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 :

H1150: Coastal lagoons

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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H1150 Coastal lagoons

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 & correspondence with National Vegetation Classification (NVC) and other habitat types

Table 1.1.1 provides a summary description of H1150 and its relations with UK classifications.
Coastal lagoons are areas of shallow, coastal salt water, wholly or partially separated from the sea by sandbanks, shingle or, less frequently, rocks. Lagoons show a wide range of geographical and ecological variation; five main sub-types have been identified in the UK, on the basis of their physiography, as meeting the definition of the Annex I habitat type (Jackson and McLeod 2000).

- Isolated lagoons. These are separated completely from the sea or estuary by a barrier of rock or sediment. Seawater enters by limited groundwater seepage or by over-topping of the sea barrier. Salinity is variable but often low. Isolated lagoons are often transient features with a limited life-span due to natural processes of infilling and coastal erosion.
- Percolation lagoons. These are normally separated from the sea by shingle banks. Seawater enters by percolating through the shingle or occasionally by over-topping the bank (e.g. in storms). The water level shows some variation with tidal changes, and salinity may vary. Since percolation lagoons are normally formed by natural processes of sediment transport, they are relatively transient features, which may be eroded and swept away over a period of years or decades or may become infilled by movement of the shingle bank.
- Silled lagoons. Water in silled lagoons is retained at all states of the tide by a barrier of rock (the 'sill'). There is usually little tidal rise-and-fall. Seawater input is regular (i.e. on most tides) and although salinity may be seasonally variable, it is usually high, except where the level of the sill is near to high tide level. These lagoons are restricted to the north and west of Scotland and may occur as sedimentary basins or in bedrock (where they are called 'oban'). Muddy areas are dominated by filamentous green algae, amongst which may be colonies of rare charophytes, such as foxtail stonewort *Lamprothamnium papulosum*. There may be beds of tasselweed *Ruppia* spp. and, in the deeper most stable lagoons, eelgrass *Zostera marina*.
- Sluiced lagoons. Sluiced lagoons are formed where the natural movement of water between the lagoon and the sea is modified by artificial structures, such as a culvert under a road or valved sluices. Communities present in sluiced lagoons vary according to the type of substrate and salinity, but may resemble those of silled lagoons.
- Lagoonal inlets. Seawater enters lagoonal inlets on each tide and salinity is usually high, particularly at the seaward part of the inlet. Larger examples of this sub-type may have a number of different basins, separated by sills, and demonstrate a complete gradient from full salinity through brackish to freshwater. This salinity gradient significantly increases the habitat and species diversity of the sites in which it occurs.

Table 1.1.1 Summary description of habitat H1150 and its relations with UK vegetation/habitat classifications.

Classification	Correspondence with Annex I type	Comments
EU Interpretation Manual	= H1150	Lagoons are expanses of shallow coastal salt water, of varying salinity and water volume, wholly or partially separated from the sea by sand banks or shingle, or, less frequently, by rocks. Salinity may vary from brackish water to hypersalinity depending on rainfall, evaporation and through the addition of fresh seawater from storms, temporary flooding of the sea in winter or tidal exchange (European Commission 2006).
Biodiversity Action Plan (BAP) priority habitat type	Saline Lagoons	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.
Common Standards Monitoring (CSM) reporting categories	Lagoons	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.

