

Biodiversity, Habitats, Flora and Fauna - Protected Sites and Species

Baseline/issues: North West Plan Areas 10 11

(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- Special Areas of Conservation (SACs): There are five SACs in the plan area – Solway Firth SAC, Drigg Coast SAC, Morecambe Bay SAC, Shell Flat and Lune Deep SAC and Dee Estuary SAC (Biodiv_372). The Sefton Coast SAC is a terrestrial site, mainly for designated for dune features. Although not within the inshore marine plan area, the development of the marine plan could affect the SAC (Biodiv_665)
- Special protection Areas (SPAs): There are eight SPAs in the plan area - Dee Estuary SPA, Liverpool Bay SPA, Mersey Estuary SPA, Ribble and Alt Estuaries SPA, Mersey Narrows and North Wirral Foreshore SPA, Morecambe Bay SPA, Duddon Estuary SPA and Upper Solway Flats and Marshes SPA (Biodiv_371)
- Ramsar sites: There are six Ramsar sites in the inshore plan area – Dee Estuary, Mersey Estuary, Ribble & Alt Estuaries, Morecambe Bay, Duddon Estuary and the Upper Solway Flats and Marshes. The Dee Estuary Ramsar crosses the border with the Wales National Marine Plan area and the Upper Solway Flats and Marshes Ramsar crosses the border with the Scotland Marine Plan area (Biodiv_660)
- The Ribble Coast and Wetlands Regional Park includes part of the Ribble and Alt Estuaries SPA (Biodiv_370)
- The Morecambe Bay and Duddon Estuary potential SPA (pSPA) is in the inshore plan area. The pSPA would combine and extend the area currently protected by the Morecambe Bay SPA and Duddon Estuary SPA (Biodiv_599)
- Sites of Special Scientific Interest (SSSIs): There are 24 Sites of Special Scientific Interest (SSSI) in the North West inshore plan area (Biodiv_379)
- Marine Conservation Zones (MCZs): There are three MCZs in the inshore plan area – Allonby Bay MCZ (Biodiv_362), the Cumbria Coast MCZ (Biodiv_373) and Flyde MCZ (Biodiv_374). The West of Walney MCZ stretches across the inshore and offshore plan areas (Biodiv_363)

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- SACs: There are two SACs in the plan area – the Berwickshire and North Northumberland Coast SAC, and the Flamborough Head SAC (Biodiv_334)
- The Southern North Sea pSAC for harbour porpoise (*Phocoena phocoena*) is currently undergoing public consultation (until 3 May 2016). Part of the pSAC is in the offshore plan area. The pSAC stretches across the North East offshore, East inshore and offshore and South East plan areas (Biodiv_595)
- SPAs: There are six SPAs in the plan area - Teesmouth and Cleveland Coast SPA, Coquet Island SPA, Lindisfarne SPA, St Abbs Head to Fast Castle SPA and the Farne Islands SPA, Flamborough Head and Bempton Cliffs SPA (Biodiv_335)
- The Northumberland Marine pSPA is currently undergoing public consultation (until 21 April 2016). The pSPA would surround the Coquet Island SPA and the Farne Islands SPA. The pSPA would protect the foraging waters used by breeding seabirds (Biodiv_598). The Flamborough and Filey Coast pSPA extends the Flamborough Head and Bempton Cliffs SPA (Biodiv_663)
- Ramsar sites: There are three Ramsar sites in the inshore plan area – Lindisfarne, Northumbria Coast, Teesmouth & Cleveland Coast, (Biodiv_661)
- SSSIs: There are 37 SSSIs in the inshore plan area (Biodiv_361)
- MCZs: There are three MCZs in the inshore plan area - Coquet to St Mary's MCZ (Biodiv_364), Runswick Bay MCZ (Biodiv_366) and the Aln Estuary MCZ (Biodiv_367). There are three MCZs in the offshore plan area - the North East of Farnes Deep MCZ (Biodiv_590), Swallow Sand MCZ (Biodiv_375) and Fulmar MCZ (Biodiv_591). The Farnes East MCZ stretches across the inshore and offshore plan areas (Biodiv_365)
- Potential new waste development along the Tees Estuary and river corridor could adversely impact on the Teesmouth and Cleveland Coast SPA (Biodiv_516)

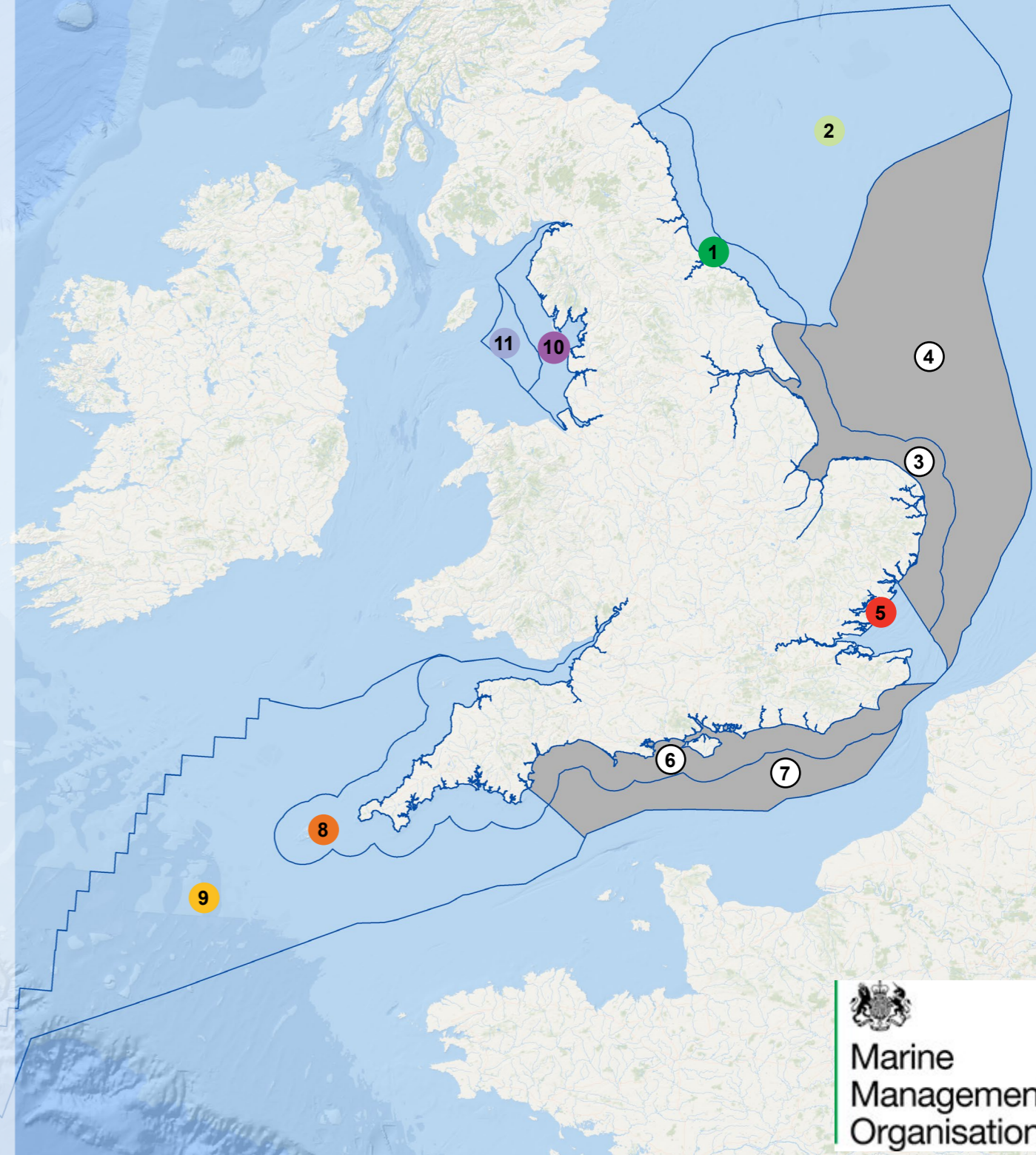
Baseline/issues: South West Plan Areas 8 9

- SACs: There are eight SACs in the inshore plan area – Start Point to Plymouth Sound and Eddystone SAC, Plymouth Sound and Estuaries SAC, Fal and Helford SAC, Lizard Point SAC, Lands End and Cape Bank SAC, Lundy SAC, Severn Estuary SAC and Isles of Scilly Complex SAC (Biodiv_369). The Haig Fras SAC is in the offshore plan area (Biodiv_592)
- The Bristol Channel Approaches possible SAC (pSAC) for harbour porpoise stretches across the inshore and offshore plan areas as well as the Wales National Marine Plan area (Biodiv_594)
- SPAs: There are two SPAs in the plan area - the Tamar Estuaries Complex SPA and the Severn Estuary SPA (Biodiv_297). The Falmouth Bay to St Austell Bay pSPA is also in the plan area (Biodiv_656)
- Extensions are proposed to the Skokholm & Skomer SPA, which is currently exclusively in Welsh waters, that would extend the site into the SW offshore plan area. The proposals would also add protection for two new species, foraging Manx shearwater (*Puffinus puffinus*) and Atlantic puffin (*Fratercula arctica*) (Biodiv_597).
- Ramsar sites: There are two Ramsar sites in the inshore plan area – Severn Estuary Ramsar and Isles of Scilly Ramsar. The Severn Estuary Ramsar crosses the border with the Wales National Marine Plan area (Biodiv_659)
- SSSIs: There are 118 SSSIs in the South West inshore plan area (Biodiv_411)
- MCZs: - There are 13 MCZs in the inshore plan area – Bideford to Foreland Point MCZ (Biodiv_390), Hartland Point – Tintagel MCZ (Biodiv_392), Mounts Bay MCZ (Biodiv_393), Newquay and the Gannel MCZ (Biodiv_394), Runnel Stone MCZ (Biodiv_396), Isles of Scilly MCZ (Biodiv_400), Lundy MCZ (Biodiv_401), The Manacles MCZ (Biodiv_402), Padstow Bay and Surrounds MCZ (Biodiv_403), Skerries Bank and Surrounds MCZ (Biodiv_404), Tamar Estuary MCZ (Biodiv_406), Upper Fowey and Pont Pill MCZ (Biodiv_407), and Whitsand and Looe Bay MCZ (Biodiv_408)
- There are six MCZs in the offshore plan area – The Canyons (Biodiv_398), South West Deep (West) MCZ (Biodiv_405), North West of Jones Bank MCZ (Biodiv_395), Greater Haig Fras MCZ (Biodiv_391), East of Haig Fras MCZ (Biodiv_399) and the Western Channel MCZ (Biodiv_397)
- The River Fowey ferry/navigation channel maintenance may pose a risk to protected sites (Biodiv_482)
- There are several proposals for tidal lagoons in the inshore plan area or in adjacent plan areas (Wales National Marine Plan area), which could affect protected sites and species (Biodiv_507)

Baseline/issues: South East Plan Areas 5

- SACs: There are three SACs in the plan area – Essex Estuaries SAC, Margate and Long Sands SAC and Thanet Coast SAC (Biodiv_381)
- The Southern North Sea possible SAC (pSAC) for harbour porpoise stretches across the North East offshore, East inshore and offshore and South East plan areas (Biodiv_595)
- SPAs: There are 13 SPAs in the plan area: the Stour and Orwell Estuaries SPA, Hamford Water SPA, Outer Thames Estuary SPA, Benfleet and Southend Marshes SPA, Crouch and Roach Estuaries SPA, Blackwater Estuary SPA, Dengie SPA, Colne Estuary SPA, Foulness Estuary SPA, Thames Estuary and Marshes SPA, Medway Estuary and Marshes SPA, The Swales SPA and Thanet Coast and Sandwich Bay SPA (Biodiv_283)
- There are proposals to extend the boundaries of the Outer Thames Estuary SPA. The site is currently classified for non-breeding red-throated divers only (*Gavia stellata*). The extension will include little tern and common tern foraging areas. The pSPA stretches across the East inshore and offshore and South East plan areas (Biodiv_596)
- Ramsar sites: There are 12 Ramsar sites in the plan area – Stour & Orwell Estuary, Hamford Water, Colne Estuary, Blackwater Estuary, Dengie, Crouch & Roach Estuaries, Foulness, Benfleet & Southend Marshes, Thames Estuary & Marshes, Medway Estuary & Marshes, The Swale, and Thanet Coast & Sandwich Bay (Biodiv_662)
- SSSIs: There are 31 SSSIs in the South East inshore plan area (Biodiv_382)
- MCZs: There are five MCZs in the plan area - The Swale Estuary MCZ (Biodiv_383), Dover to Deal MCZ (Biodiv_385), Blackwater, Crouch, Roach, and Colne Estuaries MCZ (Biodiv_386), Medway Estuary MCZ (Biodiv_387) and Thanet Coast MCZ (Biodiv_388)

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Protected Sites and Species

Summary of the legislative / policy context

The main policy and legislative instruments relating to protected sites and species are:

- [The Habitats \(92/43/EEC\)](#) and [Birds Directives \(2009/147/EC\)](#) and national legislation that transposes these. These Directives help to implement the aims and objectives of several international conventions to which the EU is a signatory, including the [Ramsar](#), [Bonn](#), [Bern](#) and [OSPAR Conventions](#) and the [Convention on Biological Diversity \(CBD\)](#). The CBD and OSPAR Conventions specifically include a commitment to establish 'an ecologically coherent network of marine protected areas.' A network of protected sites (Natura 2000) has resulted, which includes Special Areas of Conservation (SAC) and Special Protection Areas (SPA). Ramsar sites are protected sites designated specifically under the Ramsar convention to protect wetlands of international importance, particularly for waterfowl. As a result, Ramsar sites are often contiguous with SPAs. It is UK policy to give Ramsar sites the same level of protection as sites protected under the Habitats and Birds Directives
- [Marine and Coastal Access Act \(MCAA\) 2009](#) - Provides the ability to establish Marine Conservation Zones (MCZs).
- [Wildlife and Countryside Act \(WCA\) 1981](#) - Establishes the ability to designate and protect Sites of Special Scientific Interest (SSSI) and builds on the National Parks and Access to the Countryside Act 1949 in order to allow designation of National Nature Reserves (NNRs)
- [Countryside and Rights of Way \(CRoW\) Act](#) - Provides a duty on Government to have regard for the conservation of biodiversity and provides additional protection for SSSIs and for protected species
- The EU Water Framework Directive includes consideration of effects on protected sites and species
- [Natural Environment and Rural Communities \(NERC\) Act 2006](#) - Contains statutory lists of priority habitats and species in need of conservation (including Biodiversity Action Plan (BAP) species and habitats). Helps to implement the CBD / [Rio Convention](#). Includes duty on public bodies to protect biodiversity
- Under the [Marine Strategy Framework Directive \(MSFD\)](#), Good Environmental Status (GES), several Descriptors are relevant to protected sites and species, including D6 - Seafloor integrity is at a level that does not affect benthic ecosystems, D4 - Marine food webs are normal, D1 - Biological diversity is maintained and D3 - populations of commercially exploited fish and shellfish stocks are within safe biological limits. Arguably, all GES Descriptors are of relevance to the health of protected sites and species. The MSFD also requires the establishment of Marine Protected Areas (MPAs), which contribute to the creation of an ecologically coherent network of MPAs and help to meet the aims of international conventions to which the EU is party (e.g. OSPAR). It should be noted that other regulations also exist and cross reference to the other Biodiversity report cards should be made for a more full appreciation of legislation and policy relating to habitats and species. Sites that are protected for reasons other than biodiversity (e.g. geological importance, landscape, historic features) are covered in the relevant report cards
- The UK [Marine Policy Statement \(MPS\)](#) requires marine plan makers to consider protected areas and features into their plan development, including how plans and development decisions could (positively or negatively) affect legal obligations to protect sites and to halt biodiversity loss. This includes taking account of the effects of climate change on protected sites and species and how climate change should be incorporated into the selection / de-selection of protected sites

Key cross cutting baseline / issues across all plan areas

- Issues that affect protected sites and species are very site specific, making it difficult to identify cross cutting issues that affect all areas, sites and species. Fishing has been identified as an activity capable of potentially adversely affecting marine protected areas. Not all fishing activities may have an adverse effect on protected sites and not all features of protected sites are at risk from fishing activity. A risk-based, phased approach to identifying fishing activities that could have an adverse effect on features of protected sites has been adopted so that management measures can be applied to those activities in the sites where a potential or actual adverse impact is identified, by either the relevant IFCA or the MMO. This approach will be applied to European protected sites and MCZs in inshore and offshore waters in a phased manner (Biodiv_656)
- Protected sites in the marine plan areas that are protected by legislation include Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Ramsar sites, Sites of Special Scientific Interest (SSSIs) and Marine Conservation Zones (MCZs). SACs, SPAs and MCZs can be designated in both inshore and offshore plan areas, while SSSIs are only in inshore areas, with most confined to the intertidal area. As at 31 July 2015, over 4 million hectares of England's sea out to the limit of the UK continental shelf (over 17%) was covered by protected sites designations (SAC, SPA, Ramsar, SSSI, MCZ). It should be noted that there are several new and extended SACs and SPAs currently being consulted on (see information on specific plan areas below). Possible SACs (pSAC) and potential SPAs (pSPA), including proposed changes or extensions to existing sites, are given the same level of protection as sites that are fully designated
- Protected species may be protected as features of protected sites, or separately. Natural England has recently published updated conservation advice packages for Marine Protected Areas (MPAs), covering SPAs, SACs, Ramsar sites and MCZs. Some of the advice is still in draft and being consulted on, so may be subject to change. JNCC publish conservation advice on offshore protected sites and sites that cross the inshore/offshore area (Biodiv_600). European Protected Species (EPS) are those listed in Annex IV of the Habitats Directive. It is an offence to kill, injure, capture or disturb EPS. Five species of dolphin, five species of whale, harbour porpoise, Leatherback turtle (*Dermochelys coriacea*) and Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) are all EPS found in UK waters (Biodiv_666). The Common / Harbour seal (*Phoca vitulina*) and Grey seal (*Halichoerus grypus*) are also protected by the Protection of Seals Act 1970. Refer to the Marine megafauna report card for more information on marine mammals, basking sharks and turtles
- There are 50 MCZs in English waters, which have been designated in two tranches, covering over 20,000km² seabed. 127 MCZs were recommended by the MCZ project in 2011. 27 sites were designated in November 2013 and a further 23 were designated in January 2016. There will be a consultation on a third tranche of MCZs in 2017, with the aim to designate further sites in 2018. MCZs along with other protected sites will contribute towards the aim of creating a network of ecologically coherent MPAs
- The MMO has produced draft site summary assessments for managing fisheries in MPAs for eight sites within the plan areas considered in this document - Fylde MCZ, Land's End and Cape Bank European Marine Site (EMS), Liverpool Bay EMS, Margate and Long Sands EMS, Outer Thames Estuary SPA, Shell Flat and Lune Deep EMS, Skerries Bank and Surrounds MCZ, Start Point to Plymouth Sound and Eddystone EMS (Biodiv_601). Impacts from fishing activity are very site specific, depending on the reasons for site designation (i.e. the features for which the site has been designated) and the type of fishing activity that takes place
- Reduction in sandeel stocks may affect the breeding and reproductive survival of protected seabirds, particularly in the North East (Biodiv_517)
- Coastal squeeze resulting in loss of intertidal habitats and species (incl. birds) may affect the extent or quality of protected sites and / or the features for which they have been designated. This may require new compensatory habitat to be created and/or designated in coastal areas, particularly estuaries (Biodiv_526)

