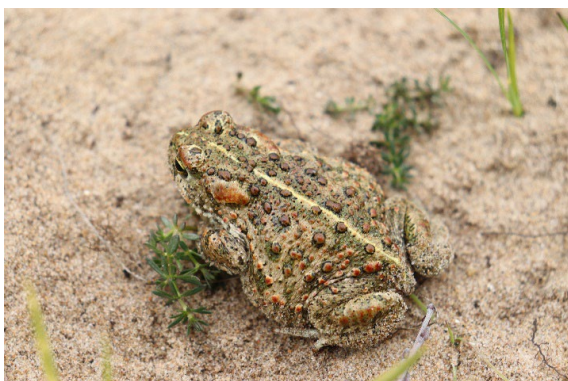
pond loss in the countryside where the absence of management allows hydrosere succession from aquatic towards terrestrial habitats to occur unimpeded. Deliberate or accidental introduction of fish also causes declines. Disease is an emerging threat; *Batrachochytrium salamandrivorans*, introduced to Europe via the trade in exotic pet newts, is of particular concern due to its virulence to urodeles (newts and salamanders), and of this pathogen is present in captive collections in the UK. Other pressures include pollution and agricultural runoff which can lead to eutrophication and accelerated pond senescence.

Climate change, with milder, wetter winters predicted increases the likelihood of mortality, and drier summers could increase the proportion of ponds desiccating too early to accommodate successful breeding.

Targeted habitat creation and ongoing management are required to maintain sites in suitable condition, particularly at scale. Conservation measures include pond management and restoration to provide optimal conditions, typically including removal of trees and/or scrub, de-silting and under certain circumstances, deepening the profiles of ponds.

The overall status for Great Crested Newt is **Unfavourable-inadequate** and overall trend is **stable**.

S6284, Natterjack Toad, *Epiladea calamita*



© Tim Bernhard/ Natural England

In Britain, the natterjack toad is almost exclusively confined to coastal sand dune systems, coastal grazing marshes and sandy heaths. They are often associated with ponds in sand dune slacks, which are shallow and warm and required for successful breeding. Natterjacks are found on about 60 sites in Britain including sand dunes along the Merseyside coast, the Cumbrian coast and on the Solway estuary. The species used to be quite common on the heaths of Surrey and Hampshire, and the coast of East Anglia, but only one or two colonies now remain. During the breeding season (April – July) they congregate around the edges of pools at night to spawn. The tadpoles develop quickly to reach metamorphosis before desiccation of the shallow breeding pools.

In England, the natterjack toad is a habitat specialist that is largely restricted to open, early successional habitats on coastal dune systems, upper salt marshes and lowland heathlands. The home range of the natterjack toad fluctuates throughout the year. During the breeding season, the toad tends to stay within a 400 – 600 m terrestrial buffer around the breeding pond. However, the

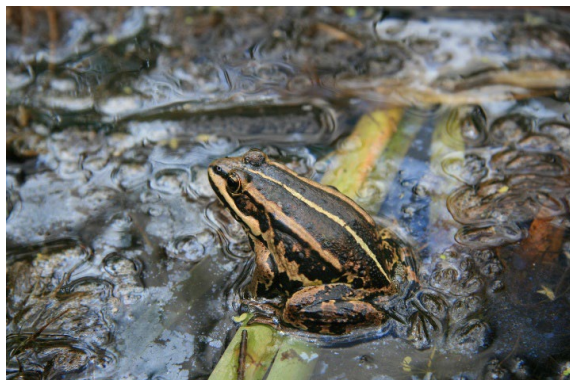
species is capable of travelling over 4km where suitable habitat persists. It is important to consider both the terrestrial and breeding pond habitats, as both are equally important in maintaining the long-term persistence of the species in an area. Both habitat types are required to be within close proximity as natterjacks will not cross extensive areas of unsuitable terrain to move between breeding and summer/winter habitats.

The current range is thought to be stable due in part to continued intensive management, with the potential to increase in the future through successful translocations. However, a combination of climate change, coastal squeeze and habitat degradation is likely to seriously threaten the English range of natterjack toads. Anthropogenic pressures have weakened the adaptive capacity of the species leaving it vulnerable to new pressures caused by climate change.

It is likely that without conservation action, including habitat creation and restoration, the current coastal range of the population will contract. This is particularly problematic as much of the population (89%) is found on the coast. Restoration and creation may need to focus on other areas within the historic range. Where areas of the historical range are no longer suitable due to a change in habitat quality or immovable constraints, new sites should be considered through feasibility studies.

The overall status for Natterjack Toad is **unfavourable inadequate** and trend is **stable**.

S6981, Pool frog, *Pelophylax lessonae*



© Tim Bernhard/ Natural England

The Northern clade pool frog became extinct in England in 1995 and has since been introduced at two sites in Norfolk. They are only found in very restricted areas of Scandinavia, Estonia and England. Pool Frogs were reintroduced from Sweden between 2005 and 2008 and a second reintroduction was carried out using stock from the first successfully established population. Although they vary in colour, they are predominantly brown with dark brown or black blotches over the back and a lighter, often yellow dorsal stripe. They are about 6cm in length, with females being slightly larger than males.

The species is the rarest amphibian in Britain, and site protection should be a significant delivery mechanism for its conservation within the considered natural range in East Anglia. The current populations are small and fragile and therefore highly vulnerable to stochastic events, for example extreme weather conditions such as drought, as seen most recently in 2022.

The reintroduction strategy developed by project partners includes an account of the conservation measures needed for the species. Measures to achieve that goal commenced with the reintroduction of two populations, along with efforts to ensure they persist, primarily habitat management, monitoring, legal protection, protected area mechanism improvements, communications, and research.

Natural England has funded a project to continue head-starting and to design and construct a bespoke captive breeding facility, based at Zoological Society of East Anglia, Banham Zoo (Norfolk). The aim is to retain a number of animals every year to found a captive breeding colony by Year 3 (2028), removing the requirement of wild sourcing over time. This will create a sustainable, long-term solution for producing large numbers of head started tadpoles in following years.

The breeding facility is supported by a long-term partnership agreement that will operate for a minimum of 10 years. It is anticipated that it will be able to support current and found new populations across the historical range in England within this time frame and beyond.

From the conservation assessment conducted, the overall conservation status for pool frog is **unfavourable-bad** and the overall trend is **improving**.

S1213, Common Frog, *Rana temporaria*



© Tim Bernhard/ Natural England

The Common Frog is found throughout England. Adult males grow to about 9cm in length and females up to 13cm in length. They vary in colour but are usually a shade of olive-green or brown. There are dark patches on the back with dark bands on the hind legs and a dark 'mask' behind the eye.

The Common Frog inhabits both lowland and upland habitats (up to c1000m altitude) and occupies a large range of different waterbodies and terrestrial habitats. The species breeds in a variety of waterbodies; it is typically found in smaller ponds, including garden ponds, but also spawns in the shallower reaches of larger ponds and lakes. Terrestrial habitats include woodland, hedgerows, rough grassland, moorland, pasture, arable and gardens.

The common frog population is considered stable, based on limited data and expert opinion. Although it is evident that populations have been lost from the wider countryside due to reduction in traditional farm ponds, these are generally considered to have been offset,

to some degree, by increasing use of garden ponds for breeding.

The creation and ongoing management of habitat, mainly ponds, is the main conservation measure required. The main mechanisms for improving habitat extent and quality are through reducing the impact of agriculture and forestry. Reductions in use of fertilisers and chemicals would improve habitat quality. Impacts from development could be further minimised and mitigated by improvements to land use planning, including Biodiversity Net Gain. Further control of invasive species and better awareness of their impacts would be valuable. Surveillance for disease outbreaks should be increased to identify the introduction of important new pathogens.

Habitat loss and fragmentation through development remain key issues. Ponds becoming unsuitable for breeding due to senescence, through silting up or becoming overshadowed by trees and scrub, the introduction of fish which prey on the eggs and tadpoles are all significant threats. Use of smaller breeding ponds than historically may prove to have interactions with warmer spring/summer temperatures with ponds drying out (or drying earlier than usual) and could reduce successful metamorphosis.

The overall status is **Unfavourable-inadequate**, and trend is overall **stable**.

S1261, Sand lizard, *Coronella austriaca*



© Tim Bernhard/ Natural England

Sand Lizard has a very restricted range and now only occurs naturally on protected heathland sites in Surrey, Dorset, Hampshire and the protected Merseyside dune systems. Reintroduction programmes have now re-established the species at many other sites in these counties and aimed to restore their historic range, to Kent, West Sussex, Devon and Cornwall.

They can reach up to 20cm in length and have brown varied patterns down the back and two dorsal stripes. Males have striking green flanks which are particularly bright during the breeding season in April and May.

The distribution of sand lizard populations is skewed towards a few localities, especially in Dorset, that support significant areas of suitable habitat. The distribution is steadily expanding due to re-introductions, plus habitat restoration and re-creation carried out by numerous organisations. This has allowed some natural dispersal.

The current area of critical habitat for sand lizards in England has been estimated as 2,535 ha with approximately 410 ha of frontal sand dune habitats and 2,125 ha of sandy, dry lowland heath. Extensive habitat restoration and creation has taken place, especially through large projects funded by Agri-environment schemes and the National Lottery and exposed many new areas of habitat. These occur either adjacent to existing sand lizard populations or on sites with re-introduction potential and may over time develop suitable structure for this species to thrive, given appropriate long-term habitat management.

There are active nature conservation measures at many sites, but often these do not incorporate the specific needs of this species, in relation to intensive heather management and provision of exposed sand for breeding. The main activities required are active and targeted creation, restoration and management of habitat, in particular breeding areas; management of predator threats and recreational disturbance; reducing the risk of fires. Reintroduction continues to be important; to date there have been 76 reintroductions, largely using captive bred stock, with a high rate of success. The role of genetic management is unclear, but it is feasible that this is warranted given the small size and isolation of many populations.

The overall conservation status of sand lizard is **unfavourable-inadequate**, but the trend shows the species **improving**.