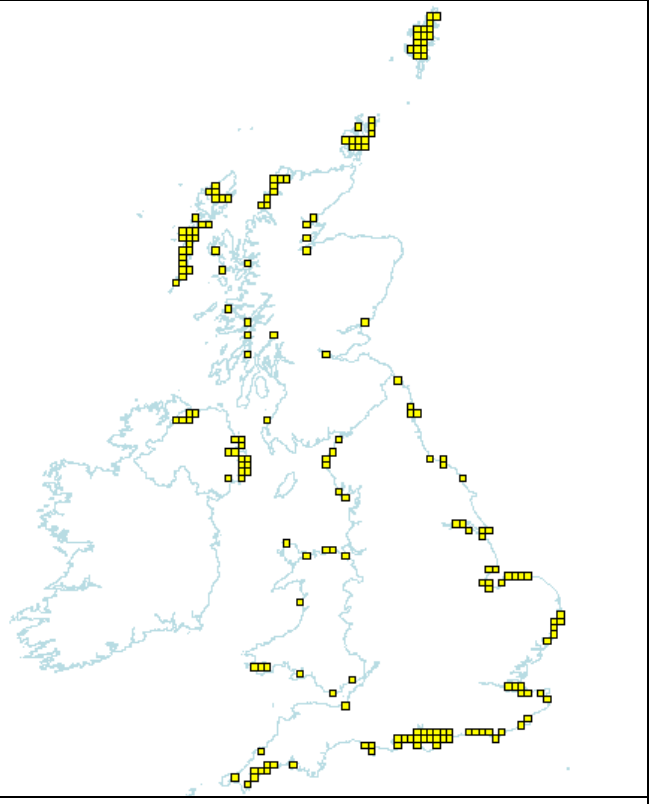
2. Range [2.3]

2.1 Current range

Range surface area [2.3.1]: 55 km²
Date of calculation [2.3.2]: May 2007
Quality of data [2.3.3]: Good

As this feature is defined by its physiographic nature rather than by a specific biological community, the range surface area is considered to be equivalent to UK extent (section 3), which was calculated using polygon shapefiles of lagoons provided by the Scottish Environment Protection Agency (SEPA), Natural England (NE) and the Environmental Heritage Service (EHS). The Welsh lagoons were extracted from a shapefile provided by the Environment Agency (EA). All shape files were derived from extensive survey data held by the agencies. Hence data quality is good.

Coastal Lagoons are considered to be a prominent and important coastal feature on a world scale (Barnes 1988); they are relatively scarce in Europe, and particularly so in the UK (Saunders 2004). Maps 2.1.1 and 2.1.2 show the range and distribution of H1150 in the UK.

Map 2.1.1 Habitat range map [1.1] for H1150	**Map 2.1.2** Habitat distribution map [1.2] for H1150
As for Map 2.1.2	
Because range is equal to area for this feature, it is not possible to map it at this scale.	Data source: SEPA, NE, EA, EHS shapefiles. Each blue square represents a 10x10km square of the National Grid with the known occurrence of this habitat.

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**

The range of this feature is determined primarily by physical and geological processes occurring over very long timescales and is not affected by the status of the biological communities supported by the feature. While the physical area of some individual lagoons may have declined due to natural and/or anthropogenic pressures (see 3.2 below), the geographic spread and distribution of the feature has not declined. It is known that during the 1980s, some 30 to 40 lagoons were lost in England alone, and it was suggested that 120 ha of Saline Lagoon needed to be created in the 20 years following 1992 in order to offset projected losses (Pye and French 1993). However, since the Habitats Directive came into force in 1994, there has been no indication that a reduction has occurred. Therefore, range is judged to be stable.

2.3 Favourable reference range

Favourable reference range[2.5.1]: **54.8 km^2**

The current range is not restricted and there has been no evidence of a decline since the Habitats Directive came into force. The current estimate has therefore been set as the baseline favourable reference value.

2.4 Conclusions on range

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

The current range is stable and not less than the favourable reference range.

The range of this feature is determined primarily by physical and geological processes occurring over very long timescales and is not affected by the status of the biological communities supported by the feature. The geographic spread and distribution of the feature has not declined.

3. Area [2.4]

3.1 Current area

Total UK extent [2.4.1]: **54.8 km^2**
Date of estimation [2.4.2.]: **May 2007**
Method [2.4.3]: **3 = Ground based survey**
Quality of data [2.4.4.]: **Good**

Table 3.1.1 provides information on the area of H1150 in the UK. The known current area for Coastal Lagoons within the UK is 54.8 km^2 (5,480 ha). This is calculated using data from SEPA (Scotland), the Department for the Environment Northern Ireland, the EA, and NE, and has been derived from the sum of the lagoon area for each individual country (Table 1). All data is based on extensive ground based survey. Hence, the quality of data is considered good.