The likely evolution of the environment over the plan duration

- Climate change: Climate change is an issue potentially affecting all areas in the future. Climate change could affect the geographic range / distribution of protected species directly, or alter the distribution of species that compete with or prey on protected species. Climate change could also alter the distribution or extent of protected habitats. Sea level rise and associated coastal squeeze may also alter the distribution or extent of protected sites or species. As a result of changes due to climate change, the boundaries of protected sites may need to be amended. Sites may need to be de-designated, or new sites designated, to take account of such changes to legally protected habitats and species. New sites and / or species may need to be included in the network of protected sites, or protected by legislation if they become rare, threatened or vulnerable as a result of climate change and its associated effects (e.g. coastal squeeze)
- Ocean acidification is linked to climate change and there has been an observed increase in seawater pH; this may have impacts to the food chain / marine food webs, with possible impacts to protected sites and/or species. Coastal squeeze is likely to continue to affect the extent or quality of protected sites, with knock on impacts to species that depend on such sites
- Development and increased use of the marine area (on the coast, in the inshore or offshore plan areas) has the potential to affect protected sites and / or species either through isolated large-scale or inappropriate development/activity or through cumulative effects. Activities such as dredging, aggregate extraction, energy generation (wave and tidal power, windfarms (Biodiv_532), nuclear and conventional power stations and associated power cables), shipping and water use (abstraction and discharges) may affect protected sites via a range of pathways such as damage / destruction of habitat, sedimentation, changes in coastal processes, noise, electromagnetic fields, intakes, outfalls, barriers to migration, collision with vessels / structures (wind or underwater turbines), disturbance from the presence of people / watercraft
- Improvements to water quality in inshore areas and estuaries have been beneficial to species and habitats. Water quality improvements in these areas may also have benefited species that use these areas for spawning and as nursery area. These improvements are expected to continue as actions to achieve WFD and MSFD objectives are implemented



Biodiversity, Habitats, Flora and Fauna - Protected Sites and Species

Potential interactions with other topics

- There are links to other areas of the Biodiversity topic, as several species of fish, birds and marine megafauna are protected species and / or are protected as part of the protected sites network. Protected sites incorporate benthic and intertidal areas and many sites rely on the maintenance of geological and/ or coastal and metocean processes so links to the Water and Geology, Substrates and Coastal Processes topics are also directly relevant. Activities far inland may affect protected species, particularly birds and migratory fish, if they affect migration, breeding or feeding areas or water quality
- There is the potential for invasive species to directly impact protected sites and species (Biodiv_531) by competing with native species for habitat, food sources or directly through predator-prey, disease or parasite interactions.
- Marine litter has widespread implications for fish, birds, marine mammals, turtles and other protected species in terms of ingestion and entanglement. The impact of microplastics on marine food webs and the marine environment in general is also an increasing concern
- Potential interactions with climate change and associated physical changes (including coastal processes, sea level rise and coastal squeeze) is a key interaction potentially affecting sites and species. Climate change could have a number of impacts including altering predator and prey dynamics due to a change in the timing of key life cycle events (Biodiv_473) or the distribution of species. Changes in the geographic range / distribution of species may affect competition for food and habitat, as more southerly species move northwards. Climate change may alter the distribution or extent of key habitats or alter food webs
- Ocean acidification is linked to climate change and there has been an observed increase in seawater pH; this may have impacts to the food chain / marine food webs, with possible impacts to shellfish biology (shell formation) (Biodiv_478). Coastal squeeze may affect the extent or quality of protected habitats and / or the species that rely on them (Biodiv_423-424, Biodiv_526)
- Many protected species are highly mobile and / or widespread and may interact with a wide variety of economic activities at the coast and in inshore and offshore plan areas (e.g. dredging, aggregates, energy, shipping, commercial fishing). Protected sites provide resources for a variety of economic activities such as fishing (commercial and recreational), birdwatching, diving, eco-tourism (e.g. whale watching), recreational sea uses (boating, surfing, wind surfing, etc.). Designated sites may have implications for access to heritage assets and/or the conduct of archaeological investigations

Potential transboundary issues

- Many protected species are highly mobile and / or widespread, including marine mammals, turtles, birds and protected fish species, such as sharks. Populations of these species may spread beyond individual plan boundaries, as well as beyond UK administrative boundaries (England, Wales, Scotland, Northern Ireland) and UK borders (EU and non-EU countries), requiring co-ordination between plan areas, with devolved administrations, other EU countries and beyond, often via international organisations / convention (e.g. OSPAR). Activities or plans in English marine plan areas may affect protected sites and/or species in other UK administrations and/or other EU countries
- Connectivity and the creation of a coherent network of protected sites is a key aim of national and international legislation and conventions that requires cross-border co-operation across marine plan and national / international boundaries
- The Severn and Dee estuaries contain several protected sites that overlap with the Wales National Marine Plan area (Biodiv_602)
- The Solway Firth and Tweed estuary contain protected sites that overlap with Scotland's National Marine Plan area (Biodiv_603)
- The Bristol Channel Approaches pSAC and the Southern North Sea pSAC for harbour porpoise cross several marine plan area boundaries. The Bristol Channel Approaches pSAC overlaps with the Wales National Marine Plan area (Biodiv_594)
- The Skokholm & Skomer SPA proposed extension would stretch across the South West offshore plan area and the Wales National Marine Plan area (Biodiv_597)
- The Outer Thames pSPA. The pSPA stretches across the East inshore and offshore and South East plan areas (Biodiv_596)
- The East Coast Northern Ireland SPA and Carlingford Lough SPA in the Northern Ireland Marine Plan area have recently been extended to incorporate foraging habitat for birds originating in nearby designated breeding colonies (Biodiv_658)
- Terrestrial protected sites and species, although not in the marine plan area, could be affected by the development of marine plans in adjacent or nearby areas. This may be particularly relevant for sites designated for dune, cliff or other coastal features and species above Mean High Water Springs (MHWS), or nearby freshwater sites or species (Biodiv_664)

Key data gaps

- Underwater noise impacts on some protected species are recognised as a concern, particularly marine mammals (Biodiv_438-445) and fish (Biodiv_472) (see Marine Megafauna and Fish & Shellfish topics)
- The extent of marine litter within the UK seas and the effects of such litter on the marine environment are not robustly characterised (Biodiv_476)
- Lack of understanding of the effects of climate change on protected sites and species, including the distribution and abundance of protected species, their use of sites, potential movement to other sites, reproductive timing, migration, food sources and population dynamics (Biodiv_593, Biodiv_423-424, Biodiv_612)
- Information relating to the effects of electromagnetic fields on sharks and other fish is lacking and impacts are uncertain (Biodiv_561) (see also Marine Megafauna)
- Information on the condition of protected sites and species is not readily available at marine plan area spatial scale. Published data on SSSI condition amalgamates terrestrial and intertidal sites (UK Biodiversity Indicators, 2015).
- Information on the condition of SAC/SPA is available by feature (habitat and species) at a national level (Biodiv_621)
- Information on the condition of protected sites and species may not be up to date. Legislation requires regular assessments to be carried out but there are several years between assessments

Biodiversity, Habitats, Flora and Fauna - Benthic and Intertidal Ecology

Baseline/issues: North West Plan Areas 10 11

(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- A variety of habitats are present in this plan area, ranging from extensive areas of sediment (e.g. Morecambe Bay) and sand (e.g. Solway Firth) to rocky coasts. Species Features of Conservation Importance (FOCI) include Ocean quahog (*Arctica islandica*) and maerl (*Phymatolithon calcareum*). Habitat FOCI include blue mussel beds (*Mytilus edulis*) and honeycomb worm reef (*Sabellaria alveolata*), estuarine rocky habitats, intertidal boulder communities Ross worm reefs (*Sabellaria spinulosa*), sea pens and burrowing megafauna, seagrass beds, sheltered muddy gravels (e.g. Morecambe Bay) and tide swept channels. Broadscale habitats include mud habitats in deep water (e.g. offshore of the Cumbrian Coast) and large areas of intertidal mudflats (e.g. around the Mersey Estuary) (Biodiv_306)
- UK Biodiversity Action Plan (BAP) habitats include extensive areas of coastal saltmarsh (Biodiv_648)
- Offshore a small number of species FOCI include native oyster (*Ostrea edulis*) and fan mussel (*Atrina fragilis*). Habitat FOCI include subtidal sands and gravels, and sea pens and burrowing megafauna (Biodiv_301)
- There is the potential for impacts from large scale coastal developments including, tidal lagoon (Workington, West Cumbria) and nuclear power station (e.g. Moorside) developments. Impacts in the inshore plan area may include habitat loss or change, introduction of hard substrate as artificial reefs and changes in hydrodynamics affecting marine organisms (Biodiv_501, 514)
- There is a disturbance or shift in the range of native species due to habitat loss through sea level rise and coastal squeeze and storm events linked to climate change. These impacts will increasingly lead to effects such as submergence or erosion of intertidal rocky habitats (Biodiv_535)

Baseline/issues: South West Plan Areas 8 9

- The inshore plan contains numerous records of species FOCI, including lagoon sand shrimp (*Gammarus insensibilis*), starlet sea anemone (*Nematostella vectensis*), lagoon sea slug (*Tenellia adspersa*), tentacled lagoon worm (*Alkamaria romijni*), pink sea fan (*Eunicella verrucosa*), maerl (*P. calcareum*), short-snouted seahorse (*Hippocampus hippocampus*), long snouted seahorse (*Hippocampus guttulatus*), peacock's tail algae (*Padina pavonica*), sunset cup coral (*Leptopsammia pruvoti*), stalked jellyfish (*Lucernariopsis campanulata*), lagoon sea snail (*Paludinella littorina*) and ocean quahog. Habitat FOCI include blue mussel beds, and estuarine rocky habitat (e.g. in the Tamar estuary), maerl beds and seagrass beds (e.g. around Falmouth Bay) and areas of potential *Sabellaria spinulosa* reef (e.g. north coast of Devon), fragile sponge and anthozoan communities on subtidal rocky habitat, intertidal boulder communities, native oyster beds, honeycomb reef, seapens and burrowing megafauna, sheltered muddy gravel, subtidal sand and gravels and tide swept channel. (Biodiv_262)
- UK BAP habitats include extensive areas of coastal saltmarsh (Biodiv_648)
- Species FOCI for the offshore plan area include ocean quahog and fan mussel. Habitat FOCI are largely made up of subtidal sands and gravels (Biodiv_259)
- Deep sea habitats (e.g. biogenic reefs, boulder habitats or sponge aggregations) are vulnerable to impacts such as habitat loss or damage from mobile fishing gear (bottom trawling) and smothering of sediment or habitat damage from marine litter (mainly discarded nets). Expansion of deep sea fisheries will increase the likelihood of such impacts (Biodiv_487)
- Potential for impacts from large scale coastal development including tidal lagoons (i.e. Bridgwater Bay, Somerset). Impacts in the inshore plan area may include habitat loss or change, introduction of hard substrate as artificial reefs and changes in hydrodynamics affecting marine organisms (Biodiv_501, 514)
- There is impact of shellfisheries on intertidal and subtidal rocky and estuarine habitats within the inshore plan area, including removal of non-target species and habitat damage or loss, including sensitive reefs and maerl beds (Biodiv_562-564)
- Coastal lagoons within the inshore plan area have been particularly impacted by infilling and marine construction (Biodiv_574)

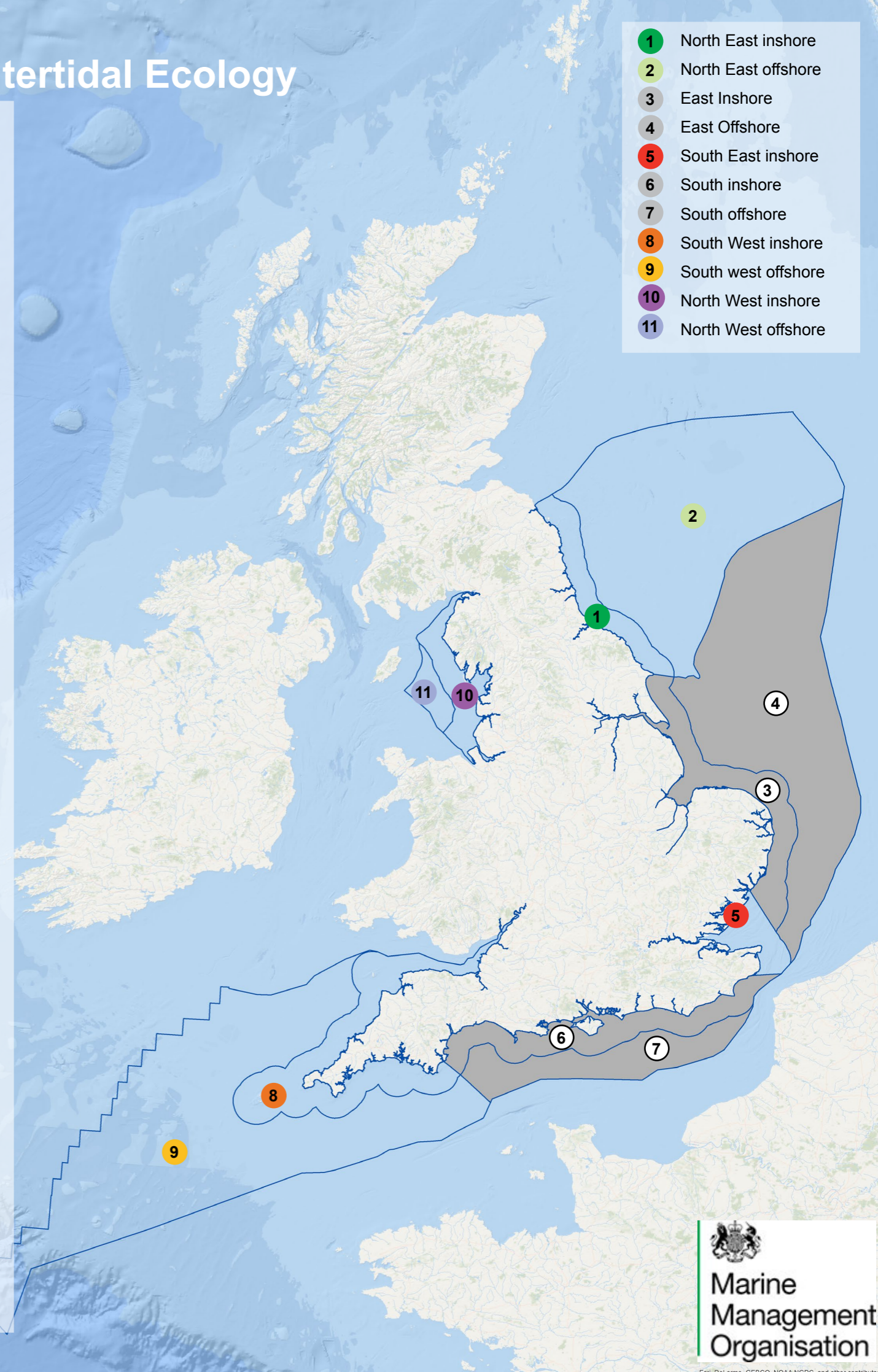
Baseline/issues: North East Plan Areas 1 2

- Within this plan area, habitat types typically range from fine muds and sands to mixed and coarse sediments, with deeper coarse sediment and mud offshore, and muddy sands and rock along coastal areas. Within the inshore plan area species FOCI include red seaweed (*Cruoria cruoriaeformis*) and stalked jellyfish (*Haliclystus auricula*), ocean quahog, European spiny lobster (*Palinurus elephas*), native oyster, and maerl. Habitat FOCI include seagrass beds, blue mussels beds, estuarine rocky habitats, intertidal boulder communities, horse mussel beds (*Modiolus modiolus*), ross worm reefs, sheltered muddy gravel, subtidal chalk, subtidal sand and gravels and tide swept channels (Biodiv_336)
- UK BAP habitats include small areas of coastal saltmarsh (Biodiv_648)
- Within the offshore area, species FOCI include ocean quahog (Biodiv_328)
- There is a disturbance or shift in the range of native species due to habitat loss through sea level rise and coastal squeeze and storm events linked to climate change (Biodiv_535)
- There is an impact of shellfisheries on intertidal and subtidal rocky and estuarine habitats within the inshore plan area, including removal of non-target species and habitat damage or loss, including sensitive reefs (Biodiv_562-564)

Baseline/issues: South East Plan Areas 5

- A variety of sediment types are present in this plan area, ranging from fine muds and sands, mixed and coarse sediments. Patches of deeper coarse sediment and rock extend further away from the coast (Biodiv_288)
- Species FOCI include St John's jellyfish (*Lucernariopsis cruxmelitensis*), lagoon sand shrimp, starlet sea anemone, lagoon sea slug, tentacled lagoon worm, ocean quahog and native oyster. Habitat FOCI include blue mussel beds, estuarine rocky habitats, intertidal boulder communities, littoral chalk communities, ross worm reefs, seagrass beds, sheltered muddy gravel, tide swept channels, subtidal sand and gravels and an area of subtidal chalk around Ramsgate. Broadscale habitat includes intertidal mudflats in much of the Thames Estuary (Biodiv_289)
- UK BAP habitats include extensive areas of coastal saltmarsh (e.g. within the Medway / Swale estuarine complex and numerous Essex estuaries) (Biodiv_648)
- Pressures on subtidal sediments from activities such as dredging (especially Thames Estuary but also potentially other future locations such as Goodwin Sands (Biodiv_542)

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Benthic and Intertidal Ecology

Summary of the legislative / policy context

Benthic and intertidal species and habitats are protected through a range of international and national legislation including:

- Habitats and species of principal importance in England, under the [Natural Environment and Rural Communities \(NERC\) Act 2006](#), including the stalked jellyfish, St John's jellyfish and pink sea fan
- Species and habitat Features of Conservation Interest (FOCI) and broad-scale habitats referred to in the Ecological Network Guidance as MCZ features following the [Marine and Coastal Access Act, 2009](#)
- Habitats such as biogenic reefs, estuaries, coastal lagoons, mudflats and sandbanks are listed under Annex I of the [EC Habitats Directive](#);
- Habitats or species listed as threatened and/or declining by OSPAR, including ocean quahog, intertidal mudflats, maerl beds and Sabellaria reefs
- Species listed under Schedule 5 of the [Wildlife and Countryside Act \(1981\)](#), such as fan mussel, lagoon sand shrimp and northern hatchet shell
- Priority species under the [UK BAP \(and subsequent UK Post-2010 Biodiversity Framework\)](#), such as maerl, fan mussel and native oyster
- Priority habitats under the UK BAP (and subsequent UK Post-2010 Biodiversity Framework), such as Sabellaria reefs, mudflats, saltmarsh, seagrass beds, maerl beds and saline lagoons

The area, range, distribution and condition of listed and predominant habitat types are included in the [Marine Strategy Framework Directive](#) under the Good Environmental Status (GES) Descriptors 1 and 6. Implementation of the [Water Framework Directive](#) includes biological targets for coastal and estuaries including saltmarsh and benthic invertebrates in order to determine ecological status.