S1283, Smooth snake, *Coronella austriaca*



© Tim Bernhard/ Natural England

The Smooth Snake is the rarest reptile in England and is only found on the heathlands of Dorset, Hampshire, Surrey and West Sussex. The name comes from their smooth and flat scales. Adults grow to a length of 6-7-cm, with females larger than males. They have a slender body and are usually grey or brown with two rows of dark spots down the back and a heart-shaped crown on the head. A dark line runs along the side of the head.

The distribution of smooth snake populations is strongly skewed towards a few localities, especially in Dorset and the New Forest, that support significant areas of suitable habitat. It is estimated that a minimum of 754 additional 1km squares in England have the potential to support smooth snakes in the future. The species may already be present in a significant number of these squares but yet to be recorded.

The current area of all known occupied habitats is estimated to be 13,747 ha in

England, although this figure will probably grow as monitoring efforts increase. The extensive habitat restoration and creation work that has taken place in recent years, especially large projects funded by agri-environment schemes and the National Lottery, have exposed many new areas of habitat. These occur either adjacent to existing smooth snake populations or on sites with re-introduction potential, and most have slowly developed a suitable structure for this species to thrive. In addition, extensive areas of potential habitat may still be present as secondary woodland, conifer plantations, dense bracken stands and farmland in southern England.

There are active nature conservation measures at many sites, but often these do not sufficiently incorporate the specific needs of smooth snake. The main measures required are active and targeted creation, restoration and management of habitat; management of predator threats and recreational disturbance; and reducing the risk of fires. Alongside habitat requirements, sites need to provide high abundance of prey (other reptile species and small mammals). Reintroduction continues to play an important role in the recovery of this species, increasing the range and population size.

The overall conservation status of smooth snake is **unfavourable-inadequate**, but the trend shows the species **improving**.

Vertebrate Species: Marine Mammal

S1351, Harbour porpoise, *Phocoena phocoena*



© Rebecca/ Natural England

Harbour porpoises are the smallest cetacean found in English waters. They inhabit all shallow shelf waters around England. Harbour porpoises are widespread over the North Sea with high numbers in the southern parts; they are also found in the Celtic and Irish seas and in the English Channel. They are usually seen alone or in small groups. Their lifespan is 8-13 years and females calve every year. They consume a variety of prey, including whiting and Atlantic herring but their preferred prey is sandeel. They have a high metabolic rate, therefore need to feed regularly.

Pressures include bycatch, entanglement and incidental killing due to fishing and hunting activities; impacts from marine renewable industry, including harmful underwater noise, collision and displacement; interspecific predation;

climate change impacts including, changes to prey distribution, abundance and quality, and disease.

Harbour porpoise is a qualifying feature of two Special Areas of Conservation (SAC) in England: The Southern North Sea SAC and the Bristol Channel Approaches SAC which spans English and Welsh waters. Disturbance from underwater noise is monitored within these SACs to ensure significant disturbance thresholds are not breached. Conservation efforts, occurring both within and outside of designated sites, include, reducing impacts from fishing industry such as bycatch monitoring and mitigation, managing renewable energy projects such as strategic planning and reducing harmful underwater noise.

At a UK level, the Overall assessment of Conservation Status for harbour porpoise is **Unfavourable-inadequate** and the Overall trend in Conservation Status is **Stable**. Within the North Sea Management Unit (covering the North Sea and eastern English Channel) the conservation status matches that of the UK level; however; for the Celtic and Irish Seas Management Unit, the Overall Conservation Status is Unfavourable-bad, determined by the population assessment of Unfavourable bad caused by a declining population in this region.

S1364, Grey Seal, *Halichoerus grypus*



© Allen Drewitt/ Natural England

Grey seals are the larger of the two resident seal species in English waters. They are widespread around English coasts, inhabiting both sandy and rocky shores where they breed, moult and rest. They forage in open sea, up to 100 m depth and frequently travel over 100 km between haul-out sites.

Grey seals are found in all coastal areas of England with highest numbers in the northeast and east coasts. Breeding colonies tend to be on remote, uninhabited islands and beaches or in caves. Grey seals spend most of their time at sea, foraging up to hundreds of kilometres from their haul-out with trips lasting from 1-30 days. Sandeels are their preferred prey, although they also take a

wide range of prey species, including gadoids and flatfish.

Pressures include: bycatch, entanglement and incidental killing due to fishing and hunting activities; impacts from marine renewable industry, including harmful underwater noise, collision and displacement; intraspecific predation; climate change impacts including, storm surges and change to prey.

Grey seals are a qualifying feature of four Special Areas of Conservation (SAC) in England which cover inshore areas. They are also features of several other Marine Protected Areas. Conservation efforts, occurring both within and outside of designated sites, include, reducing impacts from fishing industry such as bycatch monitoring and mitigation, managing renewable energy projects such as strategic planning and reducing harmful underwater noise.

The overall assessment of conservation status is determined as **favourable**. This is based on the short-term trends of stable range, increasing population and unknown status of habitat. In England, grey seal numbers are increasing, particularly in the northeast and southeast.

S1365, Common Seal, *Phoca vitulina*



© John Oates

Common seals are the smallest of the two resident seal species in English waters. The highest numbers are on south North Sea coast, where they haul-out on sheltered sandy shores and forage at sea close to their haul-out sites.

Common seals are found in high numbers in the Southeast, around the Wash and the Thames estuary; they are seen in low numbers in other coastal areas of England. They give birth in sheltered sandy coasts during June and July. They regularly haul-out on land with timings usually dictated by the tidal cycle and forage at sea. Their foraging ranges vary within regions and sites; some forage close to haul-outs with others traveling up to 100 km. They take a wide variety of

prey, varying seasonally and including sandeels, gadoids and octopus.

Pressures include bycatch, entanglement and incidental killing due to fishing and hunting activities; impacts from marine renewable industry, including harmful underwater noise, collision and displacement; interspecific predation; climate change impacts including, storm surges and change to prey.

Common seals are a qualifying feature of one Special Area of Conservation (SAC) in England, the Wash and North Norfolk Coast SAC. They are also features of four other Marine Protected Areas.

Conservation efforts, occurring both within and outside of designated sites, include, reducing impacts from fishing industry such as bycatch monitoring and mitigation, managing renewable energy projects such as strategic planning and reducing harmful underwater noise.

The Overall assessment of Conservation Status is **Unfavourable-inadequate** and the Overall trend in Conservation Status is **Stable**. In England, common seal numbers are decreasing and there are research projects currently exploring the cause of the decline.

Vertebrate Species: Terrestrial Mammal

S1303, Lesser horseshoe bat, *Rhinolophus hipposideros*



© Gareth Jones/www.bats.org.uk

England holds internationally important populations of lesser horseshoe bat due to past severe population declines and local extinctions across Europe. In England, the lesser horseshoe bat is restricted to south-west, southern and western England. The species appears to be expanding its range further north and east with relatively recent records in Cheshire and Lancashire. The highest population densities can be found in the Forest of Dean in Gloucestershire, and in south Devon.

Lesser horseshoe bats forage in broadleaved woodland (particularly wet woodland), along woodland edges, wooded riparian corridors, mature hedgerows, and semi/unimproved pasture (particularly wet grassland). Their broad wing morphology allows highly manoeuvrable flight within a cluttered environment (i.e. as found within woodland).

The main threats to the species continue to be loss of habitat and roosts. This

includes maternity, hibernation, transitional, mating and night roosts, all of which are vital to enable lesser horseshoe bats live in an area. This issue is compounded as lesser horseshoe bats have very specific roost requirements, requiring flight access and specific temperature/humidity requirements at different times of the year. Additional threats comprise increasing levels of urbanisation, light pollution, agricultural intensification, and infrastructure development, all of which are fragmenting habitat. There is also increasing evidence of roost competition between lesser and greater horseshoe bats.

Conservation measures include the maintenance and expansion of woodland (particularly wet broadleaved); and ensuring habitat permeability at landscape scale to enable effective commuting. This involves increasing the extent of linear landscape features (hedges and tree lines), dark corridor creation, strategic deployment of lighting and culverts underneath new road and rail lines. An increased understanding of emergence behaviour and interactions between lesser and greater horseshoe bats would be beneficial.

The overall conservation status assessment has been determined as **unfavourable-inadequate** as the range and population are smaller than their respective favourable reference values. However, the overall trend is **stable**.

S1304, Greater horseshoe bat, *Rhinolophus ferrumequinum*



© Daniel Whitby

The greater horseshoe bat is one of the largest, and most studied bats in England, where it is at the northern edge of its climate-limited range.

Its core range in England is in the south-west, mainly in lowland areas since viable populations can only exist where spring temperatures are favourable.

A diverse and well-connected range of habitats are needed for foraging; habitats of particular importance include pasture (ideally organic cattle) and ancient semi-natural woodland. Woodland rides, footpaths, hedges and treelines are used as commuting routes but artificially lit areas are avoided as the species is photophobic. They usually forage 3-4km from a roost but it may be up to 14km.

Greater horseshoe bats have high roost fidelity and are highly selective in the type of roosts they use throughout the year.

Historic habitat changes in England have increased reliance on human-created structures. Although there is some emigration, most females return to their natal roosts in spring to form maternity roosts. Adult males are predominantly solitary, using cooler roosts mostly underground (e.g. caves and mines). In winter bats hibernate underground.

Population pressures arise from climate change, agricultural change, and anthropogenic development. Additionally, roost availability is likely to limit species distribution, notably the requirement for caves and mines for hibernation.

Conservation measures focus on the maintenance and improvement of existing roosting, commuting and foraging habitat. The provision of organic cattle grazing near maternity roosts, heated maternity roosts, and underground hibernation site grilles have proven benefits. Agri-environment schemes that increase broad-leaved woodland cover and landscape connectivity and reduce pesticide use, increasing insect prey are beneficial.

The overall conservation status assessment for this species has been determined as **unfavourable bad** as the range and population are both below favourable reference values. However, the overall trend is **improving**.