Table 3.1.1 Area of H1150 in the UK.

	Area (ha)	Method [2.4.3]	Quality of data [2.4.4]
England	1,480	3	Good
Scotland	3,770	3	Good
Wales	53	3	Good
Northern Ireland	177	3	Good
Total UK extent [2.4.1]	5,480	3	Good

Method used to estimate the habitat surface area: 1 = only or mostly based on expert opinion; 2 = based on remote sensing data; 3 = ground based survey. Only the most relevant class is given if more than one applies.
Quality of habitat surface area data: 'Good' e.g. based on extensive surveys; 'Moderate' e.g. based on partial data with some extrapolation; 'Poor' e.g. based on very incomplete data or on expert judgement

3.2 Trend in area since c.1994

Trend in area[2.4.5]: **Stable**
Trend magnitude[2.4.6]: **Not applicable**
Trend period[2.4.7]: **1994-2006**
Reasons for reported trend[2.4.8]: **Not applicable**

There is no indication that the area of Coastal Lagoons has decreased since 1994, thus the area is judged to be stable.

Coastal lagoons are naturally ephemeral habitats, being part of an ecological succession including salinity, sedimentation and vegetation changes. The area of a lagoon has a natural tendency to reduce with the encroachment of reed-marsh, ultimately diminishing the lagoon area as it approaches the seaward end (Bamber 1997). Anthropogenic interference with the seaward barrier is therefore of particular importance. For example, encroachment by reeds coupled with the building of a seaward barrier would over a relatively short period of time lead to the disappearance of a lagoon. This interplay of natural and anthropogenic processes in changing lagoon area adds an element of complexity to determining trends in area. It also presents a particular challenge for lagoon conservation, since there can be a conflict between bird life conservation practices and those for the lagoon environment itself. Reed marsh is seen as vital for the former, but lowering of water levels to allow mudflat exposure has detrimental effects on the other biotic communities associated with coastal lagoons *per se* (Bamber 1997).

There have been some suggestions that the use of airborne remote sensing could be a useful tool for monitoring lagoons (Mumby 2000; Brown *et al.* 2003), though little has been done to date. This may not be true for all lagoons, however, as studies have shown rapid variation in lagoon volume and area at Morfa Gwyllt, in Wales, over a three month period (Smith 2006).

The UK Biodiversity Action Plan (BAP) habitat 'saline lagoons', which is a subset of the 'Coastal Lagoons' Annex 1 type has been determined to be 'stable' according to the BAP reporting 2005 (UKBAP 2006).

3.3 Favourable reference area

Favourable reference area[2.5.2]: 54.8 km^2

Area is neither restricted, nor notably fragmented. Further, since this parameter is determined by physical, rather than biological processes (see 3.2), it is appropriate to use the current estimate as a baseline favourable reference area estimate.

3.4 Conclusions on area covered by habitat

Conclusion[2.6.ii]: Favourable

The current extent is stable and not less than the favourable reference area. Therefore, in accordance with EC guidance, the conclusion is Favourable.

Overall, there is little indication that lagoon area at a UK level has been reduced to a greater extent. Therefore, the area is considered to be favourable and stable.

4. Specific Structures and Functions **(including typical species)**

4.1 Main pressures [2.4.10]

200 Fish and Shellfish Aquaculture
210 Professional fishing
211 fixed location fishing
220 Leisure fishing
221 bait digging
720 Trampling, overuse
954 invasion by a species
960 Interspecific faunal relations
970 Interspecific floral relations
974 genetic pollution
400 Urbanised areas, human habitation
410 Industrial or commercial areas
420 Discharges
504 port areas
510 Energy transport
512 pipe lines
520 Shipping
600 Sport and leisure structures
621 nautical sports
700 Pollution
701 water pollution
860 Dumping, depositing of dredged deposits
952 eutrophication
800 Landfill, land reclamation and drying out, general
801 polderisation
900 Erosion
820 Removal of sediments (mud...)
853 management of water levels
802 reclamation of land from sea, estuary or marsh