Within the seven marine plan areas, there are numerous protected sites designated for, or in part for, the presence of particular benthic or intertidal habitats or species, including Special Areas of Conservation (SACs), Sites of Special Scientific Interest (SSSIs) and Marine Conservation Zones (MCZs) which are discussed in the Protected Sites and Species section. In addition, several local plans within the inshore areas include conservation policy for sensitive habitats or seascapes with Local BAPs also in place.

Key cross cutting baseline / issues across all plan areas

- Effects of pollution from marine activities (aquaculture, shipping, oil and gas, marine construction) on benthic and intertidal habitats and species, including cumulative impacts from increasing levels of contaminants. Intertidal and estuarine species and habitats are at particular risk from a variety of pollutants entering the marine environment through point discharges, diffuse atmospheric and riverine pathways and accidental spillages. Contaminants such as heavy metals, pesticides and organochlorines (such as PCBs) can reach sublethal to lethal effects in marine organisms and lead to bioaccumulation in higher trophic levels. Persistent contamination can reduce biodiversity, resulting in impoverished communities composed of pollution-tolerant organisms (Biodiv_420)
- Reduced prey availability for some benthic and intertidal organisms due to impacts of ocean acidification on plankton increasingly affecting food webs (Biodiv_421-422)
- Change in habitat condition and habitat loss through sea level rise, coastal squeeze, storm events from climate change and creation of coastal defences. This is particularly a concern in sensitive intertidal areas, such as the Severn Estuary which is facing significant habitat loss due to coastal squeeze. Risk also includes insufficient habitat creation (Biodiv_423-424)
- Impacts to subtidal sediments from mobile fishing gear (such as bottom trawls and dredges) can cause damage and create disturbance resulting in loss of benthic habitats and species (Biodiv_425-427)
- Impacts on subtidal sediments from offshore industry (e.g. aggregate extraction, dredging, and offshore energy production) is an issue for the NE, SE and NW plan areas (with further detail provided below for SW and SE plan areas). At various locations near large ports, subtidal rocky habitat has been lost due to the provision of infrastructure (mainly coastal), other construction or via smothering from dredged deposits (Biodiv_542)
- Broad-scale changes in habitats and species are increasingly likely, resulting from rising sea temperatures due to climate change. Effects include loss of habitat, declining biodiversity and increasing abundance of non-indigenous species, ultimately altering the structure of communities and ecosystem processes (Biodiv_428-430)
- Increasing levels of pollution and nutrient enrichment within benthic and intertidal sediments, particularly in the NW, SE and SW plan areas (Biodiv_571-572)
- In some areas of the NW, SE and SW plan areas, invasive species such as common cordgrass (*Spartina anglica*) have led to widespread changes to saltmarshes and mudflats (Biodiv_511-512)
- Deteriorating intertidal sediment habitats in all inshore plan areas due to cumulative effects associated with historical land claim, presence of coastal structures, the presence of non-native species and beach litter (Biodiv_470-471)

The likely evolution of the environment over the plan duration

- Increasing anthropogenic CO2 levels will result in changes in plankton abundance and distribution, having negative consequences for higher trophic levels, including to benthic and intertidal ecology, as the distribution and reproduction of benthic and intertidal species is often linked to plankton either due to a planktonic larval stage or because plankton forms a significant part of their diet
- Increasing pressure from climate change - most notably changes in sea temperature influencing species distribution (although it is still unclear how this will affect subtidal habitats in particular). As temperature increases, some warm-water, rocky shore species will continue to advance northwards and native coldwater species will be lost from southern areas where their upper thermal tolerance levels are exceeded, such as the warm-water limpet *Patella depressa* which is now more common than the cold-water species *Patella vulgata* at many locations in southern England. This may also be linked to other effects – for example, the honeycomb worm *Sabellaria alveolata* has become re-established in the NW plan area after a long absence, possibly partly in response to warmer waters, and therefore a move northwards is possible
- Establishment of non-indigenous species which are likely to further expand their range in UK waters, such as the barnacle (*Elminius modestus*) and wireweed (*Sargassum muticum* colonising) intertidal rocky habitats and the invasive common cordgrass (*Spartina anglica*), which changes the habitat structure of saltmarsh and mudflat habitats
- High levels of coastal erosion and the resulting construction of hard coastal defence structures have led to reduced sediment input and intertidal sediment habitats being increasingly confined in estuarine areas. Such coastal squeeze is likely to increase as climate change results in increasing rates of sea level rise. Intertidal habitats such as saltmarsh, mudflats and rocky habitats continue to be at risk
- Impacts from mobile demersal fishing activities, such as trawling, have severely impacted (and continue to impact) subtidal and shelf habitats as well as rocky habitats to a lesser extent. Such activities have caused damage to these habitats and led to the disappearance of many large slow-growing and/or fragile invertebrate species, including biogenic reefs such as horse mussel beds and Sabellaria reefs
- There is continued pressure on marine habitats (although the intensity and likely distribution of anthropogenic effects are not clear) - e.g. bottom trawling and aggregate extraction, in addition to current and predicted levels of construction in the offshore renewable energy sector

Biodiversity, Habitats, Flora and Fauna - Benthic and Intertidal Ecology

Potential interactions with other topics

- One of the key controlling factors in the formation of benthic and intertidal habitats is the underlying sediment composition. Sediments are discussed more fully in the geology, substrates and coastal processes section and geo-conservation is an important consideration
- There are wide-reaching implications of climate change driving changes in habitat range and species distribution, including effects of increasing sea surface temperature and changing coastal processes influencing habitat conditions, plus sea level rise and coastal squeeze
- Indirect impact of ocean acidification as a result of climate change on plankton causes issues with prey availability for all higher trophic levels
- Marine pollution, nutrient enrichment and other changes to water quality (both positive and negative) could have widespread implications for benthic and intertidal habitats and knock-on effects on higher trophic levels including fish, birds and marine mammals
- Effects from pollution and marine activities (e.g. fishing, dredging etc.) are closely linked to levels of economic activity and wider market forces. Benthic and intertidal areas provide important goods and services that support a wide range of economic activities, including fishing, aquaculture, tourism etc
- Economic activities such as fishing, dredging, drilling, offshore development, flooding and erosion risk management may also adversely affect benthic and intertidal habitats and ecology through, for example habitat damage or loss, pollution, etc
- Areas of landscape importance may include intertidal areas whilst underwater seascapes interact with benthic habitats and ecology
- Historic and cultural assets may be located in benthic or intertidal areas. Efforts to protect and conserve benthic and intertidal areas may have benefits for historic assets (and vice versa)
- Invasive species have an impact on species abundance and distribution as they can out-compete native species
- Benthic and intertidal ecology interact with fish, shellfish, marine megafauna, birds and other biological factors through food webs and the provision of habitats for all life cycle stages. Inshore areas may be particularly important during key life cycle stages for certain species of fish, shellfish, birds and marine megafauna (e.g. during periods of migration, breeding, calving etc.)
- Some benthic and intertidal areas are contained within protected sites as part of the Marine Protected Area (MPA) network and reference should be made to the Protected Sites section for further information

Potential transboundary issues

- Impacts on inshore and offshore habitats in the NW, NE and SW plan areas from large scale transboundary offshore development and fishing activity, such as those from other English plan areas (e.g. development on Dogger Bank), Welsh or Scottish waters (most notably the Solway Firth) or waters around the Isle of Man or the Celtic Sea
- Some protected or designated sites including Special Areas of Conservation (SPAs), Sites of Special Scientific Interest (SSSIs) and Marine Conservation Zones (MCZs) cross boundaries into other UK plan areas, most notably within estuaries that form boundaries between England, Scotland and Wales (i.e. Solway, Tweed, Dee and Severn)

Key data gaps

- The extent of marine litter within the UK seas and the effects of such litter on the marine environment are not presently robustly characterised
- There is still a lack of understanding of the long term national habitat and population (species) level effects of climate change
- [Charting Progress 2](#) reports that only 10% of the UK continental shelf has been mapped and indicates that many of the available habitat descriptions have been modelled rather than directly observed/ground truthed. Greater accuracy, resolution and scope are needed for future habitat mapping to reduce uncertainty and better describe habitat extent, distribution and status. Tools are being developed to assist with this, such as [MSFD Habitat Area Indicator Development \(ME5318\)](#)
- The level of vulnerability and recoverability of habitats will differ and are not always fully known, so worst case scenario is generally employed for conservation policy and in site-specific impact assessment
- Some uncertainty over which habitats are at risk from fishing methods which physically affect the seabed, including gaps in data on where fishing activity takes place
- Over the longer term there will be a need to understand the energy flows within food web and the structure of food webs (size and abundance), development of detailed baseline information and understanding of natural variation, for assessing the quality/condition of benthic habitats as well as habitats resilience towards pressures exerted upon them
- Thresholds for habitat and population level (species) quality status should be regularly reviewed and adapted at a strategic level to contribute to meaningful targets for good environmental status under the Marine Strategy Framework Directive (MSFD)
- There is an unknown potential for carbon capture and storage within the NE and NW plan areas, the impacts of which are likely to be similar to those from other offshore industry activities, such as oil and gas
- There is a wealth of benthic and intertidal ecological data collected and held within the private sectors e.g. ports and harbours, oil and gas, and marine aggregate sectors or detailed in statutory Environmental Statements for marine/coastal developments that could also be used at a strategic level
- More work is needed to define the ecological value of areas in order to make strategic policy level and individual development level decisions

Biodiversity, Habitats, Flora and Fauna - Fish & Shellfish

Baseline/issues: North West Plan Areas 10 11

- Fish stocks: Commercial fish stocks are not at Maximum Sustainable Yield (MSY) or are not harvested sustainably for all stocks except plaice, although stocks are improving (except for cod *Gadus morhua*; and flounder *Platichthys flesus*). There is evidence of a shift towards smaller sized fish as a result of fishing pressure (Biodiv_308)
- Climate change: There is some evidence of climate change, with species previously found further south becoming more common in the plan area e.g. Black seabream (*Spondyliosoma cantharus*), John Dory (*Zeus faber*) and anchovy (*Engraulis encrasicolus*) (Biodiv_509)
- Migratory fish: There are several important salmon estuaries in the plan area. The Wyre, Leven, Crake and Calder are classed as 'failing' conservation limits (set by the Environment Agency and Cefas). Conservation limits in the Lune, Esk, Kent and Calder are uncertain (Biodiv_323)
- Shellfish: There are important shellfish beds for cockles (*Cerastoderma edule*) in Morecambe Bay (Biodiv_324) and mussels (*Mytilus edulis*) in Heysham flat, New Brighton and Lytham (Biodiv_325). Morecambe Bay, Barrow and Lune are designated for native oyster (*Ostrea edulis*) and Pacific oyster (*Crassostrea gigas*) production. The Solway Firth is also designated for Pacific oyster production (Biodiv_643)
- Spawning and nursery areas: The whole plan area is important for spawning cod (*Gadus morhua*), whiting (*Merlangius merlangus*) (Biodiv_310) and sole (*Solea solea*) (Biodiv_312). Liverpool Bay is an important sandeel (*Ammodytes*) spawning area (Biodiv_304). Both inshore and offshore NW plan areas are important nursery grounds for herring (*Clupea harengus*), cod and whiting (Biodiv_309). The plan area south of Lancaster is an important sole nursery area (Biodiv_311), while the offshore plan area is an important plaice (*Pleuronectes platessa*) nursery area (Biodiv_299). The Solway, northern part of the Irish Sea and the area to the north east of Anglesey are important nursery grounds for spurdog (*Squalus acanthias*) (Biodiv_303). There are important bass nursery areas at Heysham Power Station (Biodiv_654)

Baseline/issues: South West Plan Areas 8 9

- Fish stocks: Commercial fish stocks are not at MSY or are not harvested sustainably for all stocks except sole (Biodiv_486). There is evidence of a shift towards smaller sized fish as a result of fishing pressure (Biodiv_486). Poaching and/or overfishing have been identified as issues in the South Devon AONB (Biodiv_483)
- Migratory fish: There are several important salmon estuaries in the plan area. The Erme, Yealm, Plym, Torridge and Tavy are failing conservation limits; the Avon (Devon), Fowey and Camel are passing conservation limits, while the conservation limits for salmon in the Tamar, Lynher, Taw and Lyn are uncertain (Biodiv_254). The Severn Estuary / Bristol Channel is also important for salmon and several other migratory fish, namely: European eel (*Anguilla anguilla*); Allis (*Alosa alosa*) and Twaite (*Alosa fallax*) shad; sea (Petromyzon marinus) and river (*Lampetra fluviatilis*) lamprey; and sea trout (*Salmo trutta*) (Biodiv_255)
- Spawning and nursery areas: The Severn Estuary / Bristol Channel is an important nursery and spawning area in general (Biodiv_255) and specifically important for spawning cod and whiting (Biodiv_257). The offshore area is an important spawning and nursery area for mackerel (*Scomber scombrus*) (Biodiv_298). There are also several important bass nursery areas in Salcombe Harbour, River Avon (Devon), River Yealm, Plymouth rivers, Rover Fowey, Fal Estuary, Percuil River, Helford River, River Camel, River Torridge and River Taw (Biodiv_256)
- Shellfish: The area around Truro, Tresillian and the Fal Estuary are designated for mussel, native oyster and Pacific oyster production (Biodiv_645). The River Fal is one of the few places where large beds of native oyster are still found. Threats to native oyster beds include pollution, parasites and invasive species, particularly the slipper limpet (*Crepidula fornicata*) (Biodiv_499), American oyster drill (*Urosalpinx cinerea*) (Biodiv_573) and the Pacific oyster (Biodiv_504) (see Invasive species report card). The National Lobster Hatchery is based in Padstow. It released over 50,000 juvenile lobsters in 2014 to support wild lobster stocks (Biodiv_640)
- There are several proposals for tidal lagoons in the inshore plan area, which could affect fish (migratory species and those sensitive to noise / physical damage as a result of changes in pressure or passing through turbines e.g. Herring) (Biodiv_508)