S1308, Barbastelle, *Barbastella barbastellus*



© Ian Davidson-Watts

The Barbastelle bat is a rare species throughout its range, with relatively few known roosts. Records of the species are scattered. The British population is split between midlands-north and south population clusters across thirty counties. The first maternity colonies were only identified in 1997 and currently, 108 maternity roosting locations have been found in England.

The barbastelle roosts almost exclusively in tree holes with rare building exceptions, most notably Paston Great Barn NNR, Norfolk. Individual bats can be found in barns and other buildings though preferred roosts are in narrow crevices behind loose bark or in tree cavities or splits and so the species is closely associated with old growth woodland where veteran and dead trees are numerous. It is a specialist of broadleaved woodland and riparian margins, which are strongly selected for foraging, though unimproved grassland, field margins and hedgerows are also important.

Low population density and slow population growth make this species

vulnerable to loss and fragmentation of ancient deciduous woodland habitat; the loss, destruction and disturbance of roosts in trees, buildings and underground sites and reduction of insect prey due to habitat simplification, fertiliser and pesticide use and intensive grazing. The availability of dead and dying trees as roost sites and the lack of preferred foraging habitats, such as wetland, mature woodland and mature hedgerows, are major factors likely to affect the species status and its potential to increase current range and population size. It is a specialist moth feeder and is affected by agricultural operations that affect prey biomass.

Expansion or restoration of the species range would need to ensure availability of suitable woodland roosting habitat and landscape connectivity not impacted by artificial lighting. Whilst woodland restoration and creation is feasible it may take several decades of favourable management before significant increases in roosting opportunities develop. In the short term, ring barking and veteranisation of trees may help along with bat boxes designed for barbastelles to support existing colonies. Restoring and increasing wetland and woodland habitats that support high moth biomass would also be beneficial as well as a reduction in pesticide use.

The overall assessment of conservation status is **unfavourable bad** (whilst the trend is unknown). The current population is significantly below that which would be considered favourable as is the current range for the species.

S1309, Common pipistrelle, *Pipistrellus pipistrellus*



© Hugh Clark/www.bats.org.uk

Common pipistrelle is one of the most common and widespread species of bat in England. It is found in almost any habitat type.

Most maternity colonies are in buildings with forests of all types used for roosting and foraging. Other foraging areas include woodland edge, riparian habitats, hedges, footpaths, forest roads, pastures and gardens. Linear features are important for orientation whilst foraging or commuting. In summer, they roost mainly in crevices in buildings, especially between tiles and roofing felt or behind boards on gables. Individuals and maternity colonies use tree holes, wood crevices and bird or bat boxes as roosts.

Agricultural and forestry practices that remove or simplify these habitats or affect biomass of insect prey may negatively affect populations. Pipistrelles are vulnerable to wind turbine strikes and road collisions, but it is unclear whether the scale of casualties is sufficient to impact on local populations. Changes to building regulations and efforts to make

buildings more energy-efficient have tended to reduce their accessibility and thermal suitability for bats.

Climate change could impact this species through desynchronisation of biological and ecological processes. Many species rely on precise seasonal cues for hibernation and foraging, and disruptions in food availability, such as shifts in insect emergence, could negatively impact their survival. Despite the uncertainty, it is important to consider this factor when assessing the broader impacts of climate change on bats.

Legal and administrative measures continue to be required. Although roosts are strictly protected by legislation licenses are issued every year permitting exclusion, destruction and damage. Adequate mitigation/ compensation approaches must be delivered to maintain a favourable conservation status. Road design, construction, and operation should consider likely impacts on bats, for example, by providing safe crossing structures, avoiding loss and severance of bat habitat and considering the impacts of lighting.

Whilst the overall conservation status remains **favourable** and trend **stable**, the population parameter is unknown. It is believed the population has suffered a historical decline, the scale of which has not been estimated accurately. Further research is needed to set a Favourable Reference Population with confidence.

S1312, Noctule bat, *Nyctalus noctula*



© Martin Celuch/www.bats.org.uk

The noctule is one of the largest English bat species. It has long narrow wings enabling fast flight at the expense of manoeuvrability. It is one of the first bat species to emerge in an evening, often before sunset.

This species is found throughout England. In common with breeding populations across Europe, it is possible that there are both resident and migratory bats within all English breeding populations.

Noctules frequently forage above or adjacent to water bodies, pastures and grasslands, and urban habitats where artificial light is avoided when commuting but not necessarily when foraging. High activity has also been recorded close to forest edges. Noctules roost preferentially

in tree holes in old woodlands, often created by woodpeckers.

As for all English bat species, it is likely to be impacted by climate change, both directly (e.g. range shift), or indirectly (e.g. food availability, earlier reproduction, juvenile survival). Negative impacts of climate change could be compounded by negative impacts of intense agriculture (including grassland improvement and land drainage). Wind turbines pose an additional threat, and may be a significant cause of mortality, as indicated by the regional decline of this species in parts of Europe where the wind energy industry is expanding. Noctules are also vulnerable to changes in forestry policy that reduce the number of available roosts.

While effective mitigation measures to protect bats at wind turbines are available, it is necessary to improve implementation and impact assessment methods during the planning and permitting stages of wind turbine construction in or close to noctule habitat. Another action concerns the careful management of impacts on known roosts (including hibernacula), and the establishment of new ones (especially within managed forests with a low tree hole density).

The overall conservation status assessment for this species has been determined as **unfavourable-inadequate**. The overall trend is **stable**.

S1314, Daubenton's bat, *Myotis daubentonii*



© Hugh Clark/www.bats.org.uk

Daubenton's bat is one of the most common and widespread bats in England. It has a strong association with riparian habitat, with a distinctive flight just a few centimetres above water. In summer, roosts (which can be in buildings or trees) are often located close to riparian habitat.

It has a preference for large waterways with abundant woodland within a 1km radius. The size of the home range is dependent on habitat quality and abundance of prey insects. Within the home range there is a core sustenance zone, which is the area surrounding a communal bat roost where habitat availability and quality will have a significant influence on the resilience and conservation status of the colony. In Daubenton's bats this has been estimated as a 2 km radius.

Daubenton's bats are regional migrants, covering distances of 10-100 km between summer and winter sites, showing strong fidelity to both. In the autumn and winter,

one location can be used for both swarming (mating) and hibernation. Cool humid underground sites are required for hibernation, whereas large areas of calm still water are required during summer.

As for all English bat species, it is likely that Daubenton's bat will be impacted by climate change, both directly (e.g. range shift), or indirectly (e.g. food availability, earlier reproduction, juvenile survival). Food availability depends mostly on aquatic insects, which may be impacted by reduced water quality. Progressive landscape fragmentation (e.g. road/rail mortality, agricultural intensification) constitutes an additional pressure, as does human activity (e.g. light, noise). Daubenton's bats are also vulnerable to changes in forestry policy that reduce both landscape connectivity and the number of available roosts.

Long-term monitoring is needed to understand the impact of environmental pollution, climate change and human development and to design mitigation approaches. For example, to minimise fragmentation by roads, even small culverts can be used.

Whilst the overall conservation status remains **favourable** and trend **stable**, it is believed the population has suffered a historical decline, the scale of which has not been estimated accurately. Further research is needed to set a Favourable Reference Population with confidence.

S1317, *Nathusius' pipistrelle*, *Pipistrellus nathusii*



© Sally-Ann Hurry

The species was first recorded in the British Isles in 1940. In 2014 the National Nathusius' Pipistrelle Project (NNPP) was established by the Bat Conservation Trust with the aim of determining the resident and breeding status in Britain as the species is migratory across Europe. It is the only British species with clear evidence of considerable movement between GB and continental Europe. Recent capture and ringing effort show movement between SW England and the Netherlands, SE England and Latvia, Estonia, Lithuania and Russia and NE England and Poland. Few maternity roosts have been identified in England.

The NNPP increased the number of records through trapping and ringing studies with the aid of acoustic lures. Whilst there seems to be a genuine increase in the number of Nathusius pipistrelle bats recorded in England it is difficult to assess the scale of the trend without further analysis of the data.

Most records come from within a few km of large freshwater lakes. The species routinely forages in deciduous mixed woodlands, damp lowland forests, riparian forests but also coniferous forests, park landscapes and often over water bodies. Roosting sites in Europe are primarily within trees, though they are known to use bat and bird boxes and can be found within residential buildings. This behaviour occurs in England as well.

Agricultural and forestry practices that remove or simplify deciduous mixed woodlands, damp lowland forests, riparian forests, coniferous forests, park landscapes and water bodies or affect the biomass of insect prey could negatively affect populations. The species is known to be at high risk of collision with wind turbines based on evidence elsewhere in Europe from the growing number of records collected in high-risk areas and increasing knowledge of migratory routes.

Measures include ensuring effective management of suitable woodland and freshwater habitat and research to understand the threat posed by offshore wind infrastructure to migrating bats that is expected to be published soon.

The overall conservation assessment is **favourable** and overall trend **stable** as both the range and population are increasing.

S1320, Brandt's bat, *Myotis brandtii*



© Hugh Clark/www.bats.org.uk

Brandt's bat is a small dark grey or light brown bat with shaggy fur on its back and light grey in colour on its belly. Brandt's bat was only recognised as separate from Whiskered Bat in the UK in 1970; whilst the similar Alcaethoe bat, first described in 2001 was identified in Britain in 2010. It remains likely that the three species are still frequently confused.

Brandts bat is widely distributed in England, though probably less common in eastern England.

Brandt's bats would have originally roosted in loose bark and large tree holes but can now be found roosting in all kinds of buildings. Highly manoeuvrable in

flight, they are well adapted to foraging in cluttered habitat such as woodland, forest edges and clearings, especially wetland areas. Maternity colonies are more commonly found in buildings, in wall crevices or lofts. Winter roosts are commonly in disused mines and caves. The species also swarms at underground sites from August – October.

Changes in land use and management techniques appear to be the main pressures impacting Brandt's bat which is particularly vulnerable to habitat fragmentation.

Environmental land management schemes in the agricultural and forestry sectors are now widely used to ensure habitat in the vicinity of roosts is well-managed and provide appropriate insect food at the correct time of year.

The overall assessment of conservation status is determined as **unfavourable inadequate** and trend **unknown**, primarily due to the relative lack of information about this species and its future prospects.

