European Community Directive
on the Conservation of Natural Habitats
and of Wild Fauna and Flora
(92/43/EEC)

Second Report by the United Kingdom under Article 17

on the implementation of the Directive from January 2001 to December 2006

Conservation status assessment for :

H1110: Sandbanks which are slightly covered by sea water all the time

Please note that this is a section of the report. For the complete report visit http://www.jncc.gov.uk/article17

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H1110 Sandbanks which are slightly covered by sea water all the time

Audit trail compiled and edited by JNCC and the UK Inter-Agency Marine Monitoring Group

This paper and accompanying appendices contain background information and data used to complete the standard EC reporting form (Annex D), following the methodology outlined in the commission document "Assessment, monitoring and reporting under Article 17 of the Habitats Directive, Explanatory Notes and Guidelines, Final Draft 5; October 2006". The superscript numbers below cross-reference to the headings in the corresponding Annex D reporting form. This supporting information should be read in conjunction with the UK approach for habitats (see 'Assessing Conservation Status: UK Approach').

1. National-biogeographic level information

1.1 General description and correspondence with NVC and other habitat types

A description of "H1110 Sandbanks which are slightly covered by sea water all the time" is provided below; this clarifies precisely what is being assessed in the following sections. Table 1.1.1 provides a summary description of the habitat and its relation with other UK classifications.

'H1110 Sandbanks which are slightly covered by sea water all the time' consist of sandy sediments that are permanently covered by shallow sea water, typically at depths of less than 20m below chart datum (but sometimes including channels or other areas greater than 20m deep).

The habitat is made up of distinct banks (i.e. elongated, rounded or irregular 'mound' shapes) which arise from horizontal or sloping plains of sandy sediment. Where the areas of horizontal or sloping sandy habitat are closely associated with the banks, they are included within the Annex I type. Sandbanks and elongated sand ridges are commonly found in coastal and shelf seas where sand is abundant and where the currents are sufficiently strong to move sediment, but they occur in a wide variety of forms. The generation of sandbanks and ridges requires a source of mobile sediment, coming for example from the local seabed, or from coast erosion. Most sandbanks appear to have been created during the post-glacial rise in sea level, but they have been subsequently modified by changing currents and waves, thus losing their relict characteristics (Dyer and Huntley, 1999).

Within the UK's inshore waters 'Sandbanks which are slightly covered by sea water all the time' can be categorised into four main sub-types (Jackson and McLeod, 2000):

- Gravelly and clean sands;
- Muddy sands;
- Eelgrass (*Zostera marina*) beds;
- Maerl beds (composed of free-living Corallinaceae).

The latter two sub-types are particularly distinctive and are of high conservation value because of the diversity of species they may support and their general scarcity in UK waters. It should be noted, however, that we do not currently know what proportion of the total resource falls into each of these four categories.

Table 1.1.1 Summary description of habitat H1110 and its relations with UK vegetation/habitat classifications.

Classification	Correspondence with Annex I type	Comments
EU Interpretation Manual	= H1110	Sublittoral sandbanks, permanently submerged. Water depth is seldom more than 20m below Chart Datum (European Commission, 2006)
BAP priority habitat type	Sublittoral Sands and gravels, seagrass beds	These habitats may encompass the whole or only part of the Annex I type depending on the composition of the reef at an individual site.
CSM reporting categories	Inshore sublittoral sediment, eel grass beds	These habitats may encompass the whole or only part of the Annex I type depending on the composition of the reef at an individual site.

2. Range [2.3]

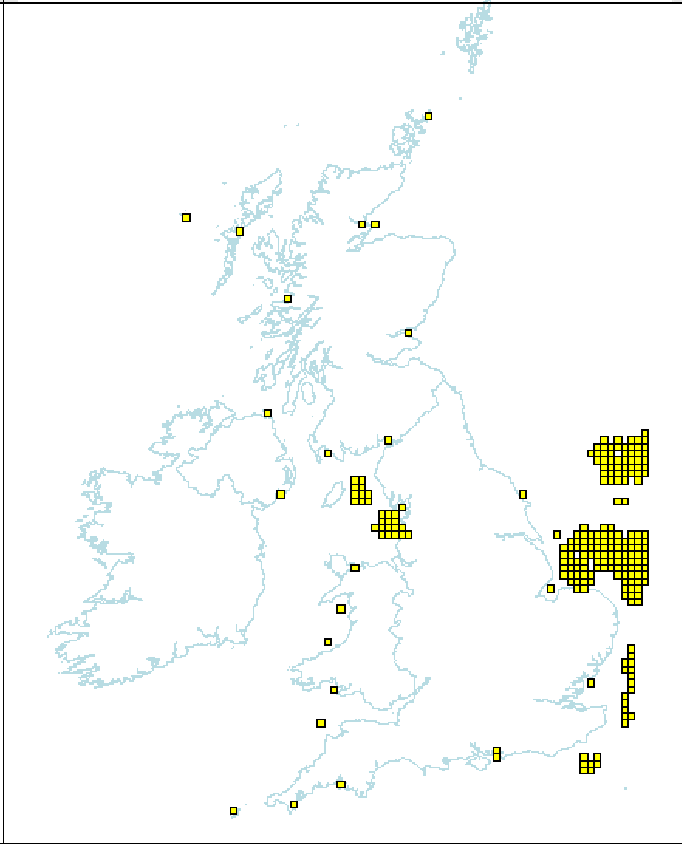
2.1 Current range

Range surface area[2.3.1]: 66,127 km²
Date calculated[2.3.2]: May 2007
Quality of data [2.3.3]: Moderate

Maps 2.1.1 and 2.1.2 show the range and distribution of H1110 in the UK.