Baseline/issues: North East Plan Areas 1 2

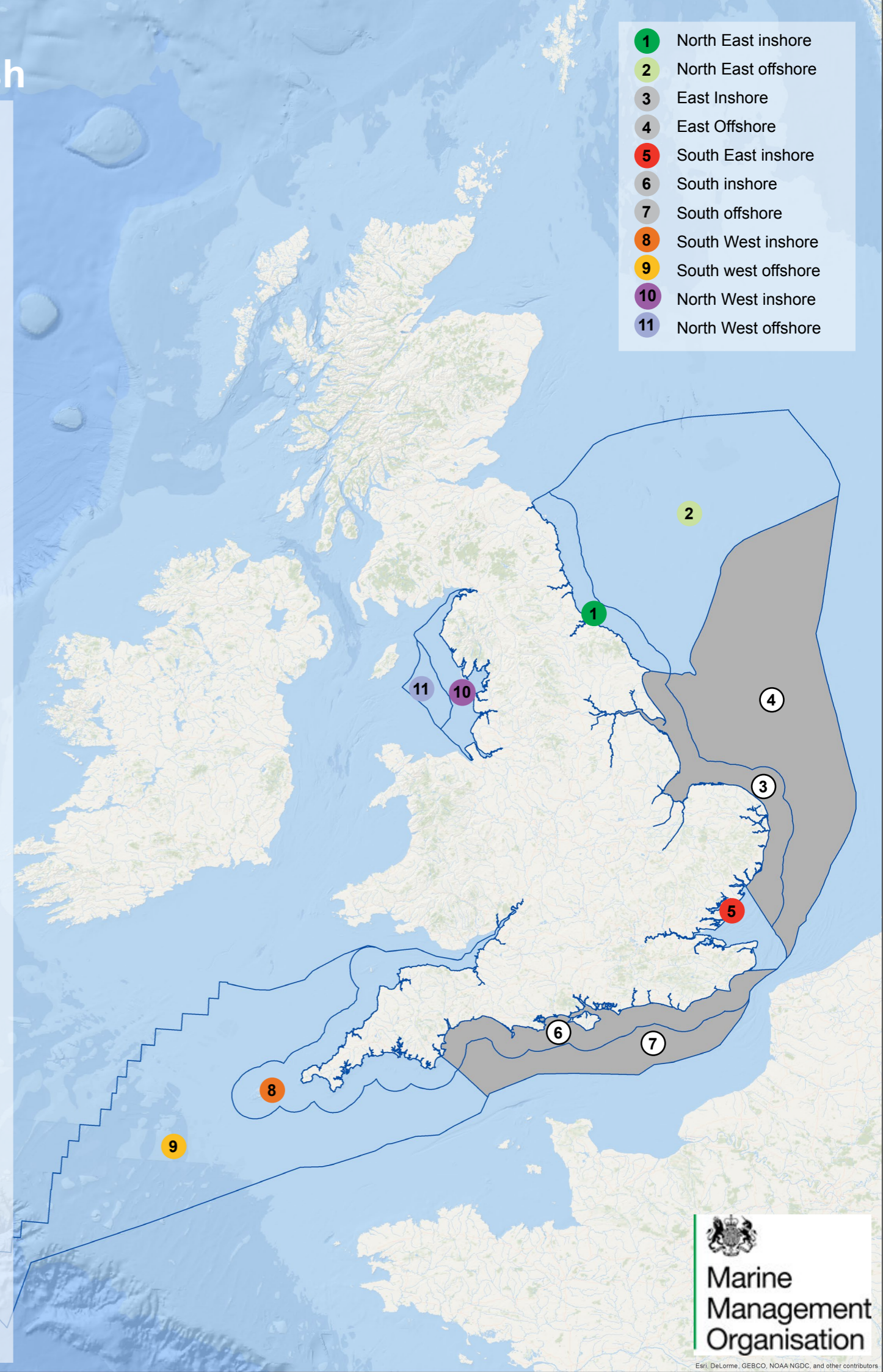
(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- Fish stocks: Commercial fishing is impacting on fish stocks with evidence of a shift towards smaller sized fish. Stocks for haddock (*Melanogrammus aeglefinus*) and saithe (*Pollachius virens*) are not improving (Biodiv_340). There are high levels of discarding in the Farne Deep Nephrops fishery (Biodiv_341) and the adult stock size is too small (Biodiv_345). Scallop (King; *Pecten maximus* and Queen; *Aequipecten opercularis*) (Biodiv_342) and edible crab (*Cancer pagurus*) (Biodiv_343) stocks are in poor condition in the area and whelk (*Buccinum undatum*) stocks are also declining (Biodiv_339)
- Shellfish: There are several important shellfish beds (mussels and winkles; *Littorina littorea*) in this plan area, including those at Flamborough Head, Scarborough, Cayton Bay, Scalby, Cloughton, Whitby, Kettleless, Redcar and Sunderland (Biodiv_333). The area around Holy Island is a designated native and Pacific oyster shellfish production area (Biodiv_644)
- Migratory fish: Important salmon estuaries in the plan area are the Tees, Coquet, Wear, Tyne and Tweed. The Tyne is classed as 'failing' conservation limits, while the Tees, Coquet and Wear are all 'passing' (Biodiv_332).
- Spawning and nursery areas: The area contains important nursery areas for cod, herring and whiting (Biodiv_344)

Baseline/issues: South East Plan Areas 5

- Fish stocks: Commercial fishing is impacting on fish stocks, although stocks are improving (except for haddock and saithe). There is evidence of a shift towards smaller sized and opportunistic fish dominating the fish community (Biodiv_276)
- Migratory fish: The Thames Estuary is important for migratory fish (Twaite shad stock is improving (Biodiv_279), but salmon and sea trout numbers are declining (Biodiv_277). In general, salmon and eel populations in estuaries in this plan area are deteriorating (Biodiv_639)
- Spawning and nursery areas: The whole plan area is an important spawning and nursery area for sole (Biodiv_281), while the Thames Estuary is important for herring (spawning and nursery) (Biodiv_280). The Thames Estuary also contains breeding smelt stock (Biodiv_278). There are also important sea bass (*Dicentrarchus labrax*) nursery areas in this plan area at Bradwell power station, Grain power station and Kingsnorth power station (Biodiv_282)
- Shellfish: A significant proportion of the plan area is covered by designated shellfish waters. Species that are cultured include mussel, Manila clam (*Venerupis philippinarum*), native oyster and Pacific oyster (Biodiv_642). The Thames estuary is one of the few places where large beds of native oyster are still found. Threats to native oyster beds include pollution, parasites and invasive species, particularly the slipper limpet (Biodiv_499), American oyster drill (Biodiv_573) and the Pacific oyster (Biodiv_504) (see Invasive species report card). Native oysters are a feature of the Blackwater, Crouch, Roach and Colne Marine Conservation Zone (MCZ) (Biodiv_386) (see Protected sites and species report card)
- Electric (pulse) beam trawling is a novel and increasing fishing technique, mainly used by Dutch vessels at present which operate in this plan area. The technique is very efficient and may adversely affect inshore fish stocks (target and non-target species), as well as benthic habitats and species, however the gear is lighter than 'traditional' trawls (Biodiv_492). An ICES Working Group is currently reviewing the knowledge relating to pulse fishing for a range of species, the potential impacts to target and non-target species and the management of pulse fishing (Biodiv_655)

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Fish & Shellfish

Summary of the legislative / policy context

Please note that information related to the economic activity of commercial fishing is found under 'economics' with this section relating to fish and shellfish ecology/populations/health only. The main policy and legislative instruments for managing fish stocks include:

- [Common Fisheries Policy \(CFP\) \(EU 1380/2013\)](#) for managing commercial marine fish stocks
- [Council Regulation 1100/2007](#) on establishing measures for the recovery of the stock of European eel (*Anguilla anguilla*). This Regulation aims to manage the whole stock to ensure a 40% return rate
- [The Salmon Act \(1986\)](#) and the [Habitats Directive](#) and the Convention for the Conservation of Salmon in the [North Atlantic Ocean \(1983\) \(NASCO\)](#) protect and manage salmon (*Salmo salar*) stocks
- The Habitats Directive also protects other migratory fish species (Annex II species) - sea lamprey (*Petromyzon marinus*), river lamprey (*Lampetra fluviatilis*) and Allis (*Alosa alosa*) and Twaite (*Alosa fallax*) shad – while the [Water Framework Directive \(WFD\)](#) aims to remove or prevent barriers to migratory fish passage
- [The Wildlife and Countryside Act \(1981\)](#) protects certain vulnerable fish species (basking shark (*Cetorhinus maximus*), angel shark (*Squatina squatina*), and white skate (*Rostroraja alba*))
- [The Tope \(prohibition of fishing\) Order 2008](#) protects the tope shark (*Galeorhinus galeus*)
- Local byelaws protect and manage fish and shellfish stocks in Inshore Fisheries Conservation Authority areas, in response to local conditions

Fish stock health is mainly monitored for commercially fished species, with little information on non-target species. The UK provides information to support the stock assessments carried out by ICES (International Council for the Exploration of the Sea), which formulates scientific advice the European Commission on the management of fish stocks, including fish stock health. Under the [Marine Strategy Framework Directive \(MSFD\)](#), Good Environmental Status (GES) Descriptor 3 relates to commercial fish and shellfish stocks. Arguably, all GES Descriptors are of relevance to the health of fish and shellfish by supporting marine ecosystem health and marine food webs.

Key cross cutting baseline / issues across all plan areas

Fish stocks: Many UK fish stocks are not fished sustainably (Biodiv_477). In 2013, only 31% of indicator fish stocks around the UK were in full reproductive capacity and were being harvested sustainably (Biodiv_587). 48% of Atlantic fish stocks are being fished above Maximum Sustainable Yield (MSY) and Total Allowable Catch (TAC) is being set on average 7% higher than ICES advice (Biodiv_475). All European eel belong to a single stock, which is severely depleted (Biodiv_472) (Biodiv_479). Sea bass stocks in all areas are in a poor and declining state as a result of fishing pressure (Biodiv_480). Action is being taken at an EU level to attempt to reverse the poor state of both these stocks.

Sharks: Portuguese dogfish (*Centroscymnus coelolepis*), gulper shark (*Centrophorus granulosus*), leafscale gulper shark (*Centrophorus squamosus*), basking shark (*Cetorhinus maximus*), porbeagle (*Lamna nasus*), spurdog (*Squalus acanthias*), and Angel shark (*Squatina squatina*) are listed as threatened and/or declining by OSPAR (Biodiv_588). In the UK, tope fishing is only permitted using rod and line and catch limits are in place, due to the poor state of the stock. Tope is listed as 'vulnerable' on the [IUCN Red List](#).

The likely evolution of the environment over the plan duration

Climate change is an issue potentially affecting all areas in the future. Climate change could have a number of impacts including altering predator and prey species dynamics due to a change in the timing of key life cycle events (Biodiv_473) or the distribution of species. Changes in the geographic range /distribution of fish species may affect competition for food and habitat, as more southerly species move northwards. Climate change impacts to habitats and species may directly or indirectly affect fish (Biodiv_543) by altering the distribution or extent of key habitats or by altering food webs. Ocean acidification is linked to climate change and there has been an observed increase in seawater pH; this may have impacts to the food chain / marine food webs, with possible impacts to shellfish biology (shell formation) (Biodiv_478). Coastal squeeze may affect the extent or quality of important inshore nursery and spawning areas, such as estuaries (Geol_179).

Developments in estuaries, on the coast and further offshore may affect fish species, particularly during vulnerable life cycle stages (migration, spawning, nursery). Activities such as dredging, aggregate extraction, energy generation (tidal power, windfarms, nuclear and conventional power stations and associated power cables), shipping and water use (abstraction and discharges) may affect fish through generation of sedimentation, changes in coastal processes, noise, electromagnetic fields, intakes, outfalls and barriers to migration.

Improvements to water quality in inshore areas and estuaries have been beneficial to many fish species, including migratory species, which have returned to estuaries and rivers from which they have been absent. Water quality improvements in these areas may also have benefited species that use these areas for spawning and as nursery area. These improvements are expected to continue as WFD and MSFD aims are implemented.

Potential interactions with other topics

Fish and shellfish most directly interact with the fishing industry (commercial and recreational) and aquaculture. Fishing relies on fish stocks, while fish stock health (target and non-target) is related, to a greater or lesser extent on fishing activity for commercial species. Other economic activities also interact with fish and shellfish (dredging, aggregates, energy, shipping – see above). Aquaculture may lead to the escape of species (both native and non indigenous) that interact with native shellfish (see below). Aquaculture of native shellfish species may also affect wild populations through, for example production of pseudofaeces, smothering of benthic habitats and through competition for habitats and food (Biodiv_641).

Fish and shellfish also interact with benthic and intertidal ecology, which provide food sources and important habitats for all life cycle stages; and with plankton, which provide food sources (directly or indirectly). Fish and shellfish eggs, larvae and early life stages also make up an important component of the plankton assemblage. Inshore areas may be particularly important during key life cycle stages (migration, breeding). Some protected sites are important to fish stocks, while specific fish species are protected under legislation that protects a wide range of marine species.

Water quality may directly affect fish and shellfish health, or indirectly affect prey species or habitat quality. Improvements to water quality will have beneficial impacts.

Fish may ingest marine litter, or impacts from marine litter may affect prey species.

Invasive species may affect fish and shellfish directly through competition, predation or by bringing disease / parasites, or indirectly by affecting food sources or the availability of habitat. Potential interactions with climate change are set out above.

Potential transboundary issues

Fish and fishing activity are highly mobile. Management is not carried out at plan level and both stocks and fishing activity may spread beyond individual plan boundaries, as well as beyond UK administrative boundaries (England, Wales, Scotland and Northern Ireland) and UK borders (EU and non-EU countries). Activities or plans in English marine plan areas may affect fish and shellfish populations in other UK administrations and/or other EU countries.

Key data gaps

- Data relating to MSY or stock health / status is only normally available for commercially fished species (unless species is also a protected species e.g. some sharks)
- Underwater noise impacts on fish are recognised as a concern, but information on impacts (and on background noise levels) is lacking. Noise may affect migration, communication, reproduction, foraging, with knock on effect to populations
- The extent of marine litter within the UK seas and the effects of such litter on the marine environment are not robustly characterised. Ingestion of or with entanglement marine litter may lead to damage or death of individuals and possible reproduction / population impacts
- Lack of understanding of the effects of climate change on fish and shellfish stock distribution, spawning, reproduction and populations
- Information relating to the effects of electromagnetic fields on fish is lacking and impacts are uncertain
- Electric beam trawling is a novel and increasing fishing technique, mainly used by Dutch vessels at present within the South East plan area. The impacts to target and non-target fish and shellfish, as well as impacts to benthic habitats and species are not well understood and further research and control may be required



Biodiversity, Habitats, Flora and Fauna - Marine Mega Fauna

Baseline/issues: North West Plan Areas 10 11

- Leatherback turtles (*Dermochelys coriacea*) are a summer visitor to this marine plan area, preying on jellyfish (Biodiv_313)
- Harbour porpoise (*Phocoena phocoena*) are common throughout the Irish Sea, including the NW inshore and offshore plan areas - notably around the Solway Firth and between Luce Bay and the Isle of Man. Other cetacean species that are occasionally observed in the Irish Sea and may enter the NW Plan area include bottlenose dolphin (*Tursiops truncatus*), short-beaked common dolphin (*Delphinus delphis*), pilot whale (*Globicephala melas*), killer whale (*Orcinus orca*), minke whale (*Balaenoptera acutorostrata*) and Atlantic white sided dolphin (*Lagenorhynchus acutus*), with a small Risso's dolphin (*Grampus griseus*) population around the Isle of Man. Rare species in the area include humpback whale (*Megaptera novaeangliae*) and fin whale (*Balaenoptera physalus*) (Biodiv_314-316 and Biodiv_680-682)
- A small population (5-7,000 animals) of grey seals (*Halichoerus grypus*) utilises all but the very NW Irish Sea for foraging, including a colony of c.200 seals at Walney Island in Cumbria. Pupping in this marine plan area occurs between September and November (Biodiv_317, Biodiv_569)
- The Isle of Man is an important area for basking sharks (*Cetorhinus maximus*) and sightings have been reported in the NW plan area. Seasonal differences in abundance occur with numbers increasing in May, peaking in June and tailing off by September. The overall numbers / sightings are reported to be increasing (Biodiv_318)
- There is an issue of bycatch from inshore pot (shellfish and mollusc) fisheries which is commonly observed as a cause of turtle mortality in the inshore area (Biodiv_566-568)
- Impacts on basking sharks from fisheries (including entanglement) and marine eco-tourism have been recorded. Anecdotal evidence of vessel collisions is available off Cornwall and may also apply in other locations that the species is present (Biodiv_502-503 and Biodiv_649)

Baseline/issues: South West Plan Areas 8 9

- The most common cetaceans in the area around the Celtic Sea and Western Channel are the common dolphin, harbour porpoise, bottlenose dolphin and minke whale. There are occasional sightings of Risso's dolphin, white beaked dolphin, long-finned pilot whale and humpback whale, with sperm whale and fin whale occasionally found in the offshore plan area. Rare species to this plan area include killer whale and Atlantic white-sided dolphin, with rare fin whale and sperm whale sightings in inshore waters, and rare sightings of beaked whales (*Mesoplodon* spp.) and northern bottlenose whale (*Hyperoodon ampullatus*) in deeper offshore waters. (Biodiv_265-267 and Biodiv_683-686)
- Small colonies of grey seals can be found around the SW coast, and around Lundy and the Isles of Scilly. Pupping occurs August to September (Biodiv_268, Biodiv_678)
- The SW plan area is an important area for basking sharks. Seasonal differences in abundance occur with an increase in May, peaking in June and tailing off by September. Overall numbers/ sightings reported are increasing (Biodiv_269)
- Impacts on basking sharks from fisheries (including entanglement) and marine eco-tourism have been recorded. Anecdotal evidence of vessel collisions is available off Cornwall (Biodiv_502-503 and Biodiv_649)
- Leatherback turtles are a summer visitor to this marine plan area preying on jellyfish (Biodiv_264)
- There is an issue of bycatch from inshore pot (shellfish and mollusc) fisheries which is commonly observed as a cause of turtle mortality in the inshore area (Biodiv_566-568)