See 5.1 for full descriptions

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- Fisheries (200, 210, 211, 220, 221, 720)
- Climate Change
- Non-Indigenous Species (954, 960, 970, 974)
- Anthropogenic activity and coastal development (400, 410, 420, 504, 510, 512, 520, 600, 621, 700, 701, 860, 952, 974)
- Coastal erosion and sea level rise (800, 801, 802, 820, 853, 900)

4.2 Current condition

4.2.1 Common Standards Monitoring (CSM) condition assessments

The conservation importance of UK coastal lagoons results both from their rarity as a physiographic type and from the biota they support (Barnes 1988; Bamber *et al.* 2001). In addition, some lagoon types found in the UK are rare elsewhere in Europe; lagoons formed by a sedimentary barrier and silled lagoons are particularly significant in the UK compared to elsewhere as a result of the macrotidal system. The following attributes were examined for all CSM assessments relevant to the habitat (JNCC 2004):

- Extent.
- Isolating barrier – presence and nature.
- Salinity regime.
- Biotope Composition.

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

- Extent of sub-feature or representative/notable biotopes
- Extent of water
- Distribution of biotopes
- Species composition of representative or notable biotopes

Special Area of Conservation (SAC) condition assessments

Table 4.2.1 and Map 4.2.1 summarise the CSM condition assessments for UK SACs supporting habitat H1150. 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:

- 3% of the area and 18% of the number of assessments was unfavourable; and
- at least 3% of the total UK habitat area was in unfavourable condition.

Table 4.2.1 CSM condition assessment results for UK SACs supporting H1150. See notes below table for details. Information on the coverage of these results is given in Section 7.2.

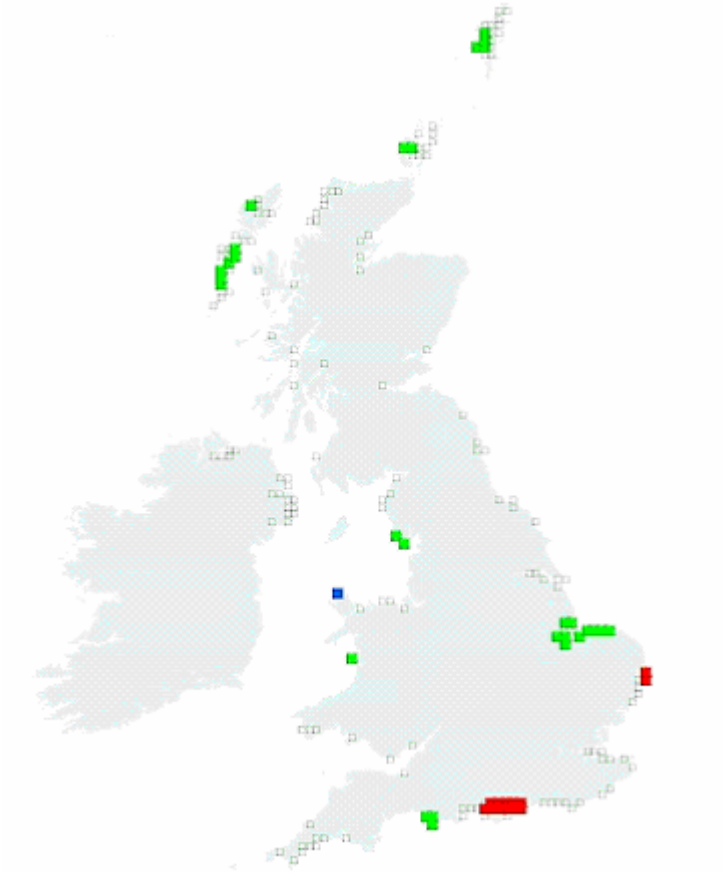
Condition	Condition sub-categories	Area (ha)	Number of site features
Unfavourable	Declining	147	1
	No change	00	0
	Unclassified		
	Recovering	19	2
	Total	166	3
	% of all assessments	***7%***	***18%***
	% of total UK resource	***3%***	***unknown***
Favourable	Maintained	1,652	9
	Recovered		
	Unclassified	709	5
	Total	2,361	14
	% of all assessments	***93%***	***82%***
	% of total UK resource	***43%***	***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 H1150 on CSM 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**

Coastal lagoons are habitat complexes which comprise an interdependent mosaic of subtidal habitats, and span the full geographic range of the UK. The feature also contains a range of substrate types dependent on the sub-type and location of individual features. In addition, there is considerable physical diversity between individual features, and species typical to one coastal lagoon may be found in very low numbers, or indeed not at all in other coastal lagoons. It is therefore not possible to define a number of species that are 'typical' to lagoons.