The range of sandbanks was calculated in a GIS environment using seabed sediment data obtained from the British Geological Survey. All sandy sediment in less than 40m was included in the range estimate. This was considered appropriate to encompass all possible occurrences of the feature, including slopes extending below 20m. Because the estimate was "based on partial data with some extrapolation", data quality is reported as moderate.

'Sandbanks which are slightly covered by sea water all the time' occur widely on the Atlantic coasts of north-west Europe and around the UK coast. They are widespread in inshore waters (within 12 nautical miles of the coast) and also occur offshore in the southern North Sea and in the Irish Sea (between 12 and 200 nautical miles). Potential sandbank sites in UK offshore waters (between 12 and 200 nautical miles from the coast) are currently being considered for recommendation to the Department for Environment, Food and Rural Affairs (Defra) and have been included in the area calculations. Areas will be identified to represent the different types (linear tidal sandbanks and sandy mounds composed of muddy sand, sand and gravelly sand) in each relevant biogeographic region of UK waters. The Special Areas of Conservation (SAC) series includes large sublittoral sandbanks showing good habitat structure and function. The selected sites represent the range of variation within the four main sub-types (gravelly and clean sands, muddy sands, eelgrass beds and maerl beds), which are often associated with different physiographic features (e.g. estuaries, open coast, bays, sea lochs). The differing character of this habitat around the UK coast has also been taken into account in designation of the SACs.

Map 2.1.1 Habitat range map [1.1] for H1110	**Map 2.1.2** Habitat distribution map [1.2] for H1110
	
Range envelope shown in blue shade in above map is constructed using data held by JNCC on the known location of sandy sediment in less than 40m water depth.	Each blue square represents a 10x10km square of the National Grid and shows the known occurrence of this habitat within UK waters.

2.2 Trend in range since c.1994

Trend in range[2.3.4]: **Stable**
Trend magnitude[2.3.5]: **Not applicable**
Trend period[2.3.6]: **1994-2006**
Reasons for reported trend[2.3.7]: **Not applicable**

'Sandbanks which are slightly covered by sea water all the time' are features defined by their physiographic nature rather than by a specific biological community. Therefore, we do not consider that the range of sandbanks within UK waters has changed significantly in recent geological times.

The range of sandbanks is determined primarily by geological and hydrographic processes that generally occur over a relatively long timescale (Dyer and Huntley, 1997; Stansby *et al.*, 2006). While the physical area of some individual sandbanks may have declined due to localised pressures, the geographic spread and distribution of feature sub-types has not been reduced. The maintenance of sandbanks may potentially be challenged by disturbances to the hydrographic regime (see Section 5, below), but there is no evidence that the broad geographic spread and distribution of feature sub-type has been reduced. Hence, the post-1994 trend is reported as stable.

2.3 Favourable reference range

Favourable reference range[2.5.1]: **66,127 km^2**

Range is not restricted or notably fragmented, and the post-1994 is stable. Therefore, in accordance with the UK approach (see 'Assessing Conservation Status: UK Approach'), the current estimate has been set as the baseline favourable reference range.

2.4 Conclusions on range

Conclusion[2.6.i]: **Favourable**

Range is stable and not less than the favourable reference range. The conclusion for this parameter is therefore Favourable.

The range of 'Sandbanks which are slightly covered by sea water all the time' is thought to be altered primarily as a result of large-scale geological processes occurring over very long time periods. Therefore, there is no evidence that 'Sandbanks which are slightly covered by sea water all the time' have experienced a significant decline in range since 1994.

3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **~7,331km^2**
Date of estimation [2.4.2]: **May 2007**
Method [2.4.3]: **2 = based on remote sensing data**
Quality of data [2.4.4]: **Moderate**

An updated estimate of the area of inshore and offshore H1110 is ~7,331km^2. The area of sandbanks was calculated in a GIS environment using seabed sediment data obtained from the British Geological Survey. All sandy sediment in less than 20m was included in the offshore area estimate. The area of inshore sandbank was then added, but was likely to be an underestimate, as it only takes into account the area of those inshore sandbanks in SACs. The data are based on a combination of ground based survey and remote-sensing data.

There are currently few comprehensive data available on the area covered by sandbanks in the UK. Offshore sandbank area is also likely to be underestimated, as limited data is available on their distribution. For this reason data quality is moderate rather than good.

3.2 Trend in area since c.1994

Trend in area: **Unknown**
Trend magnitude: **Not applicable**
Trend period: **1994-2006**
Reasons for reported trend: **Unknown**

There are insufficient data to determine a reliable assessment of trend in sandbank area.

Although the area of sandbanks is determined for the most part by the presence of suitable substrate and the hydrological regime maintaining the sandbank, and is therefore unlikely to change significantly over relatively short timescales, some recent data indicate a significant decrease in the sediment volume of some individual sandbanks (Helwick Bank) over the past decade (Davies, 2003). For the overall UK resource, trends are unknown.