Baseline/issues: North East Plan Areas 1 2

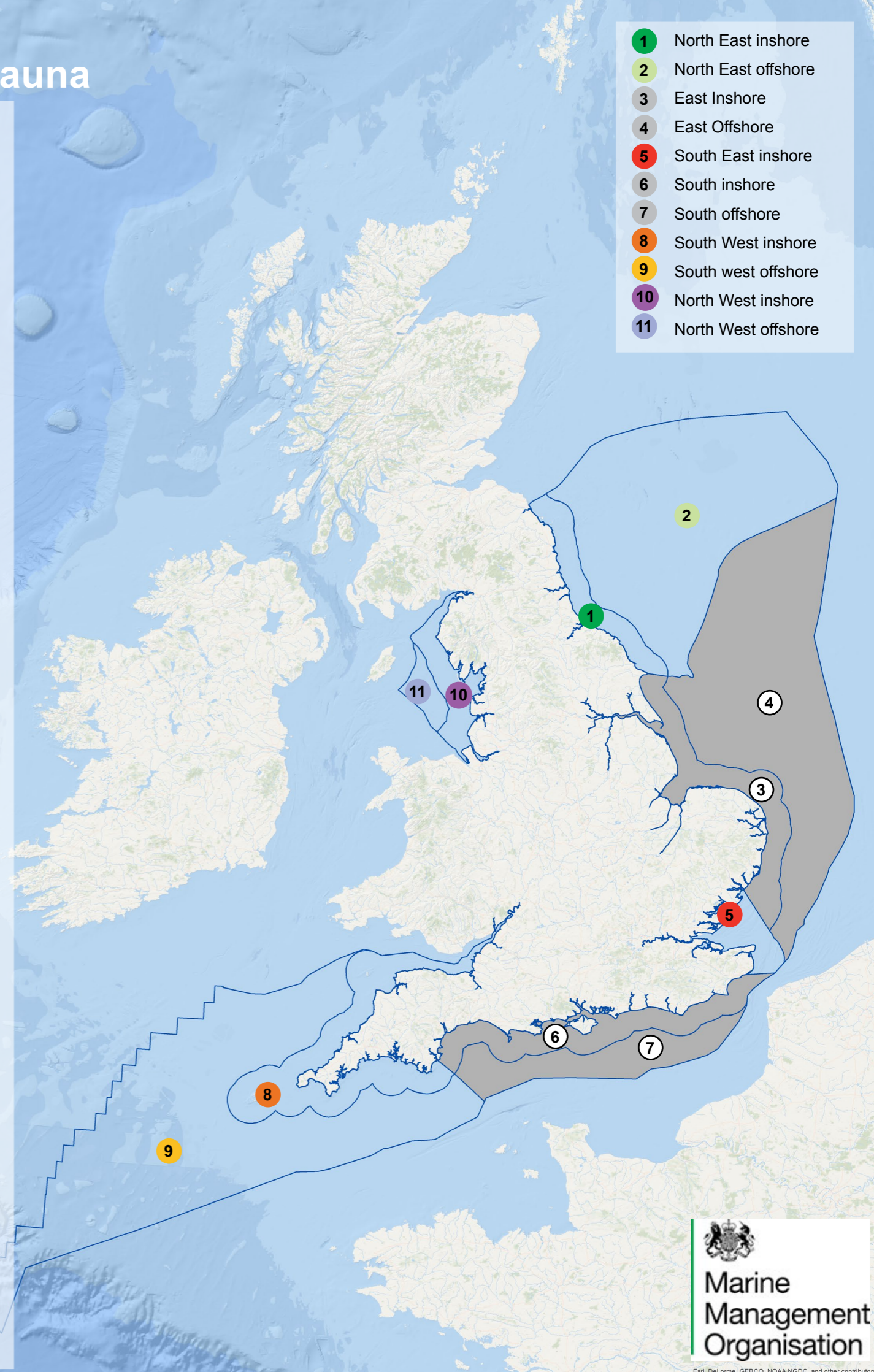
(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- Three cetacean species are commonly found in the NE Plan area – harbour porpoise, white-beaked dolphin (*Lagenorhynchus albirostris*) and minke whale. Other species occurring occasionally in the NE Plan area include bottlenose dolphin and Atlantic white-sided dolphin, with rare observations of killer whale and sightings of vagrants including sperm whale (*Physeter microcephalus*) and humpback whale (Biodiv_347-348 and Biodiv_688-690)
- One grey seal colony is located in the NE plan area, with an established population of c.3,600 grey seals around the Farne Islands. Pupping takes place between October and December. There are only two known haul-out locations for harbour seals in the NE inshore plan area, at Holy Island and in the Tees Estuary, with distribution of the species throughout this region. Pupping occurs June to July. Grey seals are commonly found along the NE coast, including the Lindisfarne National Nature Reserve, while harbour seals are also occasionally seen along the coast (Biodiv_349-350)
- Turtles are only occasionally sighted in this plan area (Biodiv_355)
- There are no specific issues affecting this plan area that do not affect some or all other plan areas

Baseline/issues: South East Plan Areas 5

- The harbour porpoise is the only cetacean species that is commonly found in the SE plan area, although white-beaked dolphin, minke whale and common dolphin can occasionally be found in this plan area (Biodiv_285 and Biodiv_286 and Biodiv_687)
- Grey seals are present in the plan area and use Goodwin Sands as a haul out site, although this species is not known to breed in the area. Harbour seals are resident and breed in the Greater Thames Estuary, with wide-spread foraging distribution in this region, representing a link between the UK and continental Europe populations (Biodiv_287, Biodiv_679)
- Turtles are only occasionally sighted in this plan area (Biodiv_284)
- There are no specific issues affecting this plan area that do not affect some or all other plan areas

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Marine Mega Fauna

Summary of the legislative / policy context

Marine megafauna are protected through a range of international and national legislation. General legislation is detailed in the database and protected areas and species card. Specific legislation for the regularly observed species include:

- The leatherback turtle and basking shark are both listed as vulnerable on the [IUCN Red List](#) (Biodiv_669)
- Numerous species are listed under the [EC Habitats Directive](#). The grey seal, harbour seal, harbour porpoise and bottlenose dolphin are listed under Annex II, the bottlenose dolphin, common dolphin, harbour porpoise, Risso's dolphin, Atlantic white-sided dolphin, white beaked dolphin, long-finned pilot whale, killer whale, minke whale, fin whale, sperm whale and the leatherback turtle are listed under Annex IV as animal species of community interest in need of strict protection, and the grey seal and harbor seal are listed under Annex V as animal species of community interest whose taking in the wild and exploitation may be the subject of management measures (Biodiv_668)
- Of the species found in these plan areas, the harbour porpoise, leatherback turtle and basking shark are on the [OSPAR List of Threatened and/or Declining Species](#) (Biodiv_670)
- All cetaceans, all turtles and the basking shark are listed under Schedule 5 of the [Wildlife and Countryside Act \(1981\)](#) (Biodiv_671)
- Seals are protected under the [Conservation of Seals Act \(1970\)](#) (Biodiv_38)
- All cetacean species observed in these plan areas are listed as priority species under the [UK BAP](#), with the exception of the humpback whale. The harbour seal, leatherback turtle and basking shark are also listed as priority species (Biodiv_672)
- The distribution, abundance and productivity of marine mammals are included in the [Marine Strategy Framework Directive](#) under the Good Environmental Status (Descriptors 1 and 4). Under these descriptors, six targets are provided including distributional range, abundance and condition for seals and cetaceans, with ten associated indicators. Targets for other descriptors will also influence marine mammals, such as underwater noise (Biodiv_6-7 and Biodiv_66)
- The protection of migratory species are considerations of the [Agreement on the Conservation of Small Cetaceans in the Baltic, North East Atlantic, Irish and North Seas \(ASCOBANS\)](#) (Biodiv_24) and the [Convention on the Conservation of Migratory Species of Wild Animals \(Bonn Convention\)](#) (Biodiv_667)
- There are currently no designated protected areas for any cetacean species within any of these plan areas, although consultation is underway on pSACs for harbor porpoise (NE, SE and SW plan areas). The grey seal is a primary qualifying species for the designation of the Berwickshire and North Northumberland Coast SAC (NE plan area), and is a qualifying feature for the designation of the Lundy SAC and Isles of Scilly Complex SAC (both SW plan area) (Biodiv_673-675)

Key cross cutting baseline / issues across all plan areas

- Physical damage to cetaceans and seals through collision with vessels and other recreational activities. There are reports of propeller strikes on small cetaceans and seals from small vessels within all offshore areas, but little data is available to estimate frequency of such events (Biodiv_559-560).
- Noise and cumulative impacts on marine megafauna e.g. seismic survey (mainly NE and NW areas), piling (mainly SE and NW areas), dredging (mainly NE, SE and NW areas), defence (mainly SW area), shipping, use of acoustic deterrent devices, UXO explosions and potentially wave and tidal devices. Each plan area has its own noise profile that varies according to the types of development and activity (Biodiv_438-445)
- Accidental capture of cetaceans in fishing gear. For example, bycatch in trammel nets and static (gill and tangle) nets is a significant cause of mortality for harbour porpoises in the North Sea, Western English Channel and Celtic Sea (NE, SW and NW plan areas in particular), with entanglement in fishing gear responsible for c.17% of stranded harbour porpoise deaths in 2000-2004. Accidental capture of common dolphins (particularly in the SW plan area), white-beaked dolphin, white-sided dolphin and harbour porpoise have also been reported in salmon drift nets, Dutch mid-water trawls, purse seine nets and longlines (Biodiv_549-551)
- Interaction (competition for food resources) occurs between marine mammals and commercial fishing activity; shifting populations and changes in targeted fish could have future impact on marine mammal populations (Biodiv_536-538). Additionally, entanglement and bycatch of seals in active fishing nets and discarded or storm-damaged (ghost) nets is an issue (Biodiv_553-554) in the NE, SW and NW plan areas
- There is increased disturbance to marine mammals from sightseeing and pleasure boats, including visiting breeding and haul-out sites. Such disturbance from vessel activity (including propeller or engine noise) may result in vessel avoidance and increased dive time. This can cause increased energy expenditure, reduced resting time and could cause cetaceans to abandon or not use ideal habitats, potentially resulting in a reduction of energy reserves which could affect foraging efficiency, overall fitness and reproductive capacity (Biodiv_546, Biodiv_547, Biodiv_555-557) (NE, SW, NW plan areas in particular).
- Ingestion of, or entanglement in, marine litter is a potential issue for marine mammals and turtles. Ingestion of plastic has been recorded in cetaceans however, it is not considered to be a significant pressure at this time in UK waters. Post-mortem examinations of turtles commonly reveal the presence of plastic debris in the gut but data are insufficient to assess the impact of this adequately. Beach litter is present in all plan areas but is most prevalent in the SW plan area. Litter may include that produced by aquaculture and commercial fishing and plastics. More information is provided in the water section (Biodiv_467-469 and Biodiv_650)
- Indirect effects on marine mammals from increased temperature due to climate change. For example, increasing numbers of sightings of fin and minke whales and a southwards shift in harbour porpoise populations are likely to be a result of increasing sea surface temperature and food abundance (e.g. sandeels) affecting species distribution (Biodiv_435-437)
- Reduced prey availability for marine megafauna due to impacts of ocean acidification on plankton (Biodiv_431)
- Impacts to marine mammals due to habitat degradation from pollution. Persistent organic pollutants such as polychlorinated biphenyls (PCB) and flame retardants can disrupt endocrine (hormone) systems resulting in susceptibility to disease and reduced reproductive success (Biodiv_432-434)
- Increasing risk of disease affecting seals as abundance and distribution shifts from the Atlantic to the Irish and North Seas (Biodiv_544-545)
- Lack of MPAs designated for large mobile marine megafauna, including cetaceans and basking shark. There is increasing evidence that MPAs in areas of high productivity can be important for specific life stages such as mating, pupping or nursing, or activities such as feeding, and if they fit into a framework of ecosystem-based management, they could contribute to the protection of wide-ranging species (Biodiv_447)

Biodiversity, Habitats, Flora and Fauna - Marine Mega Fauna

The likely evolution of the environment over the plan duration

- Noise mitigation measures for individual developments can prevent physical damage and reduce disturbance, but in areas where there is an increase in cumulative noise potential effects on marine mammals could result
- With increasing numbers of eco-tourism vessels, the risk of damage from collisions with and disturbance to cetaceans is likely to increase. Similarly increased levels of disturbance are expected from sightseeing and pleasure boats' visits to seal haul-outs
- If the observed trend of increasing sea temperatures continues in line with climate change projections it is expected that the range of some species (e.g. Bottlenose dolphin) will continue to change and this could also lead to a change in predator and/or prey abundance due to a mis-match between predator and prey species as a result of a change in the timing of key life cycle events. Similarly, there is a trend of leatherback turtles being observed at increasing northern latitudes due to increased sea surface temperature and food abundance, resulting in increased interactions with human activity in such areas. It is expected that turtle range will move further northwards which would result in increased leatherback turtle sightings, strandings and bycatch incidences along the southern coast of the UK and up through the Celtic and Irish Seas
- Increasing anthropogenic CO2 levels will result in changes in plankton abundance and distribution, having a knock-on effect on higher trophic levels
- The number of harbour porpoises (1400 to 1700) and common dolphins (276) taken as bycatch in UK fishing nets in 2014 is an increase from that recorded in 2010. Total estimated mortality from Danish and UK fishing in the North Sea alone is c.5,500 porpoises per year which already exceeds sustainable levels. Therefore over plan period these cetacean numbers may decrease in the North Sea
- Unsustainable commercial fisheries that deplete fish stocks will have an influence on seal populations, causing a change in distribution and/or changes in targeted prey species
- Phocine Distemper Virus (PDV) outbreaks are likely to recur in the future but it is not possible to predict the proportion of the seal population that might be affected, which populations are most vulnerable (besides eastern England) or precisely when outbreaks will occur

Potential interactions with other topics

- Wide-reaching implications of climate change driving changes in marine megafauna distribution, including effects of increasing sea surface temperature on habitat conditions and prey availability, such as plankton and fish (e.g. declining sandeels)
- Indirect impact of ocean acidification on plankton causing issues with prey availability for all higher trophic levels
- Marine litter also has widespread implications for fish and birds in terms of ingestion and entanglement
- Effects from underwater noise on cetaceans is closely linked to economic activity in coastal and marine areas
- There are social and economic interactions with marine megafauna, including economic and wellbeing benefits from wildlife tourism and recreation. The benefits of experiencing the natural world on peoples' wellbeing and mental health ('ecotherapy') is endorsed by a number of organisations and the ability to watch cetaceans and seals can be seen within this context, bringing people in to contact with both the sea in its broadest context whilst observing impressive marine mammals and providing niche local income and employment opportunities
- Commercial fisheries has a direct impact on marine megafauna through entanglement and bycatch in fishing nets and collisions with commercial fishing vessels. There are also indirect impacts through competition for food resources between marine megafauna and commercial fish species

Potential transboundary issues

- Activities or plans in English marine plan areas may affect marine megafauna in other UK administrations and/or other EU countries
- Marine mammals are mobile species and several, along with leatherback turtle and basking shark, are also migratory. Such mobile species may also be found in Welsh, Scottish, Irish, Manx and other European waters, and waters outside of Europe where they will be exposed to similar and additional pressures
- In addition there will be connectivity with protected areas outside these plan areas, such as bottlenose dolphin in the Cardigan Bay and Moray Firth SACs, and with policies that give protection in adjoining (non-English) areas covering transboundary populations. E.G. The [Marine Scotland Act \(2010\)](#) protects seals from harassment at haul outs in the Solway Firth
- PDV entered the UK seal populations from Europe (Wadden Sea) and outbreaks are not restricted to within the marine plan areas

Key data gaps

- Charting Progress 2 is now 6 years old and many of the feeder reports are older. Information within CP2 has been used in lieu of any more recent robust data so support a number of baseline and issues statements. However, consideration should be made at a later stage in the SA and marine planning process to review this document to ensure each statement is still valid and/or obtaining other more recent data that may be available through grey literature especially in relation to key issues that emerge through the process (Biodiv_583)
- Lack of survey data for the offshore SW plan area means that information on the presence of deep diving species, such as sperm whales and beaked whales, may be incomplete for this large and (in places) deep plan area (Biodiv_676).
- Large-scale surveys have provided key data on distribution and total abundance for certain species. However, more information needed on the ecology of most cetacean species in order to identify trends in populations and detect changes in distribution and abundance of cetacean species (Biodiv_677)
- The extent of marine litter within the UK seas and the effects of such litter on marine megafauna are not robustly characterised, including increasing levels of microplastics in the oceans (Biodiv_604)
- Impacts of contaminants, including population level effects of persistent organic pollutants on cetaceans, although there is a lot of high profile research underway after an increase in stranding events over the past decade (Biodiv_605).
- A lack of understanding of the long term population level effects of climate change (Biodiv_606)
- Lack of information on current distribution and abundance of leatherback turtles in UK waters (Biodiv_607)
- Need for more evidence of impacts relating to disturbance to cetaceans and seals from vessel activity in terms of severity and longevity of behavioural changes (Biodiv_608)
- Uncertainty over the nature of any impacts highlights the need to evaluate potential interactions between seals and cetaceans and various tidal, wind and wave devices. Studies in the Wash during wind farm construction suggest that seals were not excluded from the vicinity during this phase, and that half of the seals exceeded published auditory damage thresholds during piling. Analysis of tagged seals in proximity to tidal operations at Strangford Narrows suggests no statistically significant change in behaviour during operation, although there may be potential for collision risk. However, there is minimal data on interactions between seals and wave energy devices, with no commercial scale developments yet planned to date (Biodiv_609)
- Uncertainty surrounding the spread of PDV amongst seal populations (Biodiv_610)
- A lack of understanding of impacts from background noise and cumulative noise on marine megafauna, particularly at the population level (Biodiv_647)



Biodiversity, Habitats, Flora and Fauna - Plankton

Baseline/issues: North West Plan Areas 10 11

(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- The plankton in the North West plan area are warm-temperate Atlantic species that are influenced by the hydrological regime in the region which is characterised by a seasonal thermocline, whereby the water is stratified in the summer and mixed in the winter (Biodiv_376). Some coastal areas in the North West plan area, for example within Liverpool Bay, have elevated phytoplankton biomass that has been attributed to nutrient enrichment from anthropogenic sources (Biodiv_377)

Baseline/issues: South West Plan Areas 8 9

- The Western Channel plankton community is dominated by decapod larvae (Biodiv_409). In the Western Channel and Celtic Sea region a multi-decadal oscillation known as the Russell Cycle has been observed (Biodiv_410). The Western Channel region is more temperate than the North Sea and the regime shift in the 1980s was less pronounced in this region (Biodiv_359)
- Increases in sea temperature may facilitate the introduction or expansion of harmful species into UK waters from more southerly areas, via shipping activity, drifting debris or natural range expansion. Such species may include *Gymnodinium catenatum*, a paralytic shellfish poisoning (PSP) toxin producer from Spanish waters, and *Ostreopsis*, a toxin-producing species known to be expanding outside of the Mediterranean. Instances of the growth of *Coolia monotis*, *Prorocentrum lima* and toxic *Amphidinium* species may also be expected to increase, most likely in the SE and SW plan areas (Biodiv_624)
- An increase in tendency for, and longer duration of, stratification of the water column could influence the development of offshore harmful algal blooms. Some harmful algal blooms (e.g. *Karenia mikimotoi*), have been associated with mortality of benthic invertebrates and fish in south western coastal waters (Biodiv_625)

Summary of the legislative / policy context

Long-term observations suggest that plankton as a whole are subject to few anthropogenic pressures and are healthy. Plankton abundance regulates larval fish development and survival, and thus the success and failure of recruitment for adult fish stocks. At a regional scale, climate is the main driver of change in zooplankton and phytoplankton communities. In the north east Atlantic zooplankton have been decreasing in biomass. The North Atlantic Oscillation (NAO) has positive correlations with sea surface temperature and phytoplankton biomass in the North Sea, and negative correlations with sea surface temperature and phytoplankton biomass north west of the European Shelf.

There are no specific targets in existing national or international legislation for pelagic habitats. However, EU member states must monitor and assess plankton as a proxy for pelagic habitats as part of the [Marine Strategy Framework Directive \(MSFD\)](#). Good Environmental Status (GES) Descriptors 1, 4 and 6.

Targets and indicators in the MSFD are designed to examine changes in plankton and meroplankton (plankton with a benthic life phase) distribution, structure, condition and abundance to ensure communities are not significantly adversely affected by anthropogenic impacts. Additional targets proposed under Descriptors 3 and 5 are likely to support the achievement of GES for pelagic habitats.