The following information is provided for context only and has not been transferred to Annex D.

The water in coastal lagoons can vary in salinity from brackish (owing to dilution of seawater by freshwater) to hypersaline (i.e. more salty than seawater as a result of evaporation). The plant and animal communities of lagoons vary according to the physical characteristics and salinity regime of the lagoon, and consequently there are significant differences between sites. Although, compared to other marine habitats, there is usually only a limited range of species present, they are especially adapted to the varying

salinity regimes of lagoons and some are restricted to lagoon habitats. The vegetation may include *Fucus ceranoides*, beds of eelgrass *Zostera* spp., tasselweed *Ruppia* spp., and pondweeds *Potamogeton* spp., or stoneworts such as foxtail stonewort *Lamprothamnium papulosum*. In more rocky lagoons, communities of fucoid wracks *Fucus* spp., sugar kelp *Laminaria saccharina*, and red and green algae are also found. The fauna is often characterised by mysid shrimps and other small crustaceans, worms that burrow into the sediment, molluscs, and some fish species. Species that are particularly found in lagoons and consequently have restricted distributions in the UK include starlet sea anemone *Nematostella vectensis*, lagoon sandworm *Armandia cirrhosa*, lagoon sand-shrimp *Gammarus insensibilis* and foxtail stonewort *L. papulosum*.

Davidson *et al.* (1991) however defined a number of species which can be described as 'lagoonal specialists'. These species are considered to be more characteristic of lagoonal habitats than of freshwater, brackish or seawater environments. However, again they are not restricted to lagoon environments. Bamber (2004) showed that longer term trends in the abundance of nine lagoonal specialists are difficult to determine due to a lack of data and the likely under-recording of species within Wales and the rest of their UK distribution.

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

Conclusion[2.6.iii]: Favourable

Structures and functions in good condition and no significant deteriorations or pressures noted.

The EC Guidance states that where "structures and functions are in good condition and no significant pressures exist", the conclusion should be Favourable. In the UK, this was generally taken to mean that less than 5% the habitat area was in unfavourable condition.

Based on CSM data, only 7% of assessed Coastal lagoons are currently in unfavourable condition. This is based on a large sample of the total resource (46%). If this assessed sample is taken as being representative of the UK resource as a whole, then 93% of the resource is in favourable condition. Hence, the conclusion for this parameter is reported as Favourable.

5. Future prospects

5.1.1 Conservation measures

Elements of this habitat are covered by national action plans under the UK BAP (see www.ukbap.org.uk), with targets to maintain, improve, restore and expand the resource.

In addition, 47% 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. Thirteen SACs have H1150 as the primary qualifying feature; while for a further six SACs, H1150 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 H1150 are listed below, several of which are referred to in Section 4.1

210 Professional fishing
211 fixed location fishing
220 Leisure fishing
240 Taking / Removal of fauna, general
250 Taking / Removal of flora, general
871 sea defense or coast protection works
900 Erosion
954 invasion by a species

960 Interspecific faunal relations
969 other forms or mixed forms of interspecific faunal competition
973 introduction of disease
400 Urbanised areas, human habitation
410 Industrial or commercial areas
420 Discharges
504 port areas
510 Energy transport
512 pipe lines
520 Shipping
600 Sport and leisure structures
621 nautical sports
700 Pollution
701 water pollution
952 eutrophication
800 Landfill, land reclamation and drying out, general
801 polderisation
802 reclamation of land from sea, estuary or marsh
820 Removal of sediments (mud...)
851 modification of marine currents
853 management of water levels
860 Dumping, depositing of dredged deposits

- Fisheries (210, 211, 220, 240, 250)

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):

(i) 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.
(ii) Mortality of non-target species.
(iii) Physical disturbance of the seabed.
(iv) Shifts in community structure.
(v) Indirect effects on the food web.

