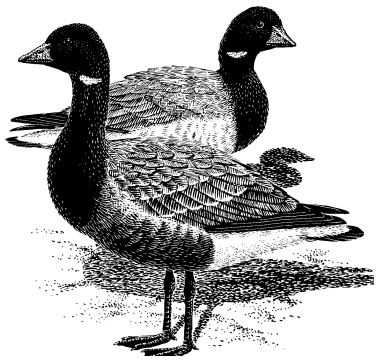
ENGLISH NATURE

BENFLEET AND SOUTHEND MARSHES

European marine site

English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994



Issued 23 January 2001

English Nature's advice for Benfleet and Southend Marshes European marine site given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

Preface

This document provides English Nature's advice to other relevant authorities as to (a) the conservation objectives and (b) any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for the Benfleet and Southend Marshes European marine site. This advice is being prepared to fulfill our obligations under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994.

The **Benfleet and Southend Marshes** Special Protection Area is a European marine site. European marine sites are defined in the Conservation (Natural Habitats &c.) Regulations 1994 as any part of a European site covered (continuously or intermittently) by tidal waters or any part of the sea in or adjacent to Great Britain up to the seaward limit of territorial waters. European sites include Special Areas of Conservation (designated under the Habitats Directive, which support certain natural habitats and species of European importance), and Special Protection Areas (designated under the Birds Directive which support significant numbers of internationally important wild birds). In many instances these designations may coincide and our advice is being prepared to cover both the SAC and SPA interests where this occurs.

This 'Regulation 33 package' is designed to help relevant and competent authorities, who have responsibilities to implement the Habitats Directive, to:

- understand the international importance of the site, underlying physical processes and the ecological requirements of the habitats and species involved;
- advise relevant authorities as to the conservation objectives for the site and operations which may cause deterioration or disturbance
- set the standards against which the condition of the site's interest features can be determined and undertake compliance monitoring to establish whether they are in favourable condition.
- develop if deemed necessary a management scheme to ensure that the features of the site are maintained.

In addition, the Regulation 33 package will provide a basis to inform the scope and nature of 'appropriate assessment' required in relation to plans and projects (Regulations 48 & 50 and by English Nature under Regulation 20). English Nature will keep this advice under review and may update it every six years or sooner, depending on the changing circumstances of the European marine site. In addition, we will provide more detailed advice to competent and relevant authorities to assess the implications of any given plan or project under the Regulations, where appropriate, at the time a plan or project is being considered. If as a result of the UK SPA Network Review (lead by JNCC) interest features are added to this European marine site or the site boundaries change, English Nature will amend this advice, as appropriate.

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23 January 2001

Issued 23 January 2001

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English Nature's advice for Benfleet and Southend Marshes European marine site given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

1. Introduction

1.1 Natura 2000

The European Union Habitats[1] and Birds[2] Directives are international obligations which set out a number of actions to be taken for nature conservation. The Habitats Directive aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements, and sets out measures to maintain or restore, natural habitats and species of European Union interest at favourable conservation status[3]. The Birds Directive protects all wild birds and their habitats within the European Union, and there are special measures for migratory birds and those that are considered rare or vulnerable.

The Habitats and Birds Directives include requirements for the designation of conservation areas. In the case of the Habitats Directive these are Special Areas of Conservation (SACs) which support certain natural habitats or species, and in the Birds Directive, Special Protection Areas (SPAs) which support wild birds of European Union interest. These sites will form a network of conservation areas across the EU to be known as "Natura 2000". Where SACs or SPAs consist of areas continuously or intermittently covered by tidal waters or any part of the sea in or adjacent to Great Britain up to the limit of territorial waters, they are referred to as European marine sites.

Further guidance on European marine sites is contained in the Department of the Environment Transport and Regions/Welsh Office document: *European marine sites in England & Wales: A guide to the Conservation (Natural Habitats &c.) Regulations 1994 and to the preparation and application of management schemes.*

1.2 English Nature's role

The Conservation (Natural Habitats &c.) Regulations 1994 translate the Habitats Directive into law in Great Britain. It gives English Nature a statutory responsibility to advise relevant authorities as to the conservation objectives for European marine sites in England and to advise relevant authorities as to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the sites have been designated. This information will be a key component of any of the management schemes which may be developed for these sites.