The abundance and composition of phytoplankton is one of the key tools in defining [Ecological Quality Status for the Water Framework Directive](#), particularly in relation to biodiversity and the impact on the ecology of coastal and transitional waters by anthropogenic inputs of nutrients. The Water Framework Directive does not require zooplankton to be assessed.

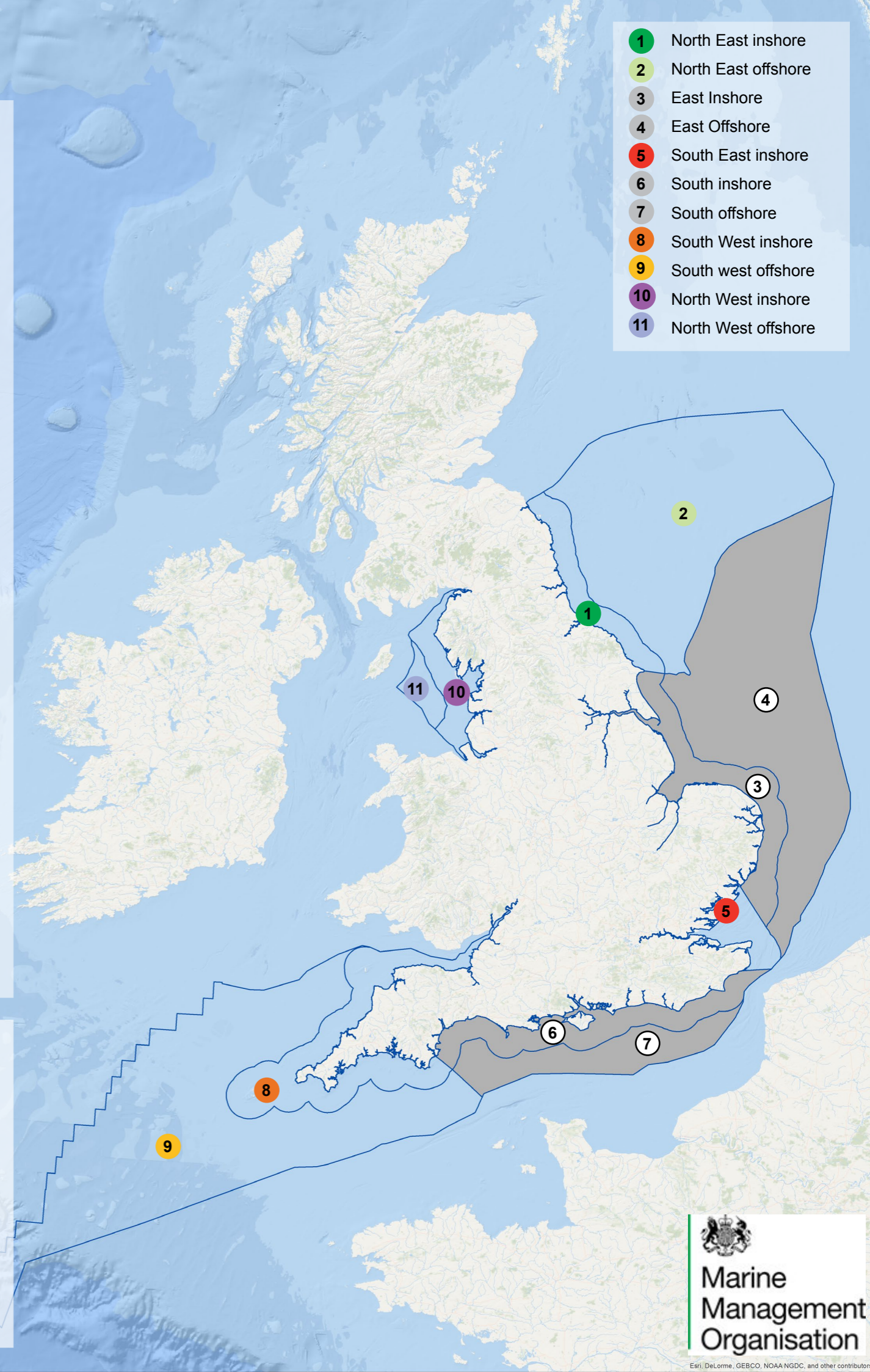
Baseline/issues: North East Plan Areas 1 2

- The northern North Sea was considered to be a cold temperature province until a regime shift in the 1980s, after which the area became a warm temperature province (Biodiv_359)
- Since the late 1980s the coastal North Sea has experienced an increase of 21% in phytoplankton biomass and the open North Sea has increased by 13%. These changes are linked to increases in sea surface temperature, water transparency, and changes in inflow from the Atlantic (Biodiv_357). The northern North Sea phytoplankton community prior to 1990 was more influenced by the monthly North Atlantic Oscillation (NAO); however since 1990, biodiversity appears to be more influenced by local sea surface temperature (Biodiv_360). There has been an influx of oceanic species into the North Sea (Biodiv_358)

Baseline/issues: South East Plan Areas 5

- The southern North Sea plankton community consists of coastal and neritic species which are suited to the mixed water in this region. Decapod larvae and copepod species including *Centropages hamatus* and *Calanus helgolandicus* are commonly found in this region (Biodiv_389). Changes in plankton in the southern North Sea are driven by climatic variability. Climate-driven warming in the southern North Sea has been faster than the northern North Sea which has been reflected in their differing phytoplankton communities (Biodiv_356). Phytoplankton biomass is greater in the southern North Sea than in the northern North Sea (Biodiv_236) with an influx of oceanic species into the North Sea overall (Biodiv_358)
- Increases in sea temperature may facilitate the introduction or expansion of harmful species into UK waters from more southerly areas, via shipping activity, drifting debris or natural range expansion. Such species may include *G. catenatum*, a paralytic shellfish poisoning (PSP) toxin producer from Spanish waters, and *Ostreopsis*, a toxin-producing species known to be expanding outside of the Mediterranean. Instances of the growth of *C. monotis*, *P. lima* and toxic *Amphidinium* species may also be expected to increase, most likely in the SE and SW plan areas (Biodiv_624)

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Plankton

Key cross cutting baseline / issues across all plan areas

- Rising sea temperature has caused a number of changes in plankton communities including a large increase in phytoplankton populations in the NW and SW plan areas; a shift to earlier blooming of surface species in the northern North Sea; northerly movements of warmer-water plankton and retreat of colder-water plankton. Zooplankton taxa have moved forward in their seasonality; but the marine growing season has been extended, particularly in the summer months and to a lesser extent during winter, resulting in the seasonal occurrence of food for zooplankton and fish larvae being out of synchrony. This could lead to a trophic mismatch and failure of fish recruitment, one example being between cod and the base of its food chain which has affected cod recruitment in the North Sea. There has also been a notable decline in the abundance of total copepods and a change from a cold boreal community dominated by holoplankton to one characterised by warm temperate species with a predominance of meroplankton (Biodiv_412-413). An increase in sea surface temperature could lead to more diversity but reduced overall biomass (Biodiv_414)
- The abundance and distribution of a key zooplankton group *Calanus* sp. has changed in many regions around the British Isles and in the North Sea. The abundance of warm water copepod *C. helgolandicus* has increased, as has its northward range. Conversely, the abundance of the cold water copepod *Calanus finmarchicus* has decreased, as has its southward range. This northward movement of these copepods is only seen along the continental shelf where deeper water is warming much more rapidly. The cold water copepod (*C. finmarchicus*) has a higher energy content than the warm water copepod (*C. helgolandicus*) therefore their changes in abundance have influenced the growth, recruitment and survival of other trophic levels such as seabirds and fish (Biodiv_415-416). Plankton can ameliorate or increase the rate of climate change through positive and negative feedbacks to greenhouse gases. Plankton can be a sink of CO₂ (during photosynthesis), and a source of CO₂ (during calcification). These feedback processes are complex as plankton have differing sensitivities to CO₂ concentration and have a variety of mechanisms for carbon utilisation. Additionally, processes such as ocean acidification and increased sea surface temperature also impact these positive and negative feedback processes (Biodiv_417 and Biodiv_646). Copepods are an important component of the zooplankton community transferring energy from primary producers to higher trophic levels and a decrease in their abundance may have unknown consequences on higher trophic levels. There has been a notable decline in the abundance of copepods in the waters around the British Isles and in the North Sea since the 1950s (Biodiv_418)
- Ocean acidification reduces the availability of carbonate ions necessary for marine calcifying organisms to produce their calcium carbonate skeletons. Calcifying planktonic organisms such as coccolithophores, foraminifera and pelagic molluscs can be impacted by these changes. Increased CO₂ will influence the abundance of pH sensitive species, where lower pH has the potential to influence the speciation of nutrients important for phytoplankton growth. In addition phytoplankton groups have varying tolerance for CO₂ therefore increasing concentrations of CO₂ could lead to changes in phytoplankton community structure and diversity (Biodiv_419 and Biodiv_622). Risk of harmful plankton / algal blooms due to the influence of climate change and anthropogenic nutrient enrichment of coastal waters. Harmful plankton / algal blooms are noted by excessive growth of phytoplankton in the water column, changes in plankton community composition or excessive growth of opportunistic macroalgae (green weed) on intertidal sediments / rock or excessive growth of epiphytic algae (algae growing on other plants), particularly on seagrass and macroalgae (Biodiv_623)

The likely evolution of the environment over the plan duration

- There is increasing pressure from climate change - most notably with changes in sea temperature and increasing anthropogenic CO₂ levels influencing plankton species abundance and distribution. As temperature increases, it is expected that species with warmer-water tolerance / affinity (such as *C. helgolandicus*) will continue to advance northwards to replace the previously dominant and nutritionally important cold-water species *C. finmarchicus*
- The seasonal timing of plankton production will also alter in response to climate change, which has consequences for plankton predator species (hypothesised as exacerbating the decline of North Sea cod stocks)
- Changes in offshore circulation will continue to influence the abundance and diversity of phytoplankton as has already been observed with the late 1970s influx of polar water into the North Sea resulting in a decrease in phytoplankton abundance, with one species *Ceratium macroceros* being lost from the North Sea dinoflagellate community

Potential interactions with other topics

- Changes in plankton abundance and distribution are directly linked to rising sea temperatures, resulting in effects on higher trophic levels including benthic and intertidal ecology, fish, birds and marine mammals. Effects may be linked to changes in fish distribution and potential fish breeding / foraging success
- Changing fish abundance and distribution due to impacts on plankton may lead to socio-economic issues such as changes in fishing effort or location
- Future warming is likely to alter the geographical distribution of primary and secondary pelagic production, affecting ecosystem services such as oxygen production, carbon sequestration and biogeochemical cycling
- The impact of ocean acidification on plankton will also reduce or change prey availability for higher trophic levels, increasingly affecting food webs
- Harmful plankton / algal blooms may in turn change ecosystem food web and nutrient cycling dynamics, with possible impacts including oxygen depletion in the water column arising from stimulation then die-off of phytoplankton blooms, which could have lethal and sub-lethal impacts on fish and invertebrates, and increased turbidity in the water column leading to reduce photic zone and shading out other plants or reduction of oxygen in surface sediment leading to anoxia, which could have lethal impacts on invertebrates and higher trophic levels, such as birds
- Nuisance or potentially toxic species (e.g. *Dinophysis*) that form harmful algal blooms can lead to increasing ecotoxicity in shellfish, which can cause widespread mortality for birds and can lead to health issues among human consumers of shellfish
- Harmful algal blooms can have a direct commercial impact on the aquaculture industry (shellfish and fish farms) and this is likely to become more of an issue as these food sources become of increasingly greater importance in the future. This may also lead to strengthening of shellfish toxin regulatory levels which will have a large impact on shellfish harvesting activities

Potential transboundary issues

- The transient nature of the pelagic environment means that plankton are influenced by factors operating outside of the marine plan areas
- International and transboundary legislation (such as the WFD and MSFD) will be of key importance for cooperation and collective action with regard to maritime resource conservation, including maintaining a healthy pelagic environment

Key data gaps

- There are major gaps in the coverage of physical, chemical and biological measurements in pelagic ecosystems in the global oceans (Biodiv_626). The MSFD has identified the need for more information regarding zooplankton in inshore areas (Biodiv_627). Better understanding is needed of the links between warming, plankton and fisheries (and other higher trophic levels such as seabirds) to form a predictive capacity for rapid and abrupt ecosystem shifts relating to climate change (Biodiv_628)
- The understanding of climate effects on nutrient concentrations and eutrophication in the North Sea, and its resulting effects on plankton, is poor. There are insufficient data on changes in nutrients with time and over sufficiently large areas. More information is needed on the consequences of changing climate (rainfall and temperature) and riverine input for nutrient discharge to the sea to better understanding nutrient cycling (Biodiv_629 and Biodiv_630).
- Increased storminess will increase concentrations of nutrients at the ocean surface, but insufficient research has been carried out in this area, predominantly using models with few direct observations (Biodiv_631)
- The majority of harmful algal bloom monitoring is in coastal areas, leaving offshore areas with sparse data. There is a need for more information on the role of wind and density driven transport at the boundary between the coastal and offshore regions, which is likely to be affected by climate change, leading to a greater frequency of coastal blooms (Biodiv_632)
- [Charting Progress 2](#) is now 6 years old and many of the feeder reports are older. Information within CP2 has been used in lieu of any more recent robust data so support a number of baseline and issues statements. However, consideration should be made at a later stage in the SA and marine planning process to review this document to ensure each statement is still valid and/or obtaining other more recent data that may be available through grey literature especially in relation to key issues that emerge through the process (Biodiv_585)

Biodiversity, Habitats, Flora and Fauna - Ornithology

Baseline/issues: North West Plan Areas 10 11

(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- Liverpool Bay SPA is one of the UK's largest SPAs supporting over 50,000 wintering birds including red-throated diver and common scoter. The plan area also includes Morecambe Bay, which supports over 200,000 wintering waders and wildfowl and 60,000 breeding seabirds. Also important are Duddon SPA/SAC, Upper Solway Flats and Marshes SPA and the Ribble and Alt estuaries SPA (Biodiv_320)
- There are several National Nature Reserves on the NW Coast inc Cabin Hill (Sefton), Ribble (West Lancs) North Walney (Barrow). North West estuaries particularly the Ribble / Mersey / Dee tend to act as a common resource with birds moving freely between them (Biodiv_320)
- Several proposed new SPAs have not yet reached pSPA stage, but are anticipated to in the near future. These include Liverpool Bay and the Solway Firth (both cases feature expansions to existing site boundaries and addition of features), and Natural England are currently consulting on Morecambe Bay and Duddon Estuary pSPA (Biodiv_510)
- RSPB reserves in this area include Dee Estuary (2 reserves important for wading birds and wildfowl); Ribble Estuary (the most important single river estuary in the UK, which attracts over 270,000 birds each year); Hesketh Out Marsh (realigned marshland); Leighton Moss (the largest reedbed in the north-west); Campfield Marshes (Solway); Merseyside (Southport) and St Bees Head (largest seabird colony in north-west). St Bees Head is home to the only breeding colony of black guillemots in England (Biodiv_378)
- The North West Plan Area has also been targeted for the further development of offshore wind, and oil and gas activities, with a risk of disturbance and displacement to the movement of species through the area. This is particularly relevant to the movement of wintering and passage waders, seaducks and terns. There are several proposals for estuarine barrages and coastal lagoons across the North West Marine Plan Area coastline (Biodiv_515)

Baseline/issues: South West Plan Areas 8 9

- The area includes the Isles of Scilly SPA/SSSI and Lundy SSSI - the South West's most important seabird colonies and England's only nesting sites for British storm petrels and Manx shearwaters (Biodiv_271)
- Several proposed new SPAs have not yet reached pSPA stage, but are anticipated to in the near future. This includes the Isles of Scilly SPA for a marine extension to the existing terrestrial SPA (Biodiv_271)
- Other designated sites include Gerran's Bay to Camel Cove SSSI, Godrevy to St Agnes SSSI, Pentire Peninsula SSSI and West Exmoor Coast and Woods SSSI (Biodiv_271)
- The plan area is also important for passage and wintering waterbirds, including sites acting as cold weather refuges. This includes nationally and internationally important wintering populations of balearic shearwaters (Outer Bristol Channel), waders and wildfowl (Severn Estuary SPA) divers and grebes (Falmouth Bay to St Austell Bay pSPA), wintering bittern and aquatic warbler (Marazion Marsh SPA), and internationally important wintering waterbirds (Tamar complex SPA) (Biodiv_271)
- Nationally important sites include Malpas Estuary SSSI, Upper Fal Estuary SSSI, Looe Pool SSSI, Hayle Estuary to Carrack Gladden SSSI, Amble Marshes SSSI (Biodiv_271)
- Includes important foraging areas for shag and other seabirds around Isles of Scilly and a range of seabirds to the west of Lundy. Nationally important numbers of breeding shag along the Cornwall coast, regionally important populations of breeding auks at Tintagel Cliffs SSSI and six black legged kittiwake colonies in Cornwall. Plan area also supports internationally important migration routes for the critically endangered Balearic shearwater and potentially important migration routes or inshore non breeding aggregations for other seabirds including Manx shearwater (St Ives to Porthgwarra), auks (St Ives to Porthgwarra), gannet and great skua (Biodiv_296)
- RSPB reserves in this area include Marazion Marsh and the Hayle Estuary (Biodiv_275)
- Includes waters targeted for offshore renewables, mineral extraction, dredging and aggregate extraction. A number of important foraging areas for seabirds have been identified as potential areas for tidal power including Land's End area and Hartland Point (Biodiv_489)