Commercial fisheries are rare in lagoons although some aquaculture does take place. Lagoons are more vulnerable to aquaculture related impacts than shallow inlets and bays or estuaries due to their restricted water exchange (Sewell and Hiscock 2005). In addition, some lagoons may contain commercial species of bivalves and algae as well as some invertebrate species commonly collected as fishing bait. There is, however, little information on how the exploitation of these resources affects the feature (Sewell and Hiscock 2005). In general, however, fisheries are therefore unlikely to represent the greatest anthropogenic threat to UK Coastal Lagoons.

(vi) 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.

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.

(vii) Non-Indigenous Species (954, 960, 969, 973)

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 NIS 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 Organization 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:

(i) 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.
(ii) 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.
(iii) Areas already altered or damaged by anthropogenic effects.
(iv) Areas that have already been invaded by high numbers of NIS.
(v) Areas of low indigenous species richness. Brackish water conditions, for example, such as those found in estuaries generally support low diversity.

For this feature, it is unlikely that we will be able to accurately predict which species will arrive, establish or what their impacts might be on native communities in the future. Though impacts can be minimal, they can also include massive population growth and subsequent displacement of native species.

(viii) Anthropogenic activity and coastal development (400, 410, 420, 504, 510, 512, 520, 600, 621, 700, 701, 952)

The development of the coastal area or construction of hard defences of any kind in the region of coastal lagoons has the potential to greatly influence the feature, whose maintenance is dependent upon the existence of a delicate hydrological regime. Any development which leads to a change in this hydrographic regime, be it a change in the water exchange with the sea, or in the freshwater input into the system is of considerable concern. However, there is a presumption against coastal development in the UK which is described by the following documents: NPPG 13 (Scotland; Scottish Executive 1997); TAN 14 (Wales; Welsh Assembly 1998); and PPG 20 (England; Department of the Environment 1992). For example, 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, coastal development is not considered to be the most significant threat to coastal lagoons in the future. However, it should be noted that new lagoon formation is likely to be quite restricted now as a result of a lack of suitable sites due to past coastal development (Davidson *et al.* 1991). Moreover, lagoons are likely to be severely affected by agricultural run-off and percolation of pollutants from nearby existing developments. Pesticide run-off from gardens and agricultural land is a major concern, but even small quantities of pollutants resulting from dumping of waste in lagoons can have significant impacts due to the closed nature of lagoonal systems (Everett 1993).

(ix) Coastal erosion and sea level rise (800, 801, 802, 820, 851, 853, 860, 871, 900)

Sedimentary areas already protected by hard defences or bordered by developed land will suffer the greatest impact in the event of sea level rise (Boorman *et al.* 1989). The combined effects of coastal erosion, sea level rise and the high cost of maintaining sea defences in areas such as the south-east are matters of concern. There has been a decision in principle to work with natural sedimentary processes in managing these problems in the UK, but if relative sea level rise continues to occur at present rates, it will necessitate a number of difficult decisions and call for novel engineering solutions. It will also necessitate the establishment of an appropriate balance between managed retreat and construction of higher and stronger sea defences (Defra 2005). Rising sea levels and coastal erosion have the potential to dramatically alter and destroy coastal lagoons, which are dependent upon a delicate balance of hydrographic conditions. Flooding and inundation of lagoons could occur, particularly since erosion is predicted to become increasingly dominant (Boorman *et al.* 1989).

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

5.2.1 CSM condition assessments

The CSM condition assessments reported in Sections 4.2.1-2 provide a basis to predict the potential future condition of H1150 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 H1150 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:

- 94% of the area and 94% of the number of assessments fall within the future-favourable category; and
- at least 43% of the total UK habitat area falls within the future-favourable category.