This document is English Nature's advice for the Benfleet and Southend Marshes European marine site issued in fulfilment of Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994

1 Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora

2 Council Directive 79/409/EEC on the conservation of wild birds

3 A habitat or species is defined as being at favourable conservation status when its natural range and the areas it covers within that range are stable or increasing and the specific structure and functions which are necessary for its long term maintenance exist and are likely to continue to exist for the foreseeable future.

(the 'Regulation 33 package'). Copies of key references quoted in this document are held at the English Nature local office in Colchester.

In addition to providing such advice, the Regulation 33 package informs the scope and nature of 'appropriate assessment' which the Directive requires to be undertaken for plans and projects (Regulations 48 & 50 and by English Nature under Regulation 20). English Nature may also provide more detailed advice to competent and relevant authorities to assess the implications of any such plans or projects.

1.3 The role of relevant authorities

The Conservation (Natural Habitats &c.) Regulations 1994 require all competent authorities to exercise their functions so as to secure compliance with the Habitats Directive. This European marine site does not have a significant subtidal component, and is managed through existing SSSI mechanisms under the Wildlife and Countryside Act 1981, as amended 1985. However, relevant authorities may, if deemed necessary, draw up a management scheme under Regulation 34 for the European marine site component of the Benfleet and Southend Marshes SPA. If such a management scheme is developed, it will provide the framework through which relevant authorities exercise their functions so as to secure compliance with the Habitats Directive and must be based on the advice in this package. Irrespective of this decision, relevant authorities must, within their areas of jurisdiction, have regard to both direct and indirect effects on an interest feature of the site as well as cumulative effects. This may include consideration of features and issues outside the boundary of the European marine site and above the highest astronomical tide.

Relevant authorities should ensure that all plans for the area integrate with any management scheme for the European marine site. Such plans may include shoreline management plans, ChaMPs (Coastal Habitat Management Plans), local Environment Agency plans, SSSI management plans, local BAP plans and sustainable development strategies for estuaries. This must occur to ensure that there is only a single management scheme through which all relevant authorities exercise their duties under the Conservation (Natural Habitats &c.) Regulations 1994.

Relevant authorities also need to have regard to changing circumstances of the SPA and may therefore need to modify the way in which they exercise their functions so as to maintain the favourable condition of interest features concerned in the long term. There is no requirement for relevant authorities to take any actions outside their statutory functions.

Under certain circumstances, where another relevant authority is unable to act for legal reasons, or where there is no other relevant authority, English Nature is empowered to use its bylaw-making powers for Marine Nature Reserves (MNR) for use in European marine sites.

1.4 Activity outside the control of relevant authorities

Nothing within this Regulation 33 package will require relevant authorities to undertake any actions or ameliorate changes in the condition of interest features if it is shown that the changes result wholly from natural causes[4]. This also applies if the changes, although causing deterioration or disturbance to the interest features, are the result of human or natural events outside their control. Having issued Regulation

[4] Determination of what constitutes natural change will be based on the best available information and scientific opinion at the time.

33 advice for European marine sites, English Nature will work with relevant authorities and others to agree, within a defined time frame, a protocol for evaluating all observed changes to baselines and to develop an understanding of natural change and provide further guidance as appropriate and possible.

On the Benfleet and Southend Marshes European marine site it is proposed to set up a Steering Group. This should be used to alert English Nature to such issues so that they may be assessed and any appropriate measures taken. This does not, however, preclude relevant authorities from taking action to prevent deterioration to the interest features, for example by introducing or promoting codes of practice through the Steering Group.

1.5 Responsibilities under other conservation designations

In addition to its SPA status, parts of Benfleet and Southend Marshes are also designated and subject to agreements under other conservation legislation (eg. SSSIs notified under the Wildlife and Countryside Act 1981 as amended 1985). The obligations of relevant authorities and other organisations under such designations are not affected by the advice contained in this document.