Some trends data do exist for some of the constituent habitats of sandbanks, such as eelgrass beds. The decline of eelgrass beds in the early part of this century certainly suggests that this sub-type has been fragmented sufficiently to cause species and habitat loss. Data collected since 1933 suggested a recovery of eelgrass beds in terms of area (Davison, 1997) but the results were variable areas across the UK. More recently, data assessed though the 2005 BAP reporting process has assessed seagrass beds to be in a 'stable' condition in the UK (UK BAP, 2006a). However, it is not currently known what proportion of the total resource contains eelgrass beds. Therefore, trends for sandbanks as a whole cannot be determined from these data.

3.3 Favourable reference area

Favourable reference area[2.5.2]: **7,331 km^2**

Although post-1994 trends are unknown, current area is sufficiently large and complete to be considered viable for the purpose of this report. The current estimate has therefore been set as the baseline favourable reference value.

3.4 Conclusions on area covered by habitat

Conclusion[2.6.ii]: Favourable

Although trends are unknown, the current area is not less than the favourable reference area. Therefore, in accordance with EU Commission guidance, the conclusion is Favourable.

The judgement on area of 'Sandbanks which are partially covered by seawater all of the time' is Favourable as there is no evidence suggesting a decline in the area of this resource at a UK level.

4. Specific structures and functions (including typical species)

4.1 Main pressures [2.4.10]

200 Fish and shellfish aquaculture
210 Professional fishing
212 Trawling
213 Drift-net fishing
220 Leisure fishing
300 Sand and gravel extraction
313 Exploration and extraction of oil or gas
400 Urbanised areas, human habitation
410 Industrial or commercial areas
420 Discharges
504 Port areas
510 Energy transport
512 Pipe lines
520 Shipping
700 Pollution
701 Water pollution
850 Modification of hydrographic functioning, general
851 Modification of marine currents
860 Dumping, depositing of dredged deposits
871 Sea defence or coast protection works
900 Erosion
952 Eutrophication
954 Invasion by a species
960 Interspecific faunal relations
969 Other forms or mixed forms of interspecific faunal competition
974 Genetic pollution
973 Introduction of disease

- Fisheries (200, 210, 212, 213, 220)
- Coastal development and other disturbances (300, 313, 400, 410, 420, 504, 510, 512, 520, 700, 701, 850, 851, 860, 871, 900, 952,)
- Climate change (871, 900)
- Non-Indigenous Species (954, 960, 969, 973, 974)
- Wasting disease of eelgrass beds

4.2 Current condition

There exist few data that examine the structure and function of 'sandbanks which are slightly covered by sea water all the time'. This has made establishing the status of sandbanks from a structure and function perspective difficult. At present, data on the condition of sandbanks comes from Common Standards Monitoring data.

4.2.1 Common Standards Monitoring condition assessments

Condition assessments based on Common Standards Monitoring (see http://www.jncc.gov.uk/page-2199) provide a means to assess the structure and functioning of H1110 in the UK. The following attributes were examined for all CSM assessments relevant to the habitat:

- Extent
- Topography
- Sediment character
- Distribution of biotopes

In addition site-specific attributes were also measured such as (JNCC, 2004):

- Extent of sub-feature or representative/notable biotopes
- Species composition of sub-feature or representative/notable biotopes
- Species population measures

SAC condition assessments

Table 4.2.1 and Map 4.2.1 summarise the Common Standards Monitoring condition assessments for UK SACs supporting habitat H1110. These data were collated in January 2007. The maps give an impression of the overall spread of where Unfavourable and Favourable sites exist (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 47% of the area and 33% of the number of assessments were Unfavourable;
- at least 15% of the total UK habitat area was in Unfavourable condition.

Note that 47% of the assessed resource extent was assessed as Unfavourable, and this proportion is likely to be higher if those sandbanks not within SACs were also assessed as there is no reason to assume that those sandbanks outside SACs would be in any better condition. Note that none of the assessed sandbanks occur in the offshore area, so we have no information about the current status of these through CSM.

Table 4.2.1 Common Standards Monitoring condition assessment results for UK SACs supporting H1110. See notes below table for details. Information on the coverage of these results is given in Section 7.2.

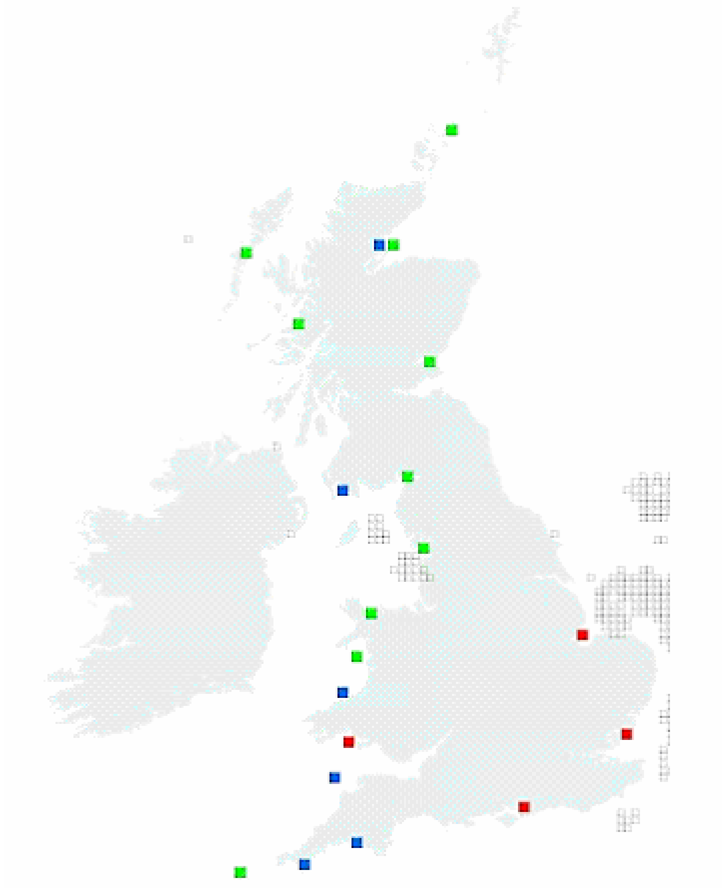
Condition	Condition sub-categories	Area (ha)	Number of site features
Unfavourable	Declining	25,278	3
	No change	41,421	1
	Unclassified		
	Recovering	44,182	1
	Total	110,881	5
	% of all assessments	***47%***	***33%***
	% of total UK resource	***15%***	***unknown***
Favourable	Maintained	95,668	8
	Recovered		
	Unclassified	28,500	2
	Total	124,168	10
	% of all assessments	***53%***	***67%***
	% of total UK resource	***17%***	***unknown***