Table 5.2.1 Predicted future condition of UK SACs supporting H1150 based on current CSM 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	147	1
	Unfavourable no change		
	Unfavourable unclassified		
	Total	147	1
	% of assessments	***6%***	***6%***
	% of total UK extent	***3%***	***Unknown***
Future-favourable	Favourable maintained	1,652	9
	Favourable recovered		
	Unfavourable recovering	19	2
	Favourable unclassified	709	5
	Total	2,380	16
	% of assessments	***94%***	***94%***
	% of total extent	***43%***	***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;

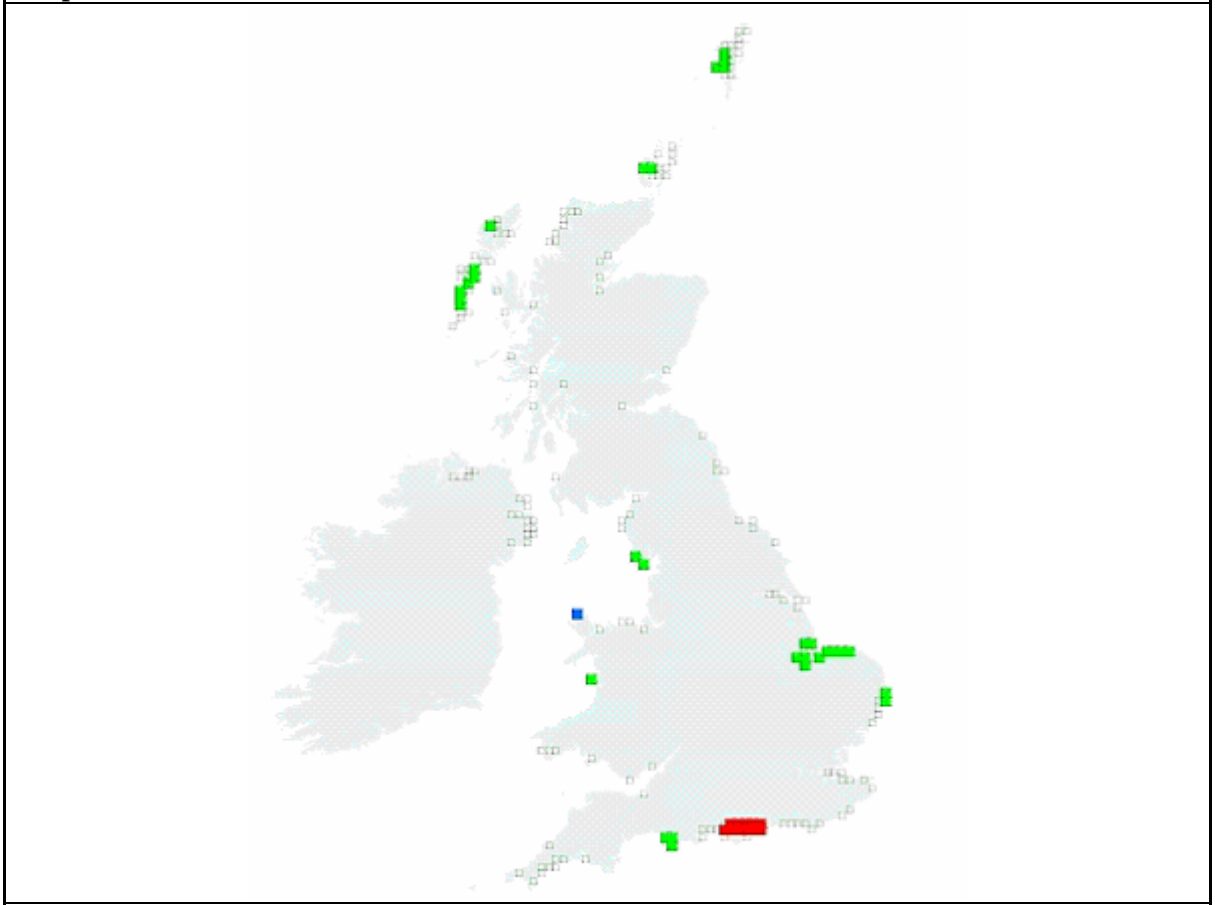
(ii) all unfavourable-unclassified sites will remain unfavourable, which is probably overly pessimistic; and

(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 H1150 based on CSM 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 - Inadequate

The EC Guidance states that where "habitat prospects are good with no significant impacts from threats expected and long-term viability assured", the judgement should be Favourable. In the UK, this was generally taken to mean that range and/or area are stable or increasing, and more than 95% of the habitat area is likely to be in favourable condition in 12-15 years.