1.6 Role of conservation objectives

Section 4 of this document sets out the conservation objectives for the Benfleet and Southend Marshes European marine site. They are the starting point from which management schemes and monitoring programmes may be developed as they provide the basis for determining what is currently or may cause a significant effect, and for informing on the scope of appropriate assessments of plans or projects. The conservation objectives set out what needs to be achieved and thus deliver the aims of the Habitats Directive.

1.7 Role of advice on operations

The advice on operations set out in Section 6 provides the basis for discussion about the nature and extent of the operations taking place within or close to the site and which may have an impact on its interest features. It is given on the basis of the working assumption that sites were in favourable condition at the time they were identified. In the 2000 to 2006 reporting period an assessment of the condition of the site will be made to support this assumption, and ensure that favourable condition is being maintained. The advice should also be used to identify the extent to which existing measures of control, management and use are, or can be made, consistent with the conservation objectives and thereby focus the attention of relevant authorities and surveillance to areas that may need management measures.

This operations advice may need to be supplemented through further discussions with any management and advisory groups for the European marine site.

2. Qualifying species within the SPA under the EU Birds Directives

The boundary of Benfleet and Southend Marshes Special Protection Area (SPA) is shown in Figure 1.

Benfleet and Southend Marshes qualifies under Article 4.2 of the EU Birds Directive by supporting:

- Internationally important populations of regularly occurring migratory species; and
- An internationally important assemblage of waterfowl.

The citation for Benfleet and Southend Marshes was updated in November 1991. The site was classified as an SPA on 14 Feb 1994 and it is that citation on which this advice is based. In due course this may be updated and at that time the advice will need revision.

3. Interest features of the European marine site

The Benfleet and Southend Marshes SPA includes both marine areas (ie. land covered continuously or intermittently by tidal waters) and land which is not subject to tidal influence. The marine part of the SPA is termed a European marine site. The extent of the Benfleet and Southend Marshes European marine site is illustrated in Figure 2. The seaward boundary of the European marine site is concurrent with that of the SPA. The landward boundary of the European marine site is the upper boundary of the SPA, or where that extends above land covered continuously or intermittently by tidal waters it is at the limit of the marine habitats.

Where SPA qualifying species occur within the European marine site they are referred to as interest features. Sub-features (habitats) have also been identified to highlight the ecologically important components of the European marine site for each interest feature. The interest features and sub-features for the Benfleet and Southend Marshes European marine site are described below and the sub-features are mapped at Figure 2 to show their distribution and extent.

3.1 Background and context

A major aim of the Birds Directive is to take special measures to conserve the habitats of Annex 1 and migratory birds in order to ensure their survival and reproduction within the European Union. A key mechanism in achieving this is the classification by Member States of the most suitable sites as SPAs.

English Nature's conservation objectives at a site level focus on maintaining the condition of the habitats used by the qualifying species. Habitat condition will be delivered through appropriate site management including the avoidance of damaging disturbance. In reporting on Favourable Conservation Status, account will need to be taken both of habitat condition and the status of the birds on the SPA.

Accordingly, English Nature will use annual counts, in the context of five year peak means for qualifying species, together with available information on population and distribution trends, to assess whether an SPA is continuing to make an appropriate contribution to the Favourable Conservation Status of the species. Count information will be assessed in combination with information on habitat condition, at the appropriate time within the reporting cycle, in order to report to the European Commission.

English Nature's advice focuses on the qualifying species for which the SPA was originally classified despite the fact that numbers and species composition may have changed on this site since that time. Such population and species composition changes are being documented through the UK SPA Network Review, led by JNCC, which will provide advice to Ministers on any changes required in SPA citations. Depending on the review and decisions from DETR, English Nature may reissue this advice.

In addition to focussing on avoiding deterioration to the habitats of the qualifying species, the Habitats Directive also requires that actions are taken to avoid significant disturbance to the species for which the site was designated. Such disturbance may include alterations in population trends and/or distribution patterns. Avoiding disturbance to species requirements is mentioned in the favourable condition table underpinning the conservation objectives for the SPA. In this context, five year peak mean information on populations will be used as the basis for assessing whether disturbance is damaging.