Notes

1. Data on features that have been partly-destroyed have been excluded from this table because they are not relevant to the consideration of present condition.
2. The data included are from CSM assessments carried out between April 1998 and March 2005, as used for the JNCC Common Standards Monitoring Report 2006.

Current Condition of H1110 on Common Standard Monitoring condition assessments
(See Sections 4.2 and 7.2 for further information)

Map 4.2.1 SAC assessments



Key
Red = Unfavourable, i.e. the square contains at least one SAC where this habitat feature is present and has been judged to be Unfavourable
Green = Favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been assessed as Favourable but there are no Unfavourable SAC features
Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported
Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type

4.3 Typical species

Typical species[2.5.3]: **None used**
Typical species assessment[2.5.4]: **Not applicable**

'Sandbanks which are slightly covered by sea water all the time' are not defined by the presence of particular species, nor are they structurally dependent upon particular species. They are habitat complexes which comprise an interdependent mosaic of subtidal (and intertidal) habitats and span the full geographic range of the UK. The following information is provided for context only and has not been transferred to Annex D.

Shallow sandy sediments are typically colonised by a burrowing fauna of worms, crustaceans, bivalve molluscs and echinoderms. Mobile epifauna at the surface of the sandbank may include shrimps, gastropod molluscs, crabs and fish. Sand-eels *Ammodytes* spp., an important food for birds, live in sandy sediments. Where coarse stable material, such as shells, stones or maerl, is present on the sediment surface, species of foliose seaweeds, hydroids, bryozoans and ascidians may form distinctive communities. Shallow sandy sediments are often important nursery areas for fish, and feeding grounds for seabirds (especially puffins, *Fratercula arctica;* guillemots, *Uria aalge*; and razorbills *Alca torda*) and sea-duck (e.g. common scoter, *Melanitta nigra*). The diversity and types of community associated with this habitat are determined particularly by sediment type together with a variety of other physical, chemical and hydrographic factors. These include geographical location (influencing water temperature), the relative exposure of the coast (from wave-exposed open coasts to tide-swept coasts or sheltered inlets and estuaries), the topographical structure of the habitat, and differences in the depth, turbidity and salinity of the surrounding water (e.g. Darbyshire *et al.*, 2001). Sandbanks are also very important habitats for the common skate (*Dipturus batis*) and the thornback ray (*Raja clavata*), both of which have experienced significant declines in recent years (Hiscock *et al*., 2005). Both species have poor recovery rates due to their slow-growing and long reproductive cycle and thus they are particularly susceptible to fishing pressure and both species are listed as ‘Endangered’ on the IUCN Red List of threatened species (Hiscock *et al*., 2005). Datasets have already indicated that the common skate is already extinct in parts of the North Sea (Rogers and Ellis, 2000).

Eelgrass (*Zostera marina*) beds, a sub-type within this Annex I feature, occur in shallow subtidal areas on sandy and muddy substrata. They are generally found in marine inlets and bays but also in other sheltered areas, such as lagoons and channels. Three species of *Zostera* occur in the UK, all are considered to be scarce, and only one, *Zostera marina* is relevant to the Annex 1 type ‘H1110 Sandbanks which are slightly covered by sea water all the time’. The plants stabilise the substratum, are an important source of organic matter, and provide shelter and a surface for attachment by other species. Eelgrass is an important source of food for wildfowl, particularly Brent geese (*Branta bernicla*) and widgeon (*Anas penelope*) which feed on intertidal beds (UK BAP, 2006a).

Maerl (composed of free-living Corallinaceae), another sub-type of this Annex I feature is a collective term for several species of calcified red seaweed. Maerl beds typically develop where there is some tidal flow, such as in the narrows and rapids of sea lochs, or the straits and sounds between islands. Live maerl has been found at depths of 40 m, but beds are typically much shallower, above 20m and extending up to the low tide level. Maerl beds are found off the southern and western coasts of the British Isles, north to Shetland, and off the coast of Northern Ireland but are particularly well developed around the Scottish islands and in sea loch narrows, around Orkney, and in the south in the Fal Estuary. Maerl beds also occur in other western European waters, from the Mediterranean to Scandinavia (UK BAP, 2006b).