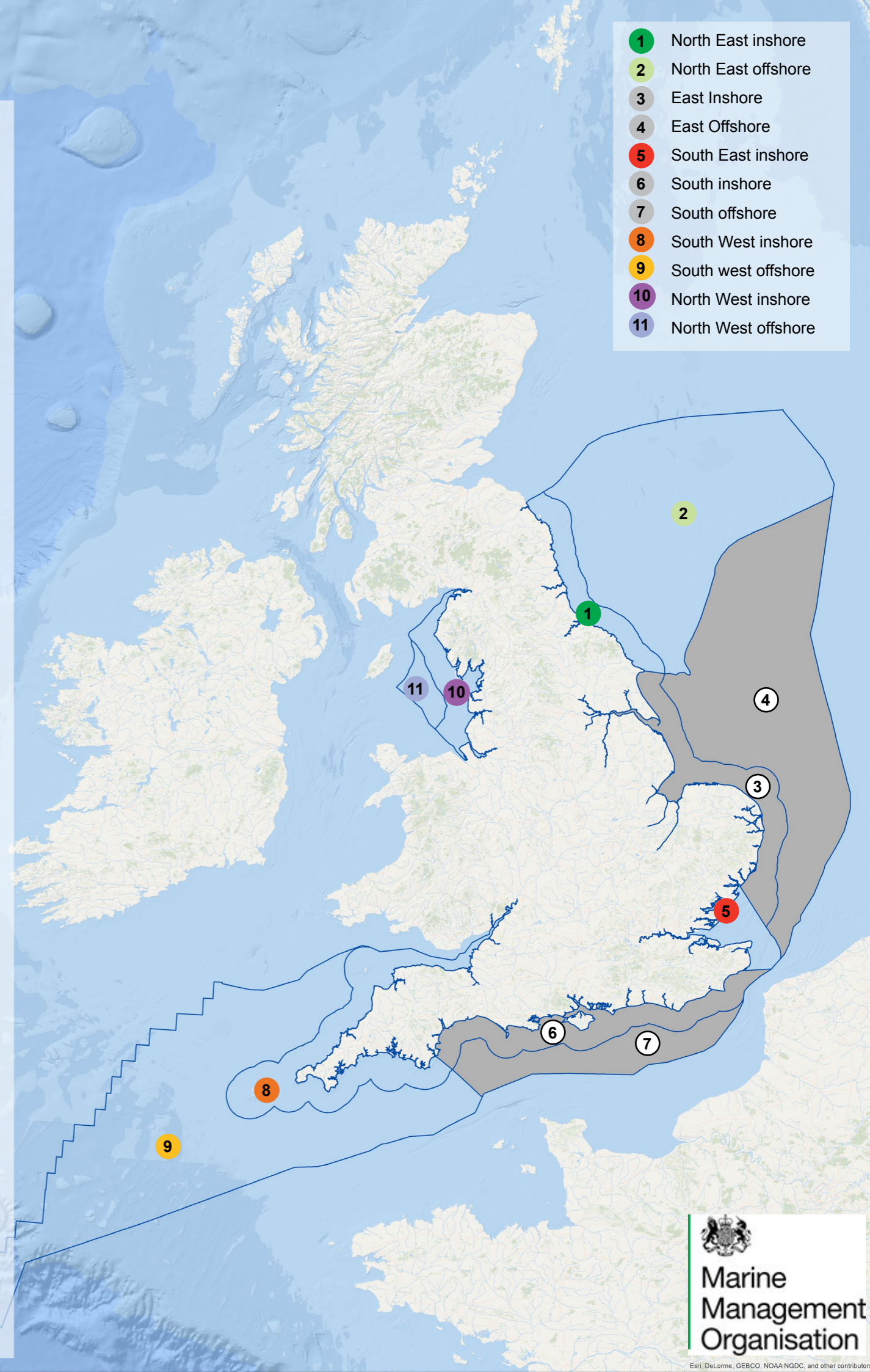
Baseline/issues: North East Plan Areas 1 2

- The area is incredibly important for seabirds including England's largest mainland gannetry (Flamborough and Filey Coast pSPA). The area hosts more than 90% of the UK's breeding population of roseate terns (Coquet Island Site of Special Scientific Information (SSSI), SPA and Bird Sanctuary), with several little tern strongholds (Northumberland including Lindisfarne SPA/SSSI and Teesside). This area also includes the Farne Islands SSSI and SPA and important foraging and roosting areas for passage and wintering waders and wildfowl (e.g. Northumberland Shore SSSI, Northumbria Coast SPA, Teessmouth and Cleveland Coast SPA) (Biodiv_352)
- There are several proposed new SPAs including the Flamborough and Filey Coast pSPA, Northumberland Marine pSPA and the Teessmouth and Cleveland Coast possible SPA extension (Biodiv_353)
- The area include waters targeted for offshore renewables, oil and gas exploitation, dredging and aggregate extraction. These activities have the potential to be damaging to the marine environment including possible adverse effects on seabirds. Within this plan area, several large offshore windfarms are either proposed or under development which could have significant impacts on the Flamborough and Filey Coast pSPA's seabirds and other species such as seaducks (e.g. common scoter and red-throated diver) through collision and displacement inshore and offshore. All of these activities will be subject to Environmental Impact Assessments and Habitat Assessments where applicable (Biodiv_354)

Baseline/issues: South East Plan Areas 5

- The estuaries and intertidal areas support important wintering waders and waterfowl populations, as well as breeding tern colonies. These SPAs comprise Stour and Orwell estuaries SPA, Hamford Water SPA, Colne Estuary SPA, Blackwater Estuary SPA, Benfleet and Southend Marshes SPA, Crouch and Roach estuaries SPA, Thames Estuary and Marshes SPA, Medway Estuary SPA, the Swale SPA and Thanet Coast and Sandwich Bay SPA. The area also includes the Outer Thames Estuary SPA, designated for its wintering red-throated diver population. Natural England is currently consulting on a proposal to add foraging terns to the Outer Thames Estuary SPA citation (Biodiv_293)
- RSPB reserves in this area include: Stour Estuary; Old Hall Marshes; Wallasea Island Wild Coast project; Cliff Pools; Nor Marsh and Motney Hill (Biodiv_291)
- The non-intertidal area is currently only designated for one species in a single season, red-throated divers in winter (Biodiv_294)
- The majority of estuaries are designated as internationally important sites reflecting their use by wintering water birds; however these areas are sensitive to sea level rise and coastal squeeze (Biodiv_295)
- The South East plan area has a number of consented and proposed offshore wind farms. (Biodiv_498).
- The South East plan area has several important ports, with London Gateway the largest of several within the Thames. Others include Sheerness Port in the mouth of the Medway and Thamesport in the Medway. The associated pressures that will need consideration within the plan include, pressure for port expansion and its impacts on coastal habitats and maintenance dredging to support the shipping channel (Biodiv_498)

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Ornithology

Summary of the legislative / policy context

Most of the legislation and international conventions that the UK is a signatory of are designed to protect bird habitat and species. Examples include the [Ramsar Convention on Wetlands of International Importance](#) especially as Waterfowl Habitat (1971, 1982); [Convention on the Conservation of Migratory Species of Wild Animals](#) (the Bonn Convention, 1979); [Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora](#) (Habitats Directive); [Directive 2009/147/EC on the Conservation of Wild Birds](#) (Birds Directive); and [The Conservation \(Natural Habitats &c.\) Regulations 2010 as amended](#) (Habitats Regulations) (Biodiv_691)

[The Wildlife and Countryside Act](#) provides protection for sites containing important aggregations by notifying them as bird Sites or Areas of Special Scientific Interest (SSSIs/ASSIs). The boundaries of these SSSIs/ASSIs extend to Mean Low Water Mark. Seabirds are indicators of Good Environmental Status under the [Marine Strategy Framework Directive](#). Indicators for seabirds have quantitative targets relating to distribution, abundance and productivity and the UK Government have committed to developing a plan of action on this topic (Biodiv_692)

The EU has a [EU Action Plan for reducing incidental catches of seabirds in fishing gears](#) (Biodiv_693)

Key cross cutting baseline / issues across all plan areas

- The issue of birds should not be taken out of the context of the ecosystems they form part of. Thirty-eight species of seabird regularly occur in the seas around the UK and fifty-seven species of waterbird regularly use UK seas for at least part of their lifecycle. Some species occur year round, but other species are only present during the breeding season, over winter or during migration. Species present all year in low numbers, or seasonally present in low numbers may still be important. As top predators birds are entirely dependent on other elements of the marine ecosystem – from prey (e.g. fish, invertebrates) down to the habitat supporting the prey (Biodiv_239)
- Waterbird and seabird species listed in Annex 1 to the EU Birds Directive that regularly breed in, over winter in or migrate through the UK include: White fronted goose; Barnacle goose; black throated diver; eurasian spoonbill; great northern diver; little egret; red-necked phalarope; red throated diver; slavonian grebe; arctic tern, Balearic shearwater; black tern; common tern; cory's shearwater; European storm petrel; leach's storm petrel; little gull; little tern; Mediterranean gull; roseate tern; sandwich tern (Biodiv_249)
- Birds that regularly use the UK seas occur in large aggregations where food is abundant, for example in and around estuaries, tidal fronts, sandbanks, upwellings etc. Most internationally important aggregations occur during spring and autumn migrations or during winter. Of those waterbird species that breed in internationally important numbers in the UK, only five predominantly forage in the marine environment during the breeding season (red-throated diver, common shelduck, common eider, ringed plover and pied avocet). There are several seabird colony SPAs in English waters and these birds use the marine environment for activities such as preening, bathing and foraging. Datasets such as European Seabirds At Sea (ESAS) can be used to show the distribution of seabird species in English waters (Biodiv_241)

The likely evolution of the environment over the plan duration

There is a complex and mixed picture regarding trends in bird numbers with geographical variations and variations in species. It is not possible to set out a simple picture of the evolution of this aspect of the environment. However, some of the trends highlighted in the baseline data are:

- Recent downward trends in breeding success of seabirds in the Greater North Sea and the northern Celtic Seas are of concern. Of the seabirds breeding in the UK, only northern gannet and great skua have sustained a positive trend in population size since 1969. The biggest declines have been in herring gulls and roseate terns – by more than 50% and 90% respectively since 1969 (Biodiv_240)
- Some species of diving duck and estuarine wader have recently declined - in 2006/07 there were 43% fewer goldeneye, 54% fewer dunlin and 28% fewer bar-tailed godwit than in 1975/76 (Biodiv_243)
- Since the mid-1970s, numbers of waterbirds wintering in or migrating through marine areas in the UK increased on average by 106% up until the mid-1990s and have since declined slightly (Biodiv_246)
- Seabird and waterbird populations in the UK have increased in size over the past century as a direct result of increased protection from hunting and persecution. Since around the mid-1990s, declines in numbers both of wintering waterbirds and breeding seabirds indicate that pressure is once again being exerted on marine bird populations (Biodiv_247)
- According to [Charting Progress 2](#), the trend for birds in Region 4 (Western Channel and Celtic Sea) is favourable (although this masks the underlining declines present in some species (e.g. gull species)). The overall trend has attained its all-time peak in the most recent winters at 80% above the level of the 1975/76 base year although the sharpest rise was during the late 1970s and early 1980s since when it has climbed only gradually. Most of that early increase was due to increases in wildfowl species. One species (goldeneye) has shown a more recent decline beginning during the late 1990s. Please note that care should be taken when interpreting this data for planning purposes. While reporting may be done for a group of species at a regional sea level, individual species may be doing either better or worse and from a planning perspective this needs to be considered (Biodiv_270)
- Numbers of waders and wildfowl in Region 2 (Southern North Sea - South East Marine Plan Area) have both been relatively stable since the beginning of the 1990s, although numbers of wildfowl have declined sharply over the most recent four winters. Overall the indices for waterbirds, wildfowl and waders are currently all higher than in the 1975/76 base year by 173%, 129% and 194% respectively (Biodiv_292)
- Waterbird trends in Region 5 (Irish Sea) largely reflect those of the UK. The overall trend now stands at 64% above the level of the 1975/76 base year, having peaked at 114% above that level during 1996/97. The 1996/1997 turning point corresponds with that for wildfowl which peaked at 268% above the level of the 1975/1976 base year and now stands 178% above that level. The sustained decline in the wader trend began following a peak 23% above the level of the 1975/1976 base year during 1989/1990 and now stands at 13% below that level (Biodiv_319)
- The trends in the multi-species indices in Region 1 (Northern North Sea) were similar to those for the UK, except that the decline in the wader trend has been more pronounced since peaking during the mid-1990s: 69%, 77% and 38% for waders, wildfowl and waterbirds respectively, but in the mid-1990s they were 105%, 107% and 89% higher than in the mid-1970s. The trends for 17 of the contributory species were either stable or had increased. However, the abundance of eight species has been declining since at least the early 1990s and seven of these are now at the lowest levels on record (Biodiv_351). In addition, changes to climate are likely to play a large part in changing the distribution of habitats and bird species (see box below: potential interactions with other topics).

Potential interactions with other topics

- There are key inter-relationships with water and coastal processes, economic and recreational activities and climate change. As the climate around the UK changes, the distribution of habitats and bird species is likely to change. Climate change has already led to a substantial shift in the distribution of waders, for example, with clear evidence of a south-westward to north-eastward shift in the centres of abundance of some wader species. Seabird breeding failure in the North Sea has been linked to variations in food availability as a result of increased sea temperatures. Changes in salinity may also affect waterbirds using estuaries (Biodiv_548). There are key interactions with coastal processes including flooding. There is likely to be loss of intertidal feeding resource through coastal squeeze. Shorebirds such as waders which feed on mudflats, sandy beaches and rocky shores are at risk of negative changes from modification of coastal processes. Additionally breeding common terns (for example, on the Isles of Scilly) are sensitive to flooding as they nest on rocky islets that can be flooded out during thunder storms or storm surges (Biodiv_273)
- There are also clear inter-relationships between economic activity and bird habitat and species and there is the potential for cumulative impacts across industry and impact interactions (i.e. increased shipping and offshore wind farms) which could cause significant impacts. Impacts from a variety of economic activities (renewable energy, shipping etc) include population level impacts of displacement and collision risk. Other examples include potential threats from seabird bycatch from driftnet and gillnet fisheries in southern England, effects of bait digging on food chain (Biodiv_523 and 524), collision effects from structures in the sea such as windfarms and habitat disturbance and effects on birds due to depletion of prey species. In addition, the Pelagic/Demersal Landings Obligation introduced under the reformed Common Fisheries Policy is likely to impact certain seabird species reliant on discarded fish as a source of food. Positive examples include marine birds providing an important source of income for local economies since many species have a wide appeal to people e.g. Atlantic puffins draw visitors. There are also negative interactions with relation to aquaculture with marked reductions in waterbird survival being shown to occur as a result of shellfish harvesting (Biodiv_452). In addition, most species of waterbird, but especially waders, can be expected to be affected by habitat loss due to activities such as coastal defence, land claim, construction of tidal barrages, and the construction and extension of marinas or harbour developments. Activities associated with leisure and recreation can impact on some seabird species, largely through disturbance to nesting sites or disturbance to feeding birds by recreational boat traffic. This is probably greatest in the South East plan area. Little terns are particularly susceptible to disturbance from people as this species nests on beaches used for recreation (Biodiv_495)
- Non-native species are one of the biggest threats to biodiversity and this specifically applies to islands where species are less well adapted to sudden introductions. For example the South West plan area supports a number of burrow nesting birds (Manx shearwater, storm petrel and puffin) that are vulnerable to predation from non-native invasive species, especially rats. Without suitable bio-security measures, developments or proposals within the marine environment could potentially increase boat traffic within close proximity to these sites putting them potentially at risk from re-incursion. There are also a number of non-native marine species that are colonising our shores as a result of inadvertent introduction as a result of boat traffic (Biodiv_274)



Biodiversity, Habitats, Flora and Fauna - Ornithology

Potential transboundary issues

- Commercial sandeel fishing in the western North Sea has a negative impact on seabirds breeding nearby. Falls in breeding success have been acute in black-legged kittiwakes that feed offshore on sandeels, especially on the coast of the North Sea and recently have been seen in seventy other offshore species such as common guillemot. Declines have also been seen in inshore species such as arctic skua. Declines in the availability of sandeels have also been linked to changes in sea temperatures which alter the composition of zooplankton populations. Kittiwakes are particularly affected by the decline in sandeels as they forage on and just below the water's surface and therefore has a much smaller area to hunt in than deeper diving species. In 2014 the RSPB hosted an international sandeel workshop with world leading researchers to discuss what action could be taken to recover sandeel stocks in the North Sea. As an output of the workshop, the RSPB is currently investigating the relationship between sandeel availability, exploitation by commercial fisheries and kittiwake productivity and results should be published in 2016. Also of note are the measures under the MSFD required to deliver GES by 2020. DEFRA have included, within the published Program of Measures, specific measures to address the decline of kittiwake and explore the relationship with sandeels (Biodiversity_449)
- The [UK Marine and Coastal Access Act](#), [Scottish Marine Act](#) and legislation in development in Northern Ireland have implications for the conservation of marine bird populations by regulating activities that create pressures that have significant impacts on marine birds (Biodiv_456)
- Movements between marine plan areas can include seabird foraging trips from terrestrial nest sites to marine foraging areas (e.g. for Manx shearwater from their internationally important breeding grounds on Welsh islands), wintering wildfowl and wader movements between estuaries and intertidal areas and seasonal movements of seabirds including Balearic shearwater, gannet and great skua along the coast. In order to safeguard birds at all stages of their lifecycle, the marine plans should consider these movements. Consideration should also be given to marine species moving to and from devolved marine plan areas (Biodiv_464)
- Natural Resources Wales, with JNCC are currently consulting on a cross border SPA in the seas off Pembrokeshire. The proposed SPA includes the islands of Skomer and Skokholm, the waters immediately surrounding them and a large sea area extending from the coast of Pembrokeshire westwards into the Celtic Sea, including UK waters outside the 12 nautical mile limit of Welsh Territorial Sea. In the Severn SPA, the plan must ensure there are sufficient refuge areas within the Estuary, particularly in relation to wildfowling and general human disturbance, including bait diggers, dog walkers and recreational craft. Similar areas exist around other sites of international importance such as the Inner Humber (Biodiv_488). Within the English Severn, an overarching plan is needed for renewable energy generation on the Estuary, seeking to encourage a mix of sustainable technologies and projects which minimise impacts on the European Marine Site and other features. This should be considered in relation to the development of the Welsh National Marine Plan to ensure a consistent approach for transboundary sites and features (Biodiv_489)