S1322, Natterer's bat, *Myotis nattereri*



© Hugh Clark/www.bats.org.uk

Natterer's bat is a widespread species which has broad wings, enabling it to fly slowly and prey on a wide variety of insects. The species is associated with trees, particularly broadleaved woodland, but also tree-lined river corridors, parkland and hedgerows adjacent to pasture. They have also been observed along roadsides and using mature pine plantations.

During the spring, most foraging activity is in open habitats. However, in summer, foraging activity moves to woodlands, including dense coniferous forests. Maternity roosts are located in trees, bat boxes and buildings, and tend to be located close to woodland habitats. Underground sites, including tunnels, caves and icehouses are used for hibernation and the extent of use of trees is unclear.

Key pressures to the population include, the loss of viable roosts during barn and other building conversions; urban development encroaching on traditional roost sites; negative impact of transport

infrastructure; artificial lighting potentially impacting on commuting routes and prey availability; and changes in the agricultural landscape, including the impact of avermectins on dung flora.

Climate change could impact this species through the desynchronisation of biological and ecological processes. Many species rely on precise seasonal cues for hibernation and foraging, and disruptions in food availability, such as shifts in insect emergence, could negatively impact their survival. Therefore, despite the uncertainty, it is important to consider this factor when assessing the broader impacts of climate change on bats.

Legal and administrative measures continue to be required to ensure that the protection provided by the legislation is effective. If roosts are to be destroyed, damaged or lost due to development, adequate mitigation/compensation methods must be put in place to maintain the favourable conservation status of the species. Road design construction and operation need to consider the likely impact on bats, for example, by providing safe crossing structures, avoiding loss and severance of bat habitat and mitigating impacts of lighting.

The population is considered to be stable, as is the range and the available habitat. The overall conservation assessment of this species is **favourable** and overall trend is **stable**.

S1323, Bechstein's Bat, *Myotis bechsteinii*



© Patrick Wright

The Bechstein's bat is a rare, long-lived woodland specialist, that shows strong loyalty to its place of birth. Individuals may live for more than 20 years. Its core range is in Southern England (Gloucestershire to Sussex), with recent records further north.

They are strongly associated with broadleaved woodland, particularly semi-natural ancient woodland with dense understorey, they also forage along large hedgerows and wooded riparian corridors. Maternity roosts are most commonly in woodpecker holes, rot holes and other crevices. Over the summer, maternity colonies frequently split into subgroups and re-form, occupying different roosts. They tend to switch roosts every few days and can use up to 60 tree roosts over a breeding season. In some woodlands particularly those with few natural tree holes, colonies can make extensive use of bat boxes. Only a single building roost is known in England.

Specialist habitat requirements, low population density and slow population growth are likely to have made this species particularly vulnerable to factors such as loss and fragmentation of ancient deciduous woodland habitat; loss, destruction and disturbance of roosts in trees and underground sites and the reduction of insect prey due to habitat simplification and factors such as fertiliser and pesticide use. Loss of native broadleaf trees through new pathogens could have a serious long-term impact.

Action needs to focus on maintaining existing habitat. Whilst ancient woodland cannot be created at speed, other woodland types also provide suitable conditions and new planting (especially when expanding current habitat) may eventually be colonised. These measures will provide additional foraging opportunities for colonies and create a larger network of connected habitat favouring gene flow (considering the species' low dispersal abilities), making populations more resilient. Agri-environment schemes that reduce pesticide and fertiliser use and increase insect prey are beneficial.

The overall assessment is **unfavourable bad** as the population estimate is less than the favourable reference population. Trend is **unknown**, a two-year national survey is currently underway to more precisely understand the current population for the species.

S1326, Brown long-eared bat, *Plecotus auritus*



© Hugh Clark/www.bats.org.uk

The brown long-eared bat is one of the most common and widespread bats in England, although difficult to detect due to quiet echolocation calls. It is a woodland specialist, with maternity colonies that are usually quite small (typically between 10-20 bats).

This species can be found throughout England wherever there is broadleaved or mixed woodland. They do not travel long distances from their roosts to forage, spending most of their time within 0.5 km. Commuting routes are strongly influenced by protective vegetation cover (e.g. woodland edges, hedgerows and tree lines). Longer distances (over 30 km) can be travelled at the end of summer and early autumn to reach swarming sites, which can be used for both mating and hibernation.

Brown long-eared bats forage at a variety of heights within woodland, including within the canopy. They are adapted to foraging within dense habitats, and make extensive use of sight, passive listening, and short duration echolocation calls. Maternity roosts can be present within both tree cavities and human-made structures.

Population pressures include agricultural intensification (e.g. increased chemical use, increasing field sizes, removal of hedgerows/tree-lines) and urban development (e.g. light and noise). A tendency to fly slowly and close to the ground over roads increases the risk of road traffic mortality.

The main actions needed to achieve effective conservation of this species include: appropriate forest management to save roost trees and provide connectivity between forest patches; rigorous protection of building roosts; mitigation of light pollution and roadkill; reduction in the use of pesticides; and control of free-ranging cats.

The overall conservation status assessment for this species has been determined as **unknown** with a **stable** trend. It is considered that the population is likely to have suffered historical decline, but the scale of decline cannot be accurately estimated without further research and it is not possible to set a Favourable Reference Population with confidence.

S1327, Serotine bat, *Eptesicus serotinus*



© Hugh Clark/www.bats.org.uk

The serotine is a large bat that forages in open habitats, mainly through aerial hawking but also by gleaning from the ground or foliage. In England, the distribution of serotine bats is mostly restricted to the south of England, with occasional records in the midlands, Welsh Borders and Merseyside.

Serotines use a wide variety of habitats including grazed pastures and meadows, woodlands, shrub, urban parks, golf courses and open water. They do not show a strong preference for linear elements (e.g. treelines) on a small scale but select foraging areas with a high density of these features at a landscape scale.

Serotine has been identified as one of the species particularly vulnerable to mortality at wind turbines in the UK. However, the number of casualties and the extent of the impact is unclear owing to limitations in both data collection and coverage. This lack of reliable species data is also

the biggest constraint to population expansion/restoration. As for all English bat species, it is likely that serotine will be impacted by climate change, both directly (e.g. range shift), or indirectly (e.g. food availability, earlier reproduction, juvenile survival). Progressive landscape fragmentation (e.g. road/rail mortality, agricultural intensification) constitutes an additional pressure, as does human development (e.g. light, noise).

Further investigation is required to identify methods to reduce/prevent adverse effects of wind turbines. Increased awareness of serotine roosting, commuting and foraging behaviour would help with roost protection, management of light/noise, and protection from predators. The presence of organically managed cattle herds in the vicinity of maternity colonies would likely benefit this species. Knowledge of its winter ecology is lacking, and more detailed studies would help in identifying and subsequently protecting important hibernation sites, in addition to informing monitoring protocols and landscape management policies. Other research needs include understanding of mating strategy and landscape connectivity requirements.

The overall conservation status assessment has been determined as **unfavourable-inadequate** due to the population falling into this category. The overall trend is **unknown**. Habitat for the species is deemed to be unfavourable inadequate. However, range has been determined as favourable.

S1329, Grey long-eared bat, *Plecotus austriacus*



© Hugh Clark/www.bats.org.uk

The grey long-eared bat is a cryptic species, similar in morphology and flight pattern to the brown long-eared bat. Very few colonies are known, almost all in lowland Southern England, close to the coast. There are thought to be about 10 maternity colonies in England, all in the loft spaces of residential buildings.

The recorded distribution of the species is along the south coast of England, north Devon and north Somerset. Ecological niche modelling suggests that the distribution is mainly limited by low winter temperatures, high summer rainfall, the availability of grasslands and suitable environmental conditions that do not extend much beyond the current distribution. However, future climate change may alter this situation.

It is primarily an open or edge habitat forager, preferring semi-improved lowland grasslands including meadows and marshes, woody riparian vegetation and broadleaved woodland. Outside of these preferred habitats within the colony range they will use arable fields, conifer woods

and open water to a lesser extent. When foraging in the agricultural landscape, they mainly use field margins, hedgerows and scattered trees. This habitat niche occupancy is related to the species being a specialist moth feeder.

Agricultural practices that remove or simplify semi-improved (unmanaged) lowland grasslands (including meadows and marshes), woody riparian vegetation and broadleaved woodland habitats or affect the biomass of insect prey could negatively affect populations. Changes to building regulations and efforts to make buildings more energy-efficient may have reduced their accessibility and thermal suitability for bats.

Legal and administrative measures continue to be required to ensure that the protection provided by the legislation is effective. The Heritage Lottery Funded, 'Back from the Brink' Project, which ran from 2017-2021 aimed to ensure that four of the most vulnerable maternity roosts had sufficiently high-quality foraging habitats surrounding them to support the colonies and to facilitate connectivity between roosts to prevent isolated colonies declining due to inbreeding.

The overall assessment for this species has been determined as **unfavourable bad** due to the current estimated population size being more than 25% below the favourable reference population. Overall trend is **unknown**.

S1330, Whiskered bat, *Myotis mystacinus*



© Hugh Clark/www.bats.org.uk

The whiskered bat is a cryptic species that is often confused with Brandt's bats and Alcatraz bats, despite whiskered and Brandt's bat being only distantly related. Brandt's bat was only recognised as a separate species to Whiskered bat in the UK in 1970; and Alcatraz bat, first described in 2001 was only identified in Britain in 2010. It remains likely that the three species are still frequently confused. Whiskered bats are widely distributed in England, although less common in eastern England.

Suitable foraging habitat includes farm woodlands, hedgerows and wetlands and semi-improved and improved grassland habitats. Maternity roosts are usually

located in buildings, though they are sometimes found in trees and bat boxes. Whiskered bats frequently visit swarming sites such as cave entrances in the autumn. Hibernation sites include underground tunnels, icehouses and caves.

Changes in building practices to improve energy efficiency mean that new buildings may offer fewer roosting opportunities. Agricultural and forestry practices that remove, modify or fragment foraging habitats, or affect the biomass of suitable insect prey could negatively affect populations.