4.4 Conclusions on specific structures and functions (including typical species)

Conclusion[2.6.iii]: Unfavourable – Bad and deteriorating

The EC Guidance states that where “more than 25% of the area of the habitat is Unfavourable as regards its specific structures and functions”, the conclusion should be Unfavourable – Bad. In the UK this was generally taken to mean that more than 25% of the habitat area in Unfavourable condition.

47% of assessed ‘sandbanks which are slightly covered by sea water at all times’ were deemed to be in Unfavourable condition as part of CSM; this is likely to be a reliable estimate for the feature as a whole, since a high proportion (32%) of the total UK resource was assessed and there is no reason to believe that features outside the assessed area are in better condition than those within.

Since 47% is notably higher than the 25% threshold, the conclusion for this feature is Unfavourable – Bad.

5. Future prospects

5.1 Main factors affecting the habitat

5.1.1 Conservation measures

Elements of this habitat are covered by several national action plans under the UK BAP (see http://www.ukbap.org.uk), with targets to maintain, improve, restore and expand the resource.
In addition, 42 % of the estimated extent of the feature is covered in the SAC series with conservation objectives to maintain the resource or restore sites to Favourable condition. Nine SACs have H1110 as the primary qualifying feature; while for a further 14 SACs, H1110 is a qualifying feature but not the primary reason for site selection.

5.1.2 Main future threats[2.4.11]

The most obvious major future threats to H1110 are listed below, several of which are referred to in Section 4.1.

200 Fish and shellfish aquaculture
210 Professional fishing
212 Trawling
213 Drift-net fishing
220 Leisure fishing
300 Sand and gravel extraction
313 Exploration and extraction of oil or gas
400 Urbanised areas, human habitation
410 Industrial or commercial areas
420 Discharges
504 Port areas
510 Energy transport
512 Pipe lines
520 Shipping
700 Pollution
701 Water pollution
850 Modification of hydrographic functioning, general
851 Modification of marine currents
860 Dumping, depositing of dredged deposits
871 Sea defense or coast protection works
900 Erosion
952 Eutrophication
954 Invasion by a species
960 Interspecific faunal relations
969 Other forms or mixed forms of interspecific faunal competition
973 Introduction of disease
974 Genetic pollution

- Fisheries (200, 210, 212, 213, 220)

Fishing activities are the most widespread source of anthropogenic physical disturbance of benthic communities in Northern Europe and represent the most significant human activity causing change in the UK marine environment (de Groot and Lindeboom, 1994, Laffoley and Tasker 2004). Of the six "Class A - Priority Human Pressures" identified by OSPAR, fisheries account for three (OSPAR, 2000). The effects of fisheries include (Laffoley and Tasker 2004):

> Removal of target species (including genetic effects) – given the size of most fish stocks the fishing pressure exerted upon them is outside safe biological limits;
> Mortality of non-target species;

- Physical disturbance of the seabed;
- Shifts in community structure;
- Indirect effects on the food web.

There is also evidence indicating that over-fishing is often a precondition for eutrophication, disease outbreaks, or species introductions (Jackson *et al*. 2001). The combined effect of all these impacts is to reduce the overall stability of marine ecosystems (Royal Commission on Environmental Pollution, 2004). It is often difficult to establish direct relationships between specific fisheries activities and ecological effects as many ecosystem properties and components that are affected directly or indirectly by fishing also show substantial natural variability. In addition, there are many gaps in our knowledge of marine ecological processes and so it is not always possible to establish clear links between ecological change and environmental or anthropogenic factors.

Unlicensed commercial fishing is considered to be one of the most significant threats to marine biodiversity (Boyes *et al*., 2006). However, the effect of this is currently unquantified due to lack of data on unlicensed activities of vessels under 11m.

Sandy seabeds are frequently found in areas where the seabed is relatively mobile, and therefore can be considered to be relatively resilient to impact. In most cases, the first pass of a trawl over an unfished benthic habitat will cause the greatest change, and some muddy-sand seabeds can show trawl tracks for many months after a single impact. The development of new gears and techniques for fishing over previously unfished grounds thus causes great damage to the marine environment (Laffoley and Tasker, 2004). In most areas of the continental shelf, damage is being inflicted on communities already substantially changed by fishing. Trawling over naturally less disturbed mud or gravel seabeds can have even longer-term impacts for years (Royal Commission on Environmental Pollution, 2004). Although fauna living in more dynamic and mobile habitats are likely to be adapted to continual disturbance and thus more resilient to the effects of trawling (Kaiser and Spencer, 1996), the effects of disturbance are additive and can thus exceed the background levels to become ecologically significant (Royal Commission on Environmental Pollution, 2004). Moreover, fishing with demersal gear on stable sediments has significant structural impacts upon benthic communities and can lead to long-term changes if fishing is frequently repeated (Kaiser *et al*., 1999). Rumohr and Kujawski (2000) suggested that fisheries impacts have led to a switch in the dominant benthic fauna in the North Sea, from infaunal bivalve communities to assemblages such as echinoderms and crustaceans, which scavenge on fishing discards or on organisms damaged by the passage of fishing gear. Trawling therefore causes a significantly reduced diversity and abundance of infauna, whilst encouraging an increase in rapidly reproducing species (Rumohr and Kujawski, 2000).

- Coastal development and other disturbances (300, 313, 400, 410, 420, 504, 510, 512, 520, 700, 701, 850, 851, 860, 871, 900, 952)

Sandbank habitats are subjected to a variety of anthropogenic factors (Elliott *et al*., 1998), the most significant of which include:

- Physical disturbance by fishing and aggregate dredging activities;
- Construction of rigs, jetties and onshore development;
- Offshore development (e.g. wind turbine arrays and other renewables);
- Pollutants and sediments in riverine discharge.