Attention is, however, also directed to the inclusion of disturbance in the advice on operations provided in section 6 . Where disturbance is highlighted in such advice, Relevant authorities need to avoid damaging disturbance to qualifying species when exercising their functions under the Directive.

3.2 Reductions in organic inputs

Under the Urban Waste Water Treatment (UWWT) Directive all coastal discharges above a certain volume must have secondary treatment installed by the end of 2000. Secondary treatment of sewage will significantly reduce organic loading and to a lesser extent reduce concentrations of dissolved nutrients. The effects of these reductions on coastal features and the birds they support are difficult to predict. On the one hand, it might be expected that there would be a redistribution of feeding birds or a reduction in the overall capacity of a coastal area to support bird populations. On the other hand, where bird populations are currently adversely affected by eutrophication, cleaner discharges may contribute to improving site condition.

English Nature supports the cleaning up of coastal discharges. On balance, the overall ecological benefits of cleaner discharges are likely, in general, to outweigh any subsequent local decline in bird numbers, although there is presently insufficient knowledge to accurately predict the effects in general or for individual SPA sites. Consequently, English Nature, with input from the Countryside Council for Wales and the Environment Agency, is commissioning a related research project to study the relationship between birds and organic nutrient levels, the overall effects on the ecosystem and thereby the effects of the clean-up programme under the UWWT and Bathing Water Directives.

Under the Habitats Regulations, if significant effects are likely from such activities, the competent authority (in this case the Environment Agency) will be required to undertake an appropriate assessment to determine whether there is an adverse effect on site integrity.

3.3 General description

In recognition that bird populations may change as a reflection of national or international trends or events, this advice on the bird interests of the European marine site focuses on the condition of the habitats necessary to support the bird populations. Sub-features are identified which describe the key habitats within the European marine site necessary to support the birds that qualify within the SPA. Detailed information and targets for habitat condition are listed in the favourable condition table in Section 5. Bird usage of the site varies seasonally, with different areas being favoured over others at certain times of the year. However, annual counts for qualifying species will be used by English Nature, in the context of five year peak means, together with available information on UK population and distribution trends, to assess whether this SPA is continuing to make an appropriate contribution to the Favourable Conservation Status of the species across Europe.

Bird communities are highly mobile and exhibit patterns of activity related to tidal water movements and many other factors. Different bird species exploit different parts of a marine area and different prey species. Changes in the habitat may therefore affect them differently. The important bird populations at this site therefore require a functional coastal site which is capable of supporting intertidal habitat for feeding and roosting. This includes extensive areas of mudflats and undisturbed high tide roosts. The most important factors related to this are:

- Current extent and distribution of suitable feeding and roosting habitat (e.g. saltmarsh, mudflats);
- Sufficient prey availability (e.g. small fish, crustaceans and worms);
- Minimal levels of disturbance;
- Water quality necessary to maintain intertidal plant and animal communities; and
- Water quantity and salinity gradients necessary to maintain saltmarsh conditions suitable for bird feeding and roosting.

3.4 Internationally important populations of regularly occurring migratory bird species

Several of the species included in the wintering waterfowl assemblage also occur in internationally important numbers, and thus qualify for SPA status in their own right. These species are listed in Table 1. As all these internationally important populations are included within the wintering waterfowl assemblage, and as they depend on the same marine habitats, they have been included in the conservation objective for the assemblage.

All the above populations and assemblages are dependent on the European marine site. However a qualifying interest feature of Benfleet and Southend SPA is an internationally important population of the migratory species Dark-bellied brent geese *Branta bernicla bernicla* which also depend on habitats above Highest Astronomical Tide that lie outside the European marine site. Some of the feeding and roosting habitat; eelgrass beds, intertidal sandflat and mudflat communities and saltmarsh, does occur within the European marine site and an objective is included within this advice package for these habitats. Objectives to maintain this aspect of bird interest in favourable condition are found within English Nature's conservation objectives for the relevant SSSI within the SPA boundary and will be dealt with through procedures outlined in the Conservation (Natural Habitats &c.) Regulations 1994. Relevant authorities need to have regard to such adjacent European interests, as they might be affected by activities taking place within, or adjacent to the European marine site.