Environmental land management schemes in the agricultural and forestry sectors are now widely used to ensure habitat in the vicinity of roosts is well-managed and provide appropriate insect food at the correct time of year.

The overall assessment of conservation status is determined as **unfavourable-inadequate**, primarily due to the lack of information known about this species and lack of knowledge of future prospects. Overall trend is **unknown**.

S1331, Leisler's bat, *Nyctalus leisleri*



© Hugh Clark/www.bats.org.uk

Leisler's bats measure around 5-7cm in length with golden tipped or reddish-brown fur. Very few roosts are known, and the species is under-recorded in Britain. Leisler's bat is considered migratory in Europe but thought to undergo only local dispersal within the UK. It is widely distributed through central and southern England, rarer in the north and the south-west.

Leisler's bats forage in woodland, pasture and riparian habitats and along woodland margins, even close to major roads and around streetlights. It has been seen foraging over beaches and sand dunes and shows no clear habitat associations. Maternity roosts are often located in tree crevices and holes, sometimes in old buildings. Leisler's have occasionally

been found in caves, tunnels and buildings during the hibernation period, but tree roosts are likely to be utilised the most.

Leisler's bat is vulnerable to loss of roost opportunities in dead, dying or damaged trees and through the demolition or alteration of buildings or changes to construction methods. Pressures that affect the biomass of flying insects, such as the widespread use of pesticides, could also affect this species. They have been shown to follow linear landscape features when emerging from the roost, therefore the loss of these features might be expected to impact on the species. Leisler's bats have a high risk of collision with wind turbines and are known to be killed by wind turbines in Europe.

Environmental land management schemes in the agricultural and forestry sectors are now widely used to ensure foraging habitats in the vicinity of roosts are well-managed and provide appropriate insect food at the correct time of year.

The overall assessment for Leisler's bat is **unfavourable-bad** as the population is significantly less than the favourable reference population and this is compounded by a lack of information about the English population. The overall trend is **stable**.

S5003, Alcathoe Bat, *Myotis alcathoe*



A Flying Alcathoe bat © Daniel Whitby

The Alcathoe bat (*Myotis alcathoe*) is one of the smallest and most elusive bat species in Europe. It was only recognised as a distinct species in 2001 and later confirmed in England in 2010, making it a relatively recent discovery for British fauna. Their diet consists mainly of small flying insects like mosquitoes and moths of a body length less than 12mm. Due to their small size and secretive nature, they are difficult to monitor, and much about their behaviour remains unclear.

The species was first identified in North Yorkshire and Sussex, and since then, a few scattered records have confirmed its presence in southern England. Its true distribution may be wider, but it is likely

under-recorded due to its similarity to other *Myotis* bats and the challenges of acoustic identification.

Alcathoe bats favour ancient woodland habitats, particularly areas near clean, slow-flowing streams or rivers, where insect prey is abundant. They are forest specialists, often roosting in tree cavities, crevices, and sometimes old buildings. Caves are visited during the swarming period which is how the species was first discovered in this country and are likely to be used for hibernation alongside trees.

Conservation concerns centre around habitat loss, especially the degradation of ancient woodlands and water quality in riparian environments. Forestry operations that prevent the maintenance or development of this resource are likely to have an adverse effect on this species. Activities which may affect future occupation of caves i.e. Mining or recreational activities may have an adverse effect on the population.

The overall assessment (both status and trend) for Alcathoe bat is '**unknown**' due to the lack of information known about this species.

S5009, Soprano pipistrelle, *Pipistrellus pygmaeus*



© Daniel Hargreaves/www.bats.org.uk

Soprano pipistrelle is one of the most common and widespread species of bat in England. It is widely distributed with gaps in distribution probably reflecting an absence of survey data.

Soprano pipistrelle usually roosts in buildings and can be found in a wide variety of constructions ranging from ancient churches to barns, warehouses, amenity buildings, and modern bungalows. Individuals and maternity colonies also use tree holes, wood crevices, and bird or bat boxes as roosts. Roosts are often found near waterways.

The species forages across a mosaic of habitat types, making particular use of riparian habitat. Agricultural and forestry practices that remove or simplify the habitats used or affect the biomass of insect prey could negatively affect populations.

Soprano pipistrelle is vulnerable to wind turbine strikes and road collisions, although it is unclear whether the scale of casualties is sufficient to impact on local populations. Changes to building regulations and efforts to make buildings

more energy-efficient have tended to reduce their accessibility and thermal suitability for bats.

Climate change could also impact on this species through the desynchronisation of biological and ecological processes. Many bats rely on precise seasonal cues for hibernation and foraging, and disruptions in food availability, such as shifts in insect emergence, could negatively impact their survival. Therefore, despite the uncertainty, it is important to consider this factor when assessing the broader impacts of climate change on bats.

Legal and administrative measures continue to be required to ensure that the protection provided by legislation is effective. Although roosts are strictly protected a number of licences are issued every year permitting exclusion, destruction and damage. Adequate mitigation/compensation methods are needed to maintain the favourable conservation status of the species. Road design construction and operation should consider impacts on bats, for example, by providing safe crossing structures, avoiding loss and severance of bat habitat and considering impact of lighting.

Whilst the overall conservation status remains **favourable** and trend **stable**, it is believed the population has suffered a historical decline, the scale of which has not been estimated accurately. Further research is needed to set a Favourable Reference Population with confidence.

S1334, Mountain hare, *Lepus timidus*



© Natural England

Mountain hares are found only within the Peak District National Park and were reintroduced to the park by landowners with sporting interests in the 1870s. From the 1970s studies describe a small and stable population. Mountain hare densities are highest in areas of restored blanket bog.

Habitat management practices which provide a mosaic of habitats for shelter and foraging within upland heather moorland where plant communities with high proportions of grasses and pioneer heather communities are preferred. Upland pasture and woodland can provide additional resources. The restored blanket bog habitat within the Peak District where the numbers of hares is highest is offering this good quality habitat.

Pressures include habitat fragmentation, land use change, roadkill, overharvesting and illegal persecution, climate change,

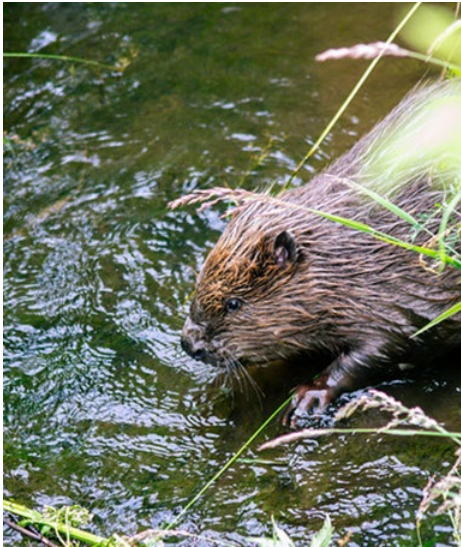
genetics, disease and population cyclicity. Mountain hare populations are cyclical and this can naturally lead to reductions in the population by up to 80%. This cyclicity is often associated with large parasite loads. However, disease has not been evidenced as the cause of continued decline in the population for this reporting period. Periodic reports of illegal persecution incidents continue to be documented.

Climate change is expected to increase vulnerability to predation and reduce the distribution of mountain hare populations. There is further concern that the hare population in the Peak District is of low genetic diversity as the small founder population came from Scotland and Scottish mountain hares have the lowest genetic diversity of all hare populations in Europe. Hybridisation and competitive exclusion with brown hares may become a pressure where ranges overlap. Roadkill of mountain hares was reportedly high in the period 2017-2022.

The continuing implementation of moorland restoration schemes should continue and the illegal harvesting of mountain hares should be prevented.

The overall assessment of conservation status and trend has been determined as **unfavourable-bad** and **deteriorating** due to continued decline in range and population.

S1337, Beaver, Caster Fiber



© Natural England/Maria Thompson

Eurasian Beaver gained legal protection in England in 2022 when it was listed on schedule 2 of The Conservation of Habitats and Species Regulations 2017. This round is the first time it has been included in England's reporting. Beavers are semi-aquatic, and their distribution is closely tied to watercourses and waterbodies. They were driven to extinction in England by the 16th century. Interest in their reintroduction began to grow in the 1990s, including for their potential to deliver conservation benefits. This led to the importation of beavers from Europe, and they were initially placed in fenced, naturalistic enclosures.

Prior to 2025, wild beaver populations in England largely stemmed from unauthorised releases or escapes from these enclosures, resulting in little to no natural population growth. Sightings of beavers were typically from localised areas such as parts of Devon and Kent.

Whilst habitat is unlikely to be a barrier to population expansion as Beavers can create and modify suitable environments, local factors can restrict access to water and vegetation making some areas unsuitable. They may also be subject to a range of other pressures including transport corridors, illegal persecution and exposure to pollution from various land and water sources.

Although their overall status is currently recorded as **unfavourable–bad** and the trend is **unknown**, this is in part a reflection of uncertainty around the status and prospects of relatively small and recently established free ranging populations. Recent announcements by Defra, permitting the release of beavers into the wild under license could indicate a positive shift in their conservation outlook.

S1341, Common dormouse, *Muscardinus avellanarius*



© Kentish Plumber/Flickr

The common or hazel dormouse (*Muscardinus avellanarius*) is a small mammal with golden-brown fur and a distinctive, furry tail. The species has undergone a long and continuing decline in Britain, with the National Dormouse Monitoring Programme showing that the population decline by 70% between 2000 and 2022.

Within England, this species can mainly be found in the southern counties. A remnant population remains in Cumbria, and the reintroduction programme has returned this species to other counties in the midlands and further north.

Common dormice are primarily found in broadleaved woodland and have traditionally been associated with early successional woodland, as well as coppice. However, more recent studies have shown that the species also occurs in other habitats, such as scrub, coniferous plantations, and hedges. Studies have shown that common dormice use a wide range of food sources, including plant foods such as

flowers, buds, seeds, and fruits, as well as invertebrates.