Physical disturbances are particularly damaging to sandbanks. For example, aggregate extraction affects the nature, size and depth of substratum material, leading to long-term habitat destruction as well as disturbing the light regime through sediment disturbance. Fishing activities potentially have similar physical effects (for example, the intense perturbation caused by beam trawling activity), but have a greater effect upon biological communities (as described above). The trophic structure of communities can be greatly altered, mainly by removal of predators and larger slow-growing epibenthic fauna, whose populations are very slow to recover from perturbation (e.g. *Pecten maximus*). These effects are of particular concern for offshore sandbanks.

In addition, any disturbance that interferes with the hydrological regime in the vicinity of sandbanks can be detrimental, as maintenance of sandbanks is dependent upon current direction and speed. Land claim, adjacent coastal development, cable laying and construction of sea defences all potentially change the hydrological regime. However, there is a presumption against coastal development in the UK which is described by the following documents: NPPG 13 (Scottish Executive, 1997), TAN 14 (Welsh Assembly, 1998), PPG 20 (DoE, England, 1992). This does not apply to Northern Ireland.

The following is adapted from NPPG 13:
The presumption against development includes projects for which a coastal location is not required; projects that are approved should be accommodated on the developed coast, reuse available and suitable brownfield land, incorporate conservation interests and work within natural processes at work on the coast. In addition, where potential damage to the environment is both uncertain and significant, a precautionary approach is required and the criteria required by the various bodies responsible for environmental protection should be met.

Thus, future coastal development is not considered to be the most significant threat to sandbanks, but development that is already in place may have an influence on their future status. Nevertheless the future impact of offshore and nearshore development should not be downplayed as offshore wind farms, for which sandbanks offer good siting potential, will have impacts on these habitats.

- Climate change (871, 900)

It is accepted that global climate change will modify habitats and ecosystems worldwide, not least in the marine environment. Shoreline areas will be affected by sea level rise and an increase in storms and winds resulting in changes to the distribution and composition of some shoreline habitats (Brooker and Young, 2005). Sea level rise will also significantly impact the intertidal zone resulting in a decrease in area in some places. Sandbanks will also be affected by sea level rise and by storms, both of which can alter their morphology significantly (Dyer and Huntley, 1997; Stansby *et al.*, 2006), and thus are of particular concern.

Changes in the length of growing and breeding seasons, community composition and species ranges are likely to continue (Brooker and Young, 2005). Increasing temperatures can alter the timing of ecological processes and there is therefore potential for temporal mismatch between trophic levels. Generally, warm water species are likely to replace cold water species, with cold water species moving to more northerly latitudes or greater depths (Brooker and Young, 2005). Patterns of species response to climate change are not straightforward, due to factors such as current flow, which may also change, and barriers to species movement. The positive effects of increased temperatures, for example increased primary productivity may be offset by the negative impacts of increased disturbance from wave and storm surge action (Brooker and Young, 2005). There has already been a change in plankton species composition and abundance with a major shift in trends recorded in the early 1980s (Hays *et al.*, 2005). This shift affects a large area of the North Atlantic and appears to be linked to changes in the North Atlantic Oscillation and climate (Hays *et al.*, 2005).

Uncertainties exist for many predictions including: species specific responses to climate change; the capacity of species from different habitats to migrate in response to a changing climate; the possible influx of new invasive species; the impact of increasing ocean acidity due to absorption of atmospheric CO_2.

In addition, changes in certain activities as a result of climate change, in particular those caused by sea level rise could also have an impact on the marine environment. For example, managed retreat to enable persistence of some coastal habitats might be inhibited by coastal development and construction of sea defences, whilst changes in fishing policy will substantially alter the pressure on the marine biodiversity resource.

- Non-indigenous species (954, 960, 969, 973, 974)

Non-indigenous species (NIS) present a significant threat to the marine environment and their effects can have both economic and ecological ramifications, including biodiversity loss (e.g. Ruiz *et al*. 1997; Cohen and Carlton 1998). The deleterious impacts of NIS have been shown across global regions, habitat types, and taxonomic groups worldwide, including marine systems (Ruiz *et al*., 1997; Cohen and Carlton, 1998; Ruiz *et al*., 2000). Within marine systems, ships' ballast water, used to improve ship stability and trim, is one of the primary mechanisms for the transport and introduction of non-indigenous marine species to ports worldwide (Carlton, 1996). Given the continued growth of global trade and the complexity of shipping patterns globally, with numerous different source regions, ship types and routes operating worldwide, it is clear that non-indigenous species will continue to be transferred to UK waters for the foreseeable future.