Although Coastal Lagoons face severe threats from global warming (with sea level rise) and associated coastal squeeze in the longer-term, there are currently insufficient data to quantify these threats. Lagoons depend upon a delicate balance of fresh and sea water input, and any disruption of this balance potentially destroys lagoon environments and associated communities. However, CSM data indicates that only 94% of those lagoons assessed will be in favourable condition in the future. This is based on a large sample of the total resource (46%), which is taken as being representative of the UK resource as a whole. Therefore, the conclusion for prospects is Unfavourable - Inadequate.

6. Overall conclusions and judgements on conservation status

Conclusion[2.6]: Unfavourable - Inadequate

On the basis of Future Prospects, the overall conclusion is Unfavourable – Inadequate.

Table 6.1 Summary of overall conclusions and judgements

Parameter	Judgement	Grounds for judgement	Confidence in judgement*
Range	Favourable	The range of this feature is determined primarily by physical and geological processes occurring over very long timescales and is not affected by the status of the biological communities supported by the feature. The geographic spread and distribution of the feature has not declined.	1
Area covered by habitat type within range	Favourable	The current extent is stable and not less than the favourable reference area. Therefore, in accordance with EC guidance, the conclusion is Favourable. Overall, there is little indication that lagoon area at a UK level has been reduced to a greater extent. Therefore, the area is considered to be favourable and stable.	1
Specific structures and functions (including typical species)	Favourable	Habitat prospects over the next 12-15 years considered to be good with no significant impacts from threats expected and long-term viability assured. Based on CSM data, only 7% of assessed Coastal lagoons are currently in unfavourable condition. This is based on a large sample of the total resource (46%). If this assessed sample is taken as being representative of the UK resource as a whole, then 93% of the resource is in favourable condition.	2
Future prospects (as regards range, area covered and specific structures and functions)	Unfavourable - Inadequate	Habitat prospects considered to be intermediate between "good with no significant impacts from threats expected and long-term viability assured" and "bad with severe impacts from threats expected and long-term viability not assured. Although Coastal Lagoons face severe threats from global warming (with sea level rise) and associated coastal squeeze in the longer-term, there are currently insufficient data to quantify these threats. Lagoons depend upon a delicate balance of fresh and sea water input, and any disruption of this balance potentially destroys lagoon environments and associated communities. However, CSM data indicates that only 94% of those lagoons assessed will be in favourable condition in the future. This is based on a large sample of the total resource (46%), which is taken as being representative of the UK resource as a whole. Therefore, the conclusion for prospects Unfavourable - Inadequate.	2
Overall assessment of conservation status	Unfavourable - Inadequate	All parameter conclusions are Favourable.	2

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

Audit trail

7. Annexed material (including information sources used [2.2])

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7.2 Further information on CSM 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)	13	7%
Current – Favourable (green)	33	17%
On SAC but not assessed (blue)	4	2%
Not on SAC (transparent)	149	75%
Total Number of 10km squares (any colour)	199	
Future – Unfavourable (red)	11	6%
Future – Favourable (green)	35	18%

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)	19
Number of SACs with CSM assessments (b)	17
% of SACs assessed (b/a)	89
Extent of feature in the UK – hectares (c)	5,480
Extent of feature on SACs – hectares (d)	2,596
Extent of features assessed – hectares (e)	2,527
% of total UK hectarage on SACs (d/c)	47
% of SAC total hectarage that has been assessed (e/d)	97
% of total UK hectarage that has been assessed (e/c)	46