High species diversity and a dense shrub layer are both considered important in maintaining this species and there is increasing evidence that rising deer populations are having a negative impact on the structure of woodland habitats. A lack of appropriate woodland management, the removal of hedgerows, and a changing climate are also considered to be important pressures on dormouse populations. Continued development of infrastructure leads to habitat loss and fragmentation of the landscape.

Appropriate habitat management, improved connectivity across the landscape, and legal protection should be continued, along with provision of advice to landowners and managers, and consideration of the impacts of infrastructure. Proactive and targeted reintroduction and reinforcement of populations remain key elements of the long-term conservation strategy. The National Dormouse Monitoring Programme continues to provide valuable information about the status of this species, along with continued research to further understand the species.

The overall assessment of conservation status is determined as **unfavourable bad**. Whilst the range currently appears to be stable, the population continues to decline and key pressures, particularly around habitat availability, are high.

S1355, Otter, *Lutra lutra*



A Leaping Otter © Charlie Marshall/Flickr

Eurasian otters are large mustelids well-suited to life on land and in water. By the 1950s, otters were on the brink of extinction in Britain due to hunting, habitat destruction and chemicals in watercourses. In the 1980s, otters were given legal protection, water quality was improved, and a series of reintroductions allowed numbers to increase.

The otter can be found in freshwater habitats throughout the country and is capable of long overland journeys between watersheds. It can also be found in coastal areas, particularly along rocky coasts where there is high food supply, but fresh water is required for cleaning salt from its fur.

Pressures affecting this species include transport infrastructure, biocides, by-catch and incidental capture, pollution, and changes in hydraulic conditions. The species has previously suffered a huge population crash due to the use of toxic pesticides and this could remain a serious threat, although more rigorous control of pesticides, including the banning of substances, is now in place. Road deaths and accidental capture (e.g. in fishing equipment) continue to cause mortality.

Conservation measures for this species include continued legal protection; habitat protection and management; the regulation and/or banning of pesticides and other pollutants; as well as the promotion of better consideration by Highways Agency and local planning authorities when considering development or road proposals.

Based on the current trends and current (and potential future) pressures and threats, the future prospects for this species have been assessed as stable for habitat, with continuing increases for range and population. The overall conservation status is determined as **favourable**, and the trend is **improving**.

S1357, Pine marten, *Martes martes*



© Robert Cruickshanks

Pine marten is a medium sized mustelid and was once found throughout mainland Britain. Severe declines in numbers and distribution were due to predator control combined with the effects of loss and fragmentation of woodland habitat.

By the beginning of the 20th century, pine marten was extinct in almost all southern Britain with a small remnant population remaining in northern England. Other scattered and sporadic records in Northern England may be dispersing animals from Scotland. Reintroduction exercises took place in the Forest of Dean, Gloucestershire between 2019-2021 and in 2024 in Devon and Cumbria. Other records in Shropshire and the New Forest may be from unofficial releases.

Pine martens use a variety of coniferous and deciduous woodland types, including old-growth forests, commercial plantations, fragmented forests and non-forested habitats such as scrub and heath. Woodland edges and hedgerows may be used for foraging, but they generally avoid open tree-less habitats

such as moorland, agricultural land and parkland.

The main barrier to continued expansion is a lack of suitable woodland and poor connectivity between woodland fragments. The density of roads in some parts of England may limit expansion due to vulnerability to road traffic accidents. This may be most pronounced in southern England but in the NE could limit further spread of pine martens into Durham and Yorkshire. Accidental or intentional trapping and illegal killing may prevent pine martens establishing in areas of high predator control, such as the Pennines and the Peak District.

Habitat improvement and legal protection has led to partial recovery of the species. Measures to expand and connect suitable woodland habitats should continue, providing den sites and foraging opportunities. Proactive, targeted reintroduction and reinforcement remain a key element of the long-term conservation strategy.

The overall assessment of conservation status is determined as **unfavourable-bad** and overall trend **unknown**. Both range and population are significantly below measures that would be considered favourable for the species. There are sustained efforts to increase pine marten population, such as the reintroduction exercises referenced, but these efforts are at their very early stages. It is too early to state what the prospects for the species are.

S1358, Polecat, *Mustela putorius*



© Charlie Marshall/Flickr

The polecat is a mustelid with a long, slim body and a distinctive mask-like area of dark fur across its eyes. True polecats are often misidentified, polecats and ferrets can hybridise to produce polecat-ferrets. Although there are methods for identifying true polecats by pelage characteristics, it can be difficult, and it is likely that many polecat-ferrets are reported as true polecats.

The polecat's range continues to expand in England. The recovery of the species has been due to the reduction in trapping pressures, legal protection, a post-myxomatosis increase in the rabbit population, and the ability of the species to utilise a wide range of habitats. There has also been releases of polecats in some areas, which may mask the true extent of their natural range expansion. Although there is difficulty in separating true polecats from polecat-ferrets, there is evidence to suggest that polecats are likely to outcompete hybrid animals in the

long-term and lead to a population that mainly consists of true polecats.

Polecats use a wide range of habitats. However, there is some evidence of a preference for woodland edge, field boundaries and farm buildings, with an avoidance of more open areas, as well as suburban and urban areas. Unlike elsewhere in Europe, polecats in Britain do not show a preference for riparian habitats and this is likely to be due to the avoidance of competition with mink and due to the abundance of rabbits throughout their range which provides a source of food away from riparian habitats.

Issues which continue to threaten polecats include road accidents, trapping mortality, secondary rodenticide poisoning, changes in agricultural practices, and the loss of genetic integrity through hybridisation with feral domestic ferret. The status of the rabbit population in Britain may also have some impact.

The overall conservation status is **Favourable** and overall trend **improving**. The polecat's range has continued to expand in England and habitat for this species is stable due to their ability to utilise a wide range of habitats across Britain. A new National Polecat Survey is due to conclude at the end of 2025, but at present, the future prospects for this species are favourable.

Lower Plant Species

S1378, Cladonia Subgenus of Lichens, *Cladonia* subgenus *Cladina*



© Karsten Madsen

The Reindeer lichen is a group of functionally and morphologically similar ground-living lichen in the former genus *Cladina*. In England, this group includes *C. arbuscula*, *C. arbuscula* subsp. *arbuscula*, *C. arbuscula* subsp. *squarrosa*, *C. ciliata*, *Cladonia ciliata* var. *ciliata*, *Cladonia ciliata* var. *tenuis*, *C. mediterranea*, *C. mitis*, *C. portentosa*, *C. rangiferina* and *C. azorica* (though this may be a chemotype of *C. portentosa*). The group are characterised by cushion-like tufts of extensively branching thalli. Species vary in range and conservation status. The *Cladina* group take their common name from the reindeer who depend on some of these lichen as a primary food source.

The distribution of the species extends from the Scottish Borders to the south-

west tip of Cornwall. The group are generally absent from the lime-rich soil of central England. Reindeer lichens are found in a range of nutrient-poor and generally acidic habitats including lowland and montane heathland, moorland, dune sites and open woodlands.

Reindeer lichens are protected under Annex V, however there are no known incidences of harvesting in England and so this is not considered a pressure. These lichens do face other pressures, primarily from nitrogen deposition from agriculture and burning which is causing deterioration of their habitat. Unsympathetic land management (typically over and under grazing and increasing frequency and ferocity of wildfire) are also major threats.

There are no specific conservation actions targeting this group. They do benefit from efforts to protect and restore their key habitat.

While the distribution of the species is reasonably stable, the pernicious effects of nitrogen are causing serious declines in the quality of the habitat leading to an **unfavourable-inadequate** conservation status and overall trend is **unknown**.

S1390, Western Rustwort, *Marsupella profunda*



© Des Callaghan

Western Rustwort is a liverwort- a type of non-vascular plant- and is considered globally rare, with known populations limited to just three countries, including England. Within England, the species is only found in designated Special Areas of Conservation (SAC) within Cornwall.

Western Rustwort is found in both active and abandoned china clay quarries. The species depends on quarrying to create fresh, bare ground that it can colonise and grow on. Cessation of quarrying can put the plant at risk- especially because it

struggles to compete with more vigorous, taller vegetation.

This has become a key pressure and expert opinion states that declining china clay production at active clay pit sites is likely to have reduced the area of suitable habitat. Another factor affecting the availability of suitable habitats is due to vegetation succession. This can be seen at the Lower Bostraze SAC which is a disused china-clay quarry.

The species conservation status is currently **Unfavourable- bad**, with conservation efforts focused on the management of habitats with some conservation measures having taken place, including the designation of SACs. To support the population further, maintenance and creation of bare china substrates is required to produce suitable areas for colonisation, both within and outside SACs. Conservation enhancement schemes are in place for three sites but due to limited data, the trend of this species is **unknown**.

S6216, Slender Green Feather-Moss, *Hamatocaulis vernicosus*



© Iain Diack/ Natural England

The altitudinal range of *H. vernicosus* is 10–620 m, but losses from the lowlands (south and east England) means it is now more usually found in upland mires where there is some mineral enrichment but where conditions are not strongly base rich. The species grows in neutral flushes and fens, especially domed springheads, where alkaline water breaks through acidic peat, or areas where alkaline flushes spread onto flushed, acidic ground.

The species has recently been discovered in Northumberland in a base-

rich fen in a wetland complex that forms part of the Border Mires SAC.

Spring-fen vegetation in the upland fringes remains vulnerable to agricultural intensification with habitat loss and negative impacts on the hydrology and water quality of extant mires, still occurring.

Conservation measures are largely directed towards management and protection of the habitats, and although sites are less affected by inappropriate habitat management, there are existing and ongoing external pressures such as atmospheric N-deposition.

Overall, the status has been summarised as **Unfavourable Bad** and trend **deteriorating** due to the loss of the species from a major part of its range, the unfavourable condition of the habitats which it is typical of and in which it still persists, and because of the ongoing vulnerability to atmospheric N-deposition and the potential for future changes to environmental conditions driven by climate change.

S1395, Petalwort, *Petalophyllum ralfsii*



© Rob Large/ Natural England

Petalwort is a small, pale green liverwort- a type of non-vascular plant- that is rare and scattered across the UK. In England, it is mainly found along the south-west coast, particularly at sites like Dawlish Warren Special Area of Conservation (SAC), with a few additional locations further north.