There is some legislation currently in place to reduce the introduction of NIS via Ballast Water through the International Maritime Organization (International Maritime Organisation, 2004). This legislation aims to limit the number of viable organisms within ballast tanks in the future, but NIS remain a grave concern, and could potentially lead to habitat alteration and biodiversity loss within marine Annex I habitat features. Our ability to predict invasions is severely limited by the complexity of the invasion process itself, and therefore it is difficult to identify those marine Annex I features that are at greatest risk. Nonetheless, certain areas are known to be at a particularly high risk:

Areas within the vicinity of ports. Because the marine environment is essentially an open system, there is also potential for rapid and widespread secondary transfer of NIS within the UK once species establish reproducing populations;

Areas with a high diversity of habitat types (including diversity of substrate, salinity and temperature regimes and exposure). These habitats are most likely to be successfully invaded because, as the number of habitat types increases, so does the chance that a particular species will locate a suitable habitat for its establishment;

Areas already altered or damaged by anthropogenic effects;

Areas that have already been invaded by high numbers of NIS;

Areas of low indigenous species richness. Brackish water conditions, for example, such as those found in estuaries, generally support low diversity

Based on these criteria, it would seem that inshore sandbanks are more at risk than those offshore, but it is unlikely that we will be able to accurately predict which species will arrive and establish or what their impacts might be on native communities in the future. Though impacts of NIS can be minimal, they can also include massive population growth and subsequent displacement of native species. For one sub-type of this feature, eelgrass beds, there is some evidence that the invasive weed, *Sargassum muticum*, could directly threaten eelgrass beds by competing for space (den Hartog, 1997), and this is an ongoing concern.

- Wasting disease of eelgrass beds

Wasting disease, which affects eelgrass beds (a sub-type of 'sandbanks which are slightly covered in sea water all of the time'), is a significant threat to this Annex I sub-type. The disease causes eelgrass to die away over time, the leaves detaching from the main plant and the regenerative shoots decay. This disease appears to have occurred globally during the 1920s and 1930s and re-occurred in the 1980s (Butcher, 1933, Giesen *et al*., 1990; Short *et al*., 1986). The causes of the disease are not fully understood, and theories range from sunshine deficiency, extremes of temperature to pathogenic causes such as protozoan, fungal or bacterial infection (Butcher, 1941 and other references cited in Davison, 1997). However, the cause has never been clearly established. It is known that the disease is still present, thus future epidemics seem likely and are of grave concern as die-offs of up to 90% of plants within a population have been reported (Whelan and Cullinane, 1987).

5.2 Future condition (as regards range, area covered and specific structures and functions)

5.2.1 Common Standards Monitoring condition assessments

The Common Standards Monitoring condition assessments reported in Sections 4.2.1-2 provide a basis to predict the potential future condition of H1110 in the UK. This involved treating all assessments currently identified as either Favourable or Unfavourable-recovering as future-Favourable: remaining categories were treated as future-Unfavourable – see Table 5.2.1.1 There are a number of caveats to this approach, which are set out beneath this table.

SAC condition assessments

Table 5.2.1 and Map 5.2.1 summarise the predicted potential future condition of H1110 on UK SACs. This is based on the approach described above. The maps give an impression of the overall spread of where future-Unfavourable and future-Favourable sites are predicted to occur (summary statistics for the map are given in Section 7.2). The combined assessments show that of the SACs assessed:

- 72% of the area and 73% of the number of assessments fall within the future-Favourable category;
- at least 9% of the total UK habitat area falls within the future-Favourable category.

Importantly, much of the offshore resource for this feature is not within protected sites, which increases the likelihood of that area deteriorating further until conservation measures are put in place.

Table 5.2.1 Predicted future condition of UK SACs supporting H1110 based on current Common Standards Monitoring condition assessments. See notes below table for details. Information on the coverage of these results is given in Section 7.2

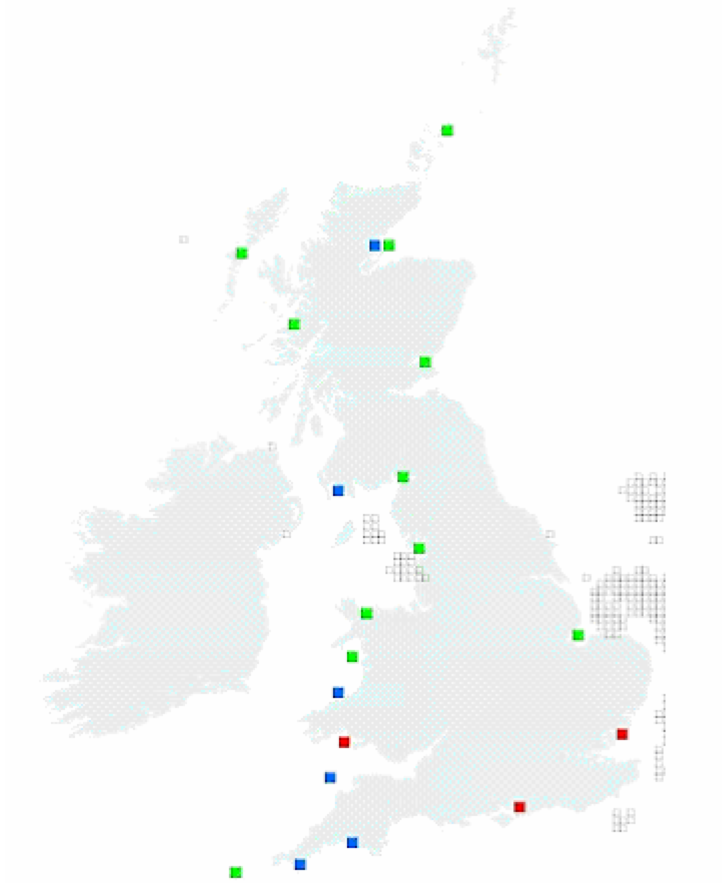
Future condition	Present condition	Area (ha)	Number of site features
Future-Unfavourable	Unfavourable declining	25,278	3
	Unfavourable no change	41,421	1
	Unfavourable unclassified		
	Total	*66,699*	*4*
	% of assessments	***28%***	***27%***
	% of total UK extent	***9%***	***Unknown***
Future-Favourable	Favourable maintained	95,668	8
	Favourable recovered		
	Unfavourable recovering	44,182	1
	Favourable unclassified	28,500	2
	Total	168,350	11
	% of assessments	***72%***	***73%***
	% of total UK extent	***22%***	***Unknown***