Key data gaps

- Since 2012 the RSPB have been developing their seabird tracking work through the [Future of the Atlantic Marine Environment \(FAME\) project](#) and the [Seabird Tracking and Research \(STAR\) project](#). The final results are due to be published this year and these results and the tracking data should be used to inform the development of the marine plans.
- The MMO collaborated with Natural England to fund the [Seabird Mapping & Sensitivity Tool](#) which aimed to map seabird densities in all English waters, as well as indicating constraints for offshore renewables. This will be used for plan making purposes and can be used at the appraisal stage (Biodiv_694)
- The European initiated project [SEATRACK](#) is a five-year collaborative project looking at non-breeding movements in key seabird species at a select number of sites within Europe. While there may be limited UK sites included, the data will inform our understanding of non-breeding movements and dispersal between colonies (Biodiv_695)
- Other sources of information at the detailed assessment stage are likely to include [European Seabirds at Sea \(ESAS\) Database](#) and the [Seabird Monitoring Program \(SMP\)](#) (Biodiv_696)
- There is need to consider data deficient areas within the North West marine plan area and the importance for seabirds. For species such as wintering Common scoter, Eider and Red throated diver modelled spatial data exists, and following the precautionary principle, these modelled areas should be considered in the development of marine plan areas (Biodiv_321)
- Seabird breeding success and survival have reduced due to food shortages possibly caused by fishing and climate change. There is as yet no data on how many seabirds from UK colonies are killed as a result of becoming entangled in fishing nets or taking the baited hooks of long-line fisheries operating within and outside UK waters (Biodiv_565)
- Natural England's and the RSPB's consultation response has highlighted some further data gaps including lack of up to date counts of seabird at breeding sites and at a national scale; lack of demographic data on seabirds (survival / productivity); lack of data on connectivity of seabirds between nesting sites and feeding sites; and lack of clarity on effects of some marine operations, for instance displacement of puffins, razorbills and guillemots from offshore wind farms. The RSPB note that the absence of a UK seabird Census since 2000, (a 15 year census of all UK seabirds) results in an incomplete picture of the status of UK seabirds beyond those recorded on protected sites. Undertaking the census would provide an accurate baseline of the current state of UK seabirds, informing the marine plan and associated activities) (Biodiv_697)
- There are omissions within the protected site network including the protection of aggregations or migration routes of non-breeding seabirds (e.g. Balearic shearwater and Manx shearwater), seaward extensions of many nationally important (SSSI) seabird colonies and breeding season foraging areas (relevant to inshore and offshore) (Biodiv_272)

Biodiversity, Habitats, Flora and Fauna - Non-Indigenous Species

Baseline/issues: North West Plan Areas 10 11

- The following invasive species that could lead to fouling of marine structures (marinas, intakes/outfalls, aquaculture) are known to be present in this area - Orange sheath tunicate (*Botrylloides violaceus*) (Biodiv_506), Orange tipped sea squirt (*Corella eumyota*) (Biodiv_528), Acorn barnacle (*Amphibalanus improvisus*) (Biodiv_529) and Green sea fingers (*Codium fragile*) (Biodiv_530). Green sea fingers although present in this plan area are not yet at nuisance density anywhere in the UK (Biodiv_530). Orange sheath tunicate and Acorn barnacle may outcompete native species for space and food, or smother / overgrow benthic species (Biodiv_506, Biodiv_529). The orange tipped sea squirt may compete for space and food with other immobile bottom living invertebrates (Biodiv_528)
- The Leathery sea squirt (*Styela clava*) is also present in this plan area. However, the impact of this species is unclear; it can become the dominant species but provides secondary substrate for others (Biodiv_505)
- Wireweed (*Sargassum muticum*) has been identified in this area, which could potentially become widespread (see South West). This species is fast growing and outcompetes native seaweeds, leading to a reduction in diversity (fewer species). It may also reduce light penetration and increase sedimentation where it grows abundantly, potentially affecting other species (Biodiv_500)
- Sea temperature increases / climate change could lead to breeding populations of Pacific oyster (*Crassostrea gigas*) becoming established (Biodiv_504)
- There have been several sightings of Chinese Mitten crab (*Eriocheir sinensis*) in the Dee estuary. Chinese Mitten crab may impact native benthic invertebrate species through predation and competition for space (Biodiv_527)

Baseline/issues: South West Plan Areas 8 9

- A relatively large number of invasive species that could lead to fouling of marine structures (marinas, intakes/outfalls, aquaculture) are known to be present in this area - Orange sheath tunicate (Biodiv_506), Orange tipped sea squirt (Biodiv_528) Acorn barnacle (Biodiv_529), Green sea fingers (Biodiv_530), Wireweed (Biodiv_500), and Japanese kelp (*Undaria pinnatifida*) (Biodiv_485). Orange sheath tunicate and Acorn barnacle may outcompete native species for space and food, or smother / overgrow benthic species (Biodiv_506, Biodiv_529). The orange tipped sea squirt may compete for space and food with other immobile bottom living invertebrates (Biodiv_528). Japanese kelp is likely to compete with native species of brown seaweed for space and resources (Biodiv_485)
- Wireweed is widespread in this plan area. It is fast growing and outcompetes native seaweeds, leading to a reduction in diversity (fewer species). It may also reduce light penetration and increase sedimentation where it grows abundantly, potentially affecting other species (Biodiv_500)
- Green sea fingers although present in this plan area are not yet at nuisance density anywhere in the UK. Leathery sea squirt (*Styela clava*) is also present in this plan area. However, the impact of this species is unclear; it can become the dominant species but provides secondary substrate for others (Biodiv_505)
- There are established populations of Pacific oyster in estuaries in this plan area. They can form dense groups, sometimes forming reefs, which can alter the environment (waves, currents, sedimentation, etc.), with knock-on effects to native species. They compete with native benthic species for space and resources (Biodiv_504)
- Carpet sea squirt (*Didemnum vexillum*) is found in Plymouth Sound and the Kingsbridge, Falmouth and Dart estuaries. There is also a record from the Watchet area of Somerset (Biodiv_484)
- American oyster drill / American sting winkle (*Urosalpinx cinerea*) is present and may impact on native oyster stocks by preying on native oyster. Natural dispersal of these species is limited but local populations can increase rapidly. Wider dispersal is thought to be as a result of transportation with oysters (Biodiv_573)
- Slipper limpet (*Crepidula fornicata*) is well established; it outcompetes native species for seabed space and can lead to smothering and disturbance to water flows if large colonies develop (Biodiv_499)
- There have been a few sightings of Chinese Mitten crab (*Eriocheir sinensis*) in the Tamar estuary. Chinese Mitten crab may impact native benthic invertebrate species through predation and competition for space (Biodiv_527)

Baseline/issues: North East Plan Areas 1 2

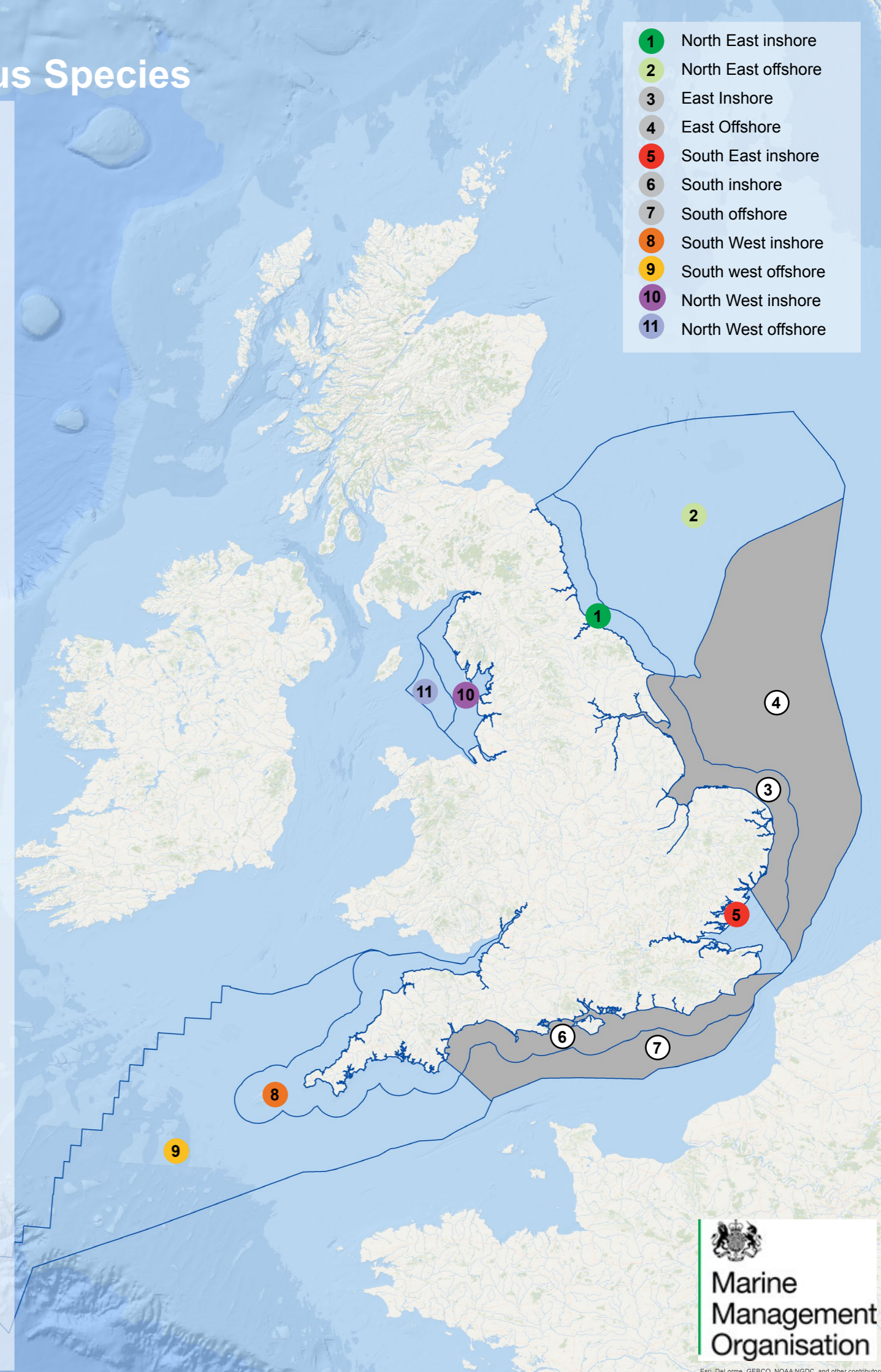
(Please note that the figures in brackets refer to the SA scoping database. This is available on the MMO website)

- The North East plan area has relatively few invasive species that could lead to fouling of marine structures (marinas, intakes/outfalls, aquaculture) present but those that are known to be present are - the Orange tipped sea squirt (Biodiv_528), Acorn barnacle (Biodiv_529) and Green sea fingers (Biodiv_530) which although present in this plan area are not yet at nuisance density anywhere in the UK (Biodiv_530). Orange sheath tunicate and Acorn barnacle may outcompete native species for space and food, or smother / overgrow benthic species (Biodiv_506, Biodiv_529)
- There have been a few sightings of Mitten crab in the Tyne Estuary. Chinese Mitten crab may impact native benthic invertebrate species through predation and competition for space. (Biodiv_527)

Baseline/issues: South East Plan Areas 5

- The Orange sheath tunicate is present in this plan area and can lead to fouling of marine structures (marinas, intakes/outfalls and aquaculture). Orange sheath tunicate may outcompete native species for space and food, or smother / overgrow benthic species (Biodiv_506)
- Chinese Mitten crab is established in the Thames and Medway estuaries with distribution throughout fresh, brackish and marine waters dependent on life stage. Chinese Mitten crab may impact native benthic invertebrate species through predation and competition for space. (Biodiv_493). There is potential for a fishery to develop. Pelagic larvae may spread over large distances or via ballast water (Biodiv_493)
- Leathery sea squirt is also present in the South East plan area. The impact of this species is unclear; it can become the dominant species but provides secondary substrate for others (Biodiv_505)
- There are established populations of Pacific oyster in a number of estuaries in this plan area which can form dense groups, sometimes forming reefs, which can alter the environment (waves, currents, sedimentation, etc.), with knock-on effects to native species. They compete with native benthic species for space and resources. (Biodiv_504). American oyster drill / American sting winkle may impact on native oyster stocks. Natural dispersal of these species is limited but local populations can increase rapidly. Wider dispersal is thought to be as a result of transportation with oysters (Biodiv_573)
- Slipper limpet is well established; it out-competes native species for seabed space and can lead to smothering and disturbance to water flows if large colonies develop (Biodiv_499)
- Carpet sea squirt has been found on the north Kent coast (Biodiv_651 & 652)

- 1 North East inshore
- 2 North East offshore
- 3 East Inshore
- 4 East Offshore
- 5 South East inshore
- 6 South inshore
- 7 South offshore
- 8 South West inshore
- 9 South west offshore
- 10 North West inshore
- 11 North West offshore



Biodiversity, Habitats, Flora and Fauna - Non-Indigenous Species

Summary of the legislative / policy context

The main policy and legislative instruments for managing non-indigenous species include:

- EU Regulation on the Prevention and Management of the [Introduction and Spread of Invasive Alien Species \(1143/2014\)](#)
- [Wildlife and Countryside Act \(1981\)](#) as amended – includes measures to prevent the spread of non-indigenous species
- International Maritime Organization (IMO) International Convention for the Control and Management of Ships' Ballast Water and Sediments ([the Ballast Water Management Convention](#)) (2004) provides a structure to address the issues of ballast water and the spread of non-indigenous species. The convention provides two performance standards for the discharge of ballast water. The UK has not ratified the convention but it is due to come into force in 2017
- [Marine Strategy Framework Directive \(MSFD\)](#), Good Environmental Status (GES) Descriptor 2 specifically relates to non-indigenous species (NIS) and their impact on the marine environment. To achieve GES, non-indigenous species introduced by human activities need to be at levels that do not adversely alter the ecosystems
- The GB Non-Native Species Secretariat (NNSS) is responsible for helping to coordinate the approach to non-indigenous species in Great Britain. It provides a single point of information on non-indigenous species, identification, records and measures, such as action plans and policies to control non-native species, such as the 'Check, Clean, Dry' campaign for recreational anglers and boat users

Key cross cutting baseline / issues across all plan areas

- Non-indigenous species can have a range of impacts on the marine environment. They may compete with native species for habitat or food, reducing their availability for native species, or may prey directly on native species. Invasive species may bring disease or parasites or may act as parasites on native species, which may not be well-adapted to defend against them. These impacts can affect individuals or act at a population level, with knock-on impacts to marine food webs and ecosystems. Some invasive species can reproduce and spread rapidly, smothering the seabed, marine structures or native species. Where large numbers of invasive species colonise marine structures, this can adversely affect their operation, or cause direct damage e.g. reducing or blocking intakes / outfalls, affecting a number of marine industries, or adding costs, through having to clean, repair or replace structures (Biodiv_635)
- Monitoring and management of non-indigenous species on the coast of Great Britain and Ireland poses significant challenges given the length of coastline and the different ways in which invasive species can be introduced and spread (Biodiv_637)
- Key introduction pathways for non-indigenous species are commercial shipping, recreational boating, aquaculture stock imports and natural dispersal. Changes in the type, distribution and frequency of pathways can affect the risk of introduction and spread of non-indigenous species (Biodiv_636)
- Potential for non-indigenous species to increase – both through more species and in more areas as a result of climate change (Biodiv_558)
- An 'Alarm List' of species thought to pose a risk to achieving WFD GES has been identified by the UK Technical Advisory Group Alien Species Group. Marine species on the current list are Schizoporella errata (bryozoan), Celtodoryx ciocalyptoides (sponge), Ocenebra inornata (Asian oyster drill), Theora lubrica (Asian semele), Megabalanus coccopoma (Titan acorn barnacle), Paralithodes camtschaticus (Red King crab), Mnemiopsis leidyi (warty comb jelly), Proterorhinus marmoratus (Tubenose goby), Neogobius fluviatilis (Monkey goby) and Neogobius gymnotrachelus (Racer goby). The species listed are those thought to pose a risk to surface waters and their ecological status under [the WFD](#), but whose presence has not yet been recorded in Great Britain (Biodiv_576)

The likely evolution of the environment over the plan duration

- Slipper limpet (*Crepidula fornicata*) distribution is likely to continue spreading northwards from the south (Biodiv_634)
- Pacific oyster may establish breeding / resident populations further north, with sea temperature rise / climate change, as reproduction seems to be linked to water temperature
- In areas where invasive species have been identified, their populations are likely to increase / spread

Potential interactions with other topics

- Non-indigenous species can have adverse environmental, economic and social impacts by competing with native species for habitat, food sources or directly through predator-prey, disease or parasite interactions; this can impact on aquaculture / fishing (commercial or recreational). Invasive species may also cause fouling of marine structures (ports, marinas, intakes / outfalls)
- Economic and social activities are also pathways for the introduction / spread of non-indigenous species (e.g. marinas, angling, and ballast water)
- *Gyrodactylus salaris* (a leech-like parasite of salmon, trout and other freshwater fish). The UK is currently recognised as being free from this parasite although evidence exists to suggest that this species presents one of the biggest threats to the wild salmon population – there are links to fish & shellfish and economy (recreation, aquaculture), as the likely sources of introduction are via aquaculture (through imported fish) and on vessels or gear used by recreational anglers and / or boaters that have visited infected areas (Biodiv_575)

Potential transboundary issues

- Controlling the spread of non-indigenous species to / from other UK marine plan areas and beyond is a key issue. At a UK level this is co-ordinated through the GB Non Native Species Secretariat (NNSS)

Key data gaps

- There is a lack of data and understanding on the effects of climate change on the risks from non-indigenous species. Climate change may enable more southerly species to move into more northern waters, allowing non-indigenous species to colonise areas that in which they could not previously have survived. Climate change may also affect other factors making native species more susceptible to competition or predation by non-indigenous species (e.g. altering food webs, increase in pH, change in predator-prey interactions, timing of reproduction, availability of habitat, etc.).
- There is no unified routine survey programme for non-indigenous species that targets locations at high risk of introduction of non-indigenous species (e.g. ports and marinas) – information is currently gathered from statutory and non-statutory (and volunteer) sources
- The NNSS database (BG NNSIP – GB Non Native Species Information Portal) may not always be up to date, as information from several databases is used to populate it (e.g. Marine Recorder)
- More research is needed as to the distribution, abundance and pathways for introduction of non-indigenous species
- Lack of evidence and information about the environmental and socio-economic impacts that non-indigenous species have in specific marine plan areas and the UK as a whole (Biodiv_653)