The species grows in damp, open dune slacks which are low-lying areas between sand dunes. They prefer lime-rich compacted sandy or muddy soils with sparse vegetation coverage. One of the biggest pressures to Petalwort is the loss of suitable habitat due to vegetation succession, where taller and more competitive plants take over. Since 2008, two of the ten known English sites- Ross

Links & Bamburgh and Holme-next-the-Sea- have lost their Petalwort populations. A 2024 survey confirmed that the habitat at Ross Links & Bamburgh is no longer suitable due to vegetation succession.

Another key concern is rising sea levels caused by climate change, especially at Dawlish Warren. To help protect the species, a translocation project was carried out, moving part of the population away to limit the impact flooding from coastal storm surges has on the species. Habitat management is another key conservation measure to support Petalwort and focus on the preservation of sand dune system. Management measures include increased grazing by livestock, removing overgrown vegetation, and reprofiling sand to create bare ground. These actions limit vegetation succession, however, without regular management Petalwort is likely to disappear from these areas.

Although the current conservation status is **Unfavourable bad**, the overall trend is **stable** with no significant changes since the last reporting period. The future of this species remains uncertain. As Petalwort is very small and low growing, it is especially vulnerable to being outcompeted by coarser, taller vegetation.

S1400, Large White-Moss, *Leucobryum glaucum*



© Ellen Jones/ Natural England

The Large White-Moss is a species of moss reported in England, along with two other *Leucobryum* species that are not always distinctive upon observation and require microscopic examination to separate. It is found widely across England, and it is likely the species is under-recorded in some areas. Unlike many rarer bryophyte species, specific surveys are not usually undertaken to record this species, and the mapping relies on general bryophyte recording.

The species have a broad ecological range and are often found in woodlands, heathlands, and bogs. Some of the key pressures these species face is extensive grazing or undergrazing by livestock, air pollution, and problematic native species. Although an Annex V species, there is no evidence that large white-moss is vulnerable to exploitation in England.

Conservation measures in place include effective management of the habitats they are found in as well as reducing air pollution from agricultural activities.

The conservation status and trend for these species have been recorded as **unknown** due to a lack of systematic survey and the likelihood of under-recording. The trend appears to be stable relative to the last reporting period, but this conclusion is based on limited data.

S1409, Bog-Mosses, *Sphagnum* spp.



Sphagnum denticulatum © Mags Cousins/ Natural England.

This group includes all the 42 *Sphagnum* species known to occur in Britain and Ireland, not all of which occur in England. Many species are common and widespread such as *Sphagnum palustre*, whilst many are more restricted e.g. Nationally scarce (GB): *Sphagnum affine*, *S. majus* (north east England), *S. platyphyllum* (north west England), *S. pulchrum*, *S. riparium*, *S. strictum* (north west England), *S. subsecundum*; and one Nationally rare (GB): *S. balticum* (northern England) also Schedule 8 (Wildlife and Countryside Act 1981).

This group of species is typically found in raised and blanket bogs, valley mires, wet heaths, besides flushes, streams and lake margins amongst rushes and sedges, and in wet woodland. Different

species have different tolerance ranges to rainfall and humidity, soil properties mineral/peat and hydrochemistry.

Key pressures are primarily loss of habitat area and quality, with some effect from unregulated harvesting of moss for horticultural and cultural use (e.g. hanging baskets, wreath making) and peat in horticultural use, although the latter may also include other moss species and some commercially harvested peat is sedge peat in origin, rather than derived from bog-mosses.

Many measures are currently being undertaken to restore degraded peat through the UK England Peat Action Plan (UK Government, 2021), including land management, restoring hydrology and reintroduction of species.

The decline in area is possibly levelling off due to commercial peat extraction tailing off and offset by habitat restoration measures. Restoration is effective for the less demanding species but is yet unproven for some of the more sensitive species. Range and population are overall stable but substantial environmental pressures remain on the habitats and threats from climate change. The overall conservation status for bog-mosses is **Unfavourable inadequate** and the overall trend is **stable**.

Higher Plant Species

S1413, Clubmosses, *Lycopodium* spp.



Lycopodium clavatum © Mags Cousins/
Natural England

Clubmosses from the *Lycopodium* species include Stiff clubmoss, running pine, one-cone clubmoss. Clubmosses can also exist as hybrids including hybrid Alpine Clubmoss. Issler's clubmoss is another hybrid however there were no records apart from one unconfirmed from Staffordshire.

Clubmosses prefer open, moist to very wet, acidic, nutrient poor, peaty soils often a shallow humic layer overlying mineral soils, in lowland or upland heath, bogs, mires, pool edges, montane scree, woodland edge and tracks in forestry.

The reason for inclusion on Annex V (collection) is a minor factor in declines that have been observed. The main pressures are drainage, eutrophication, habitat management changes, loss and fragmentation of habitat, such that the remnants can no longer sustain the species, especially in the lowlands. Even in the uplands changes to land use, such as forestry and moorland management, and climate change are likely impacting the species. It remains to be seen whether the peatland restoration initiatives will successfully restore Clubmosses.

Lycopodiella inundata has received conservation interventions at multiple sites in southern England, including trial reintroductions. For most Clubmosses, conservation effort is directed towards bringing the heaths and bogs into more favourable management, through grazing, bracken, tree and scrub control and restoration of drainage.

The overall conservation status for Clubmosses is **unfavourable-inadequate** and the trend is **deteriorating**.

S6985, Killarney Fern, *Trichomanes speciosum*



© Alex Mills/ Natural England

Killarney Fern was always a rare species in the UK, with a scattered mainly Atlantic distribution from Cornwall northwards through Wales and Cumbria to Argyll, and in Northern Ireland. The sporophyte became extinct at a number of sites, primarily due to collection and is now very rare in England, being known from only a few scattered localities in the north, the west and south west. The distribution map shows locations of both sporophyte and gametophyte generations.

The extant sites are all humid and winter-warm, in constantly damp, shaded localities, usually on acidic, but

sometimes base-flushed rocks.

Fortunately, the gametophyte generation survived at many locations and are also very likely under-recorded due to the similarity with a bryophyte or algal layer.

Pressures include gross modification (e.g. quarrying, clear-felling if wooded, alteration of watercourses), the influence of water and airborne pollution, and to some extent collection of sporophytes remains a threat to the sporophyte generation. Measures addressing aerial nitrogen deposition and diffuse water pollution have been identified but not fully implemented.

Recent surveys have found abundant evidence of new sporophytes forming from gametophytes at almost all sites, from Cornwall to Yorkshire. In addition to new sporophytes, existing patches and fronds had grown substantially. This recruitment and increased growth of sporophytes appears to be increasing and possibly climate-driven.

The assessment for this reporting period determines overall status of Killarney fern to be **favourable** with a **stable** trend.

S1441, Shore Dock, *Rumex rupestris*



© Alex Prendergast/ Natural England

Shore Dock has always been restricted to coastal regions of the southwest of England but is lost from the Isles of Scilly. It also occurs in north Wales which may be the source of a recent discovery in the northwest of England.

The species occupies freshwater seepages in a narrow zone above High-Water Mark. It is tolerant of salt spray and occasional inundation and is able to colonise bare ground exposed by wind and water scouring.

Coastal squeeze, habitat management changes, climate change and associated storm intensity and frequency continue to impinge on suitable habitat.

Shore Dock is afforded protection by Schedule 8 of the Wildlife and Countryside Act (1981). Seed collection, ex-situ propagation and reintroductions have been trialled in Cornwall (and Wales).

Climate change is increasing storminess and making populations more vulnerable to stochastic events which can lead to the loss of populations and consequent reduction of range, as indicated by the loss from Scilly. However, the naturally occurring new population in the northwest indicates that there is suitable habitat that could become colonised, providing shoreline drainage, control of pollution and habitat management remain favourable.

The overall status of this species in the current reporting period is **unfavourable-inadequate** and the trend is **unknown**.

S1528, Marsh Saxifrage, *Saxifraga hirculus*



© Peter Wakely/Natural England

Marsh Saxifrage is at the southerly end of its range in England and is now restricted to the Pennine uplands in England after the Cheshire site was lost in the 19th Century due to development. The species is found in calcareous springs, flushes and rills between 370 m and 730m above sea level, where constantly flowing water issues from calcareous shales, or more rarely directly from the underlying Carboniferous Limestone. The plants are particularly concentrated where the wet areas grade into the surrounding vegetation.

Heavy sheep-grazing has greatly suppressed flowering, seed set, and recruitment for decades or even centuries. Whilst vegetative reproduction is increased by hard grazing, this reduces flowering and genetic exchange. Livestock exclosures have been trialled and improve flowering for a period of 5-10 years, after which grazing needs to be reintroduced to reduce competition and improve clonal maintenance of populations once again.

Recovery work is aimed at maintenance and managing grazing to allow a full expression of age structure and reproduction which is currently one of the reasons that the conservation status. However, there are concerns regarding genetic diversity and inbreeding depression, and there are likely to be impacts of climate change which could impact the necessary hydrological conditions.

The overall status of Marsh Saxifrage is **unfavourable-inadequate** and trend **stable**. Range, population and habitat have all remained constant over a long period with some populations lost and others discovered.

S1614, Creeping Marshwort, *Helosciadium repens*



© John Martin/Natural England

Creeping Marshwort is highly restricted in England, occurring in the Thames floodplain in Oxfordshire; at just one location in Walthamstow, Essex; and at a recently discovered population in West Suffolk. It is small creeping perennial herb of winter-flooded grassland subject to falling water levels in spring and summer, which provides the areas of bare damp mud and short sparse vegetation the species needs.

It is a poor competitor sensitive to changes in grazing pressure, seasonality and duration of flood events, coupled with water quality and the effect this has on vegetation growth. Effective dispersal and connectivity between populations is reliant on active hydrological processes in floodplains which being highly modified, means there is a risk of local extinctions.