Note that the scenario presented above is based on the same information as used to construct the Table in section 4.1. It is based on the following premises:
(i) The Unfavourable-recovering condition assessments will at some point in the future become Favourable.
(ii) All Unfavourable-unclassified sites will remain Unfavourable, which is probably overly pessimistic;
(iii) Sympathetic management will be sustained on sites already classified as Favourable and these will not be seriously damaged by any unforeseen events.

IMPORTANT NOTE: we do not have information on the timescale of the predicted recovery, which may be influenced by many past, natural and human related factors. A sustained, sympathetic management regime is more likely to result in 'Favourable' condition being attained.

Predicted Future Condition of H1110 based on Common Standard Monitoring condition assessments
(See Sections 5.2 and 7.2 for further information on these maps)

Map 5.2.1 SAC assessments



Key:
Red = future-Unfavourable, i.e. the square contains one or more SACs where this habitat feature is present and has been predicted to be future-unfavourable
Green = future-Favourable, i.e. the square contains at least one SAC where this habitat feature is present and has been predicted to be future-favourable
Blue = SAC not assessed, i.e. the square contains at least one SAC supporting this habitat feature but no assessment has been reported
Transparent = SAC feature not present, i.e. the square does not contain any SAC features of this habitat type

5.3 Conclusions on future prospects (as regards range, area covered and specific structures and functions)

Conclusion[2.6.iv]: **Unfavourable – Bad and deteriorating**

The EC Guidance states that where "habitat prospects are bad, with severe impacts from threats expected and long-term viability not assured", the judgement should be Unfavourable – Bad. In the UK, this was generally taken to mean that habitat range and/or area are in decline, and/or less than 75% of the habitat area is likely to be in Favourable condition in 12-15 years.

In this case, only 72% of the resource is likely to be in Favourable condition in the future. In addition, the threats posed by climate change, and in particular the continued anthropogenic exploitation via fishing activity and aggregate extraction, pose real and severe threats to the condition of sandbanks in the future. The judgement for this parameter is therefore Unfavourable – Bad and deteriorating.

6. Overall conclusions and judgements on conservation status

Conclusion[2.6]: Unfavourable – Bad and deteriorating

On the basis of Structure and Function and Future Prospects, the overall conclusion is Unfavourable – Bad and deteriorating.

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for Judgement	Confidence in judgement*
Range	Favourable	Current range is stable and not less than the Favourable reference range.	1
Area covered by habitat type within range	Favourable	Current area is not less than the favourable reference area.	1
Specific structures and functions (including typical species)	Unfavourable – Bad and deteriorating	More than 25% of the habitat area is considered to be Unfavourable as regards its specific structures and functions. 47% of assessed 'sandbanks which are slightly covered by sea water at all times' were deemed to be in Unfavourable condition as part of CSM; this is likely to be a reliable estimate for the feature as a whole, since a high proportion (32%) of the total UK resource was assessed and there is no reason to believe that features outside the assessed area are in better condition than those within. Since 47% is notably higher than the 25% threshold, the conclusion for this feature is Unfavourable – Bad.	2
Future prospects (as regards range, area covered and specific structures and functions)	Unfavourable – Bad and deteriorating	Habitat prospects over next 12-15 years considered to be bad, with severe impact from threats expected and long term viability not assured. Only 72% of the resource is likely to be in Favourable condition in the future. In addition, the threats posed by climate change, and in particular the continued anthropogenic exploitation via fishing activity and aggregate extraction, pose real and severe threats to the condition of sandbanks in the future. The judgement for this parameter is therefore Unfavourable – Bad and deteriorating.	2
Overall assessment of conservation status	Unfavourable – Bad and deteriorating	One or more Unfavourable – Bad and deteriorating	2

* Key to confidence in judgement: 1 = High; 2 = Medium; 3 = Low

7. Annexed material (including information sources used 2.2)

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7.2 Further information on Common Standards Monitoring data as presented in Sections 4.2 and 5.2

Table 7.2.1 Summary of the coverage of the data shown in Tables 4.2.1 and 5.2.1

Status	Number of squares	Proportion of all squares
Current – Unfavourable (red)	5	12%
Current – Favourable (green)	10	24%
On SAC but not assessed (blue)	8	20%
Not on SAC (transparent)	18	44%
Total Number of 10km squares (any colour)	41	
Future – Unfavourable (red)	4	10%
Future – Favourable (green)	11	27%

Table 7.2.2 Summary of grid square map data shown in Maps 4.2.1-3 and 5.2.1-3

Data	Value
Number of SACs supporting feature (a)	23
Number of SACs with CSM assessments (b)	15
% of SACs assessed (b/a)	65
Extent of feature in the UK – hectares (c)	733,100
Extent of feature on SACs – hectares (d)	304,791
Extent of features assessed – hectares (e)	235,049
% of total UK hectarage on SACs (d/c)	42
% of SAC total hectarage that has been assessed (e/d)	77
% of total UK hectarage that has been assessed (e/c)	32