The species has received concerted conservation efforts particularly in Oxfordshire with several reintroductions arising from locally harvested seed and seedlings raised ex-situ. These sites received intensive management to ensure suitable habitat conditions and populations are periodically augmented with new propagules, particularly following years when there is poor recruitment, sometimes attributable to prolonged surface flooding.

Currently the species relies on intensive conservation effort, which has been successful in maintaining and slightly increasing the remaining targeted populations. The fact that the species has appeared in a new catchment in West Suffolk, serves as a great encouragement that the species can be re-established at the previously known site at Skipwith near York which would expand the current range as well as population. Reliance on conservation efforts will continue, plus wider landscape scale floodplain restoration and allowing natural processes of seasonal inundation (with accompanying reduction in pollution) and appropriate management and grazing practices.

The overall conservation status is **unknown**, and the trend is determined as **improving**.

S1654, Early Gentian, *Gentianella amarella* subsp. *anglica*



© Sean Cooch/ Natural England

The species reported here is *Gentianella amarella* subsp. *anglica* (Pugsley), endemic to Great Britain, occurring in England and just one locality in Wales. In England the core area is on the chalk downlands of Hampshire, the Isle of Wight and Wiltshire, with a few populations extending to Devon and southwest Cornwall and as far north as Cambridgeshire.

Early Gentian is a biennial herb of shallow calcareous soils on chalk downland, old quarries, coastal slopes, sand dunes, ancient earthworks, trackways and path edges.

There is continued loss of sites (especially small sites) largely attributable to the difficulty in maintaining short species-rich calcareous grassland in suitable condition for all life stages of the

plant at fragmented sites. Grazing and trampling exposes bare ground enabling successful germination and later on, for the seeds to fall and reach bare ground, and also reduces competition enabling good seedling growth. However, relaxation of grazing at the right point is necessary as it enables the plants to flower and ripen seed without being unduly damaged by trampling, but shortly thereafter grazing needs to resume to provide the openings in the sward for ripe seed to fall onto bare ground.

Appropriate grazing is difficult to manage on small, inaccessible sites, and would have happened more naturally within much larger interconnected grazing areas with animals moving around, with losses in certain areas, or damage in certain years, mitigated by other successful colonies.

Conservation efforts are largely targeted at achieving the right habitat conditions but also need to address the problems of fragmentation to improve the future prospects of the species. The overall conservation status for Early gentian is **unfavourable-bad** and overall trend **deteriorating**. Conservation efforts are largely targeted at achieving the right habitat conditions but also need to address the problems of fragmentation to improve the future prospects of the species.

S1831, Floating Water-plantain, *Luronium natans*



© Iain Diack/ Natural England

The natural distribution of Floating Water-plantain in England included the meres in the West Midlands (mainly Cheshire and Shropshire) and sites in Cumbria. This was augmented by colonisation of the canal network following its construction, mainly in the west Midlands.

Subsequently, the species has declined and disappeared from the meres and many canals, although there is still some evidence of spread along others.

It occurs in mesotrophic or oligotrophic lakes, pools and slow-flowing rivers, and abandoned or little-used canals. Growth forms vary according to conditions: in deep or faster flowing water it mainly reproduces vegetatively as stoloniferous carpets of plants with rosettes of linear-lanceolate submerged leaves, but it will produce expanded floating leaves, and flowers more freely, in quieter or shallower water or even terrestrially on

exposed mud. It can therefore perpetuate and disperse, either vegetatively through detached stolons or through viable seed.

Diffuse water pollution of the water supply of both artificial and natural sites, management of surrounding habitat and recreational management are ongoing concerns. There are known difficulties of restoring an active canal network to leisure navigation, whilst maintaining aquatic macrophyte populations due to water quality impacts, particularly due to the scale of disturbance from propellor action and resulting turbidity. Mitigations have been deployed (eg offline or inline reserves) in several canal restoration projects with limited success in establishing self-sustaining populations, despite the fact that the species propagates well ex-situ providing ample propagules for augmentation and reintroduction.

Semi-natural habitat in more naturally functioning floodplains is still very restricted but with more impetus behind natural flood management to cope with climate change this could re-establish suitable habitat in active floodplains.

The assessment for this reporting period determines overall status as **unfavourable-inadequate** and the trend is **deteriorating**.

S1833, Slender Naiad, *Najas flexilis*



Slender Naiad, Colonsay © Kevin Walker

Slender Naiad has not been observed at the only known site in England, Esthwaite Water SSSI, Cumbria, since 1982, despite searches. It is presumed extinct.

The species is an aquatic annual herb, usually rooted in fine sediments of deep, clear, oligo-mesotrophic or mesotrophic lakes. These lakes usually lie in acidic catchments but receive some base-enrichment from nearby basalt, limestone or calcareous dune-sand. Colonies can grow at depths of 1.5 m or more if the water is clear and only extend into shallower water in sheltered situations where the water is still.

Eutrophication from diffuse pollution is the ongoing threat, primarily from agricultural sources in the Esthwaite catchment, however there is now the added problem of internal nutrient loading. More nutrient-rich conditions alter the balance of

aquatic macrophytes, for example favouring the non-native Nuttall's Pondweed, which is present at the site. Even if water quality was to improve to the mesotrophic or oligo-mesotrophic conditions typically favoured by Slender Naiad, the ongoing presence of species like Nuttall's Pondweed could prevent successful re-establishment.

The legacy of nutrients that have accumulated in the lake sediments will remain a problem, as nutrients can continue to be released into the water column from the sediments, especially under warm weather conditions. The Scottish Recovery plan identifies climate change as a threat, which will include warmer water altering the hydrochemistry and storm events releasing nutrients and transporting sediment.

Conservation measures undertaken in the sole English catchment include closure of the local fish farm; upgrading of the sewage treatment works; cessation of fish stocking; and implementation of agri-environment and catchment sensitive farming initiatives. Water quality is slowly improving in Esthwaite Water, with a decline in total phosphorus and a slight improvement in Secchi depth, although phytoplankton levels failed to show an improvement 2010-2015.

The overall status for this species in the current reporting period is **unfavourable-bad** and the trend is **unknown**.

S1849, Butcher's-broom, *Ruscus aculeatus*



© Esther Pawley/ Natural England

The assessment focuses on records of Butcher's-broom which are thought to be native, or plausibly native and within the native range. It is a lowland species of dry scrub and woodlands near to the sea in southern England, and it also occurs on the Gower in Wales.

It has been widely planted as an ornamental shrub in parks and gardens and as game bird cover. The berries can

be bird-dispersed and it can readily establish from garden throw-outs by virtue of its creeping rhizomatous growth, such that deliberate, and unintentional introductions obscure the native distribution and trends.

The species is mentioned online in UK foraging, herbal and medicinal fora, but there is no evidence of exploitation at a scale that poses any threat to the species living in the wild in semi-natural situations within the native range, the reason for inclusion in Annex V.

The overall conservation status is **favourable** and the trend **stable**. The species appears to be relatively stable within the native range and has not required conservation measures to be implemented and may even be experiencing a modest increase both within and outside the historic range, due to its popularity and ability to spread.

S1902, Lady's-slipper Orchid, *Cypripedium calceolus*



© Mags Cousins/ Natural England

The native range in the UK was northern England, including Yorkshire, Lancashire, Cumbria, County Durham and Derbyshire but over collection and habitat loss reduced the species to just one remaining wild (native site).

Lady's-slipper is a long-living plant that spreads underground and prefers moist but well-drained calcareous soils derived from limestone, in herb-rich grassland, in shallow grykes of limestone pavement and in open woodland.

Illegal collection and trampling as a consequence of photography remain ongoing threats, in addition to the difficulty of achieving optimum habitat condition with the right balance of grazing to maintain the moist, open or partly shaded and sheltered scrub/woodland edges. Poor natural pollination, seed set and recruitment also hamper the species forming self-sustaining populations in the wild and semi-natural situations.

Lady's-slipper has been subject to intensive conservation efforts over many decades, both in protecting the wild site and in raising propagules for reintroduction to sites within the historic native range. Although the mycorrhizal fungi have not yet been isolated, many 100's of seedlings can be produced ex-situ using seed collected at the right stage of maturity.

There are an estimated 50 mature plants, and a total population of approximately 100 individuals living in semi-natural situations. Plants living ex-situ, of any age, in nurseries, collections and growing facilities are not included in the assessment.

In 2024 the first known new seedling was recorded at a long-established reintroduction site, arising from natural pollination, seed set and germination, indicating that it is plausible that the species can form self-sustaining populations at a reintroduction site. This provides hope for the future of the species, providing the additional pressures likely due to the effects of climate change on temperature and rainfall, problems of fragmentation and human disturbance can also be overcome.

The overall status of this species is **unfavourable-bad**, however, the trend is **improving**.

S1903, Fen Orchid, *Liparis loeselii*



© Brian Hodgkin

Fen orchid is now restricted to East Anglia where it occupies species-rich fens on infertile soils, mainly old peat cuttings, and on the south Wales coast where it grows in recently disturbed dune-slacks, and can tolerate prolonged submersion. It was lost from Braunton Burrows in the late 1980's and from Lincolnshire pre-1930's.

The species requires the right balance of soil moisture, hydrochemistry and degree of disturbance through grazing and fen management to thrive, all factors which have undergone changes in the recent past.

Intensive conservation efforts in East Anglia have resulted in remarkable improvements in the number of individuals; in 2010 there were fewer than 1,000 individuals, which increased by 2017 to 12,337 and in 2023 to 17,373 individuals. This increase was primarily attributed to improved habitat management at the remaining native sites, especially restoring hydrology, cutting and grazing at Sutton Broad but also to the rediscovery of plants at other previously known sites following intensive survey effort by the Plantlife fen orchid project which started in 2008.

Ultimately restoring the range is also critical and the experimental management with re-introductions needs to be continued. There are early signs of successfully creating new self-sustaining populations (survival and clonal regeneration in two populations), but these need more time to prove sexual regeneration can take place and to identify fungal symbionts necessary for germination. The latter would lead to locating more sites for conservation translocations with precision and certainty.

The overall status of this species is **unfavourable-inadequate**, and the overall trend is **improving**.