3.4.1 Key sub-features

The key sub-features for the internationally important populations of regularly occurring migratory bird species are as for the wintering waterfowl and seabird assemblage (given at 3.5.1).

3.5 An internationally important assemblage of waterfowl

The large areas of intertidal mudflats and sandflats at Benfleet and Southend Marshes support dense populations of marine invertebrate species, which in turn provide a food source for large populations of waterfowl (wildfowl and waders). The Thames estuary, of which Benfleet and Southend Marshes is a part, is one of the most important estuaries in the UK for wintering waterfowl regularly supporting over 20,000 birds (Cranswick *et al.*, 1995). During severe winter weather Benfleet and Southend Marshes assumes even greater national and international importance as waterfowl arrive from other areas and, as they are attracted by the mild conditions and the abundant food resource.

3.5.1 Key sub-features

Intertidal mudflat and sandflat communities - Intertidal mudflats on the site support high densities of invertebrates which are important as food for waterfowl. . In general more sheltered areas with a relatively high silt content support a richer biomass than more exposed areas.

Saltmarsh communities - Saltmarsh on the site provides important feeding and roosting areas for the areas bird life. On high spring tides thousands of wading birds concentrate on roost sites on the upper levels of the saltmarsh.

Eelgrass beds (Zostera beds). Eelgrass on the site is an important food source for the overwintering dark-bellied brent geese. The eelgrass beds just off Two Tree Island on the south west of the site are also important for other species of bird as they provide suitable habitat for their prey.

Shell banks These are important on this site as high tide roost sites for the overwintering birds, especially waders. They are situated off of Canvey and Two Tree islands on the south west of the site. The shells are mainly dead cockles and naturally accumulate forming natural, bare ground where the waders roost.

4. Conservation objectives for SPA interest features

Under Regulation 33(2)(a) of the Conservation (Natural Habitats &c.) Regulations 1994, English Nature has a duty to advise other relevant authorities as to the conservation objectives for the European marine site. The conservation objectives for the Benfleet and Southend Marshes European marine site interest features are provided below and should be read in the context of other advice given in this package, particularly:

- the attached maps showing the extent of the sub-features;
- summary information on the interest of each of the features; and
- the favourable condition table, providing information on how to recognise favourable condition for the feature and which will act as a basis for the development of a monitoring programme.

4.1 The conservation objective for the internationally important populations of regularly occurring migratory bird species

Subject to natural change, maintain in favourable condition[5] the habitats for the **internationally important populations of regularly occurring migratory bird species**, under the Birds Directive, in particular:

- Shell banks
- Saltmarsh
- Intertidal Mudflat and Sandflat communities
- Eelgrass Beds

Numbers of bird species using these habitats are given in Table 1

[5] For a detailed definition of how to recognise favourable condition see attached table (Section 5)

4.2 The conservation objective for the internationally important assemblage of waterfowl

Subject to natural change, maintain in favourable condition[6] the habitats for the **internationally important** assemblage of waterfowl, under the Birds Directive, in particular:

- Shell banks
- Saltmarsh
- Intertidal Mudflat and Sandflat Communities
- Eelgrass Beds

Numbers of bird species using these habitats are given in Table 1

Note: These SPA conservation objectives focus on habitat condition in recognition that bird populations may change as a reflection of national or international trends or events. Annual counts for qualifying species will be used by English Nature, in the context of five year peak means, together with available information on UK population and distribution trends, to assess whether this SPA is continuing to make an appropriate contribution to the Favourable Conservation Status of the species across Europe.

6 For a detailed definition of how to recognise favourable condition see attached table 2 (Section 5)

Table 1 Information on populations of internationally and nationally important species of birds under the Birds Directive using the Benfleet and Southend Marshes European marine site at the time the SPA was classified

Internationally important populations of regularly occurring migratory bird species.[7]

Species	Population (5yr peak mean 1985/86 -1989/90*
Knot (*Calidris canutus*)	8,400 birds (2% of East Atlantic flyway)
Dark-bellied brent goose *(Branta bernicla bernicla*)	7,200 birds (4% of World population)
Grey plover (*Pluvialis squatarola*)	2,500 birds (1% of East Atlantic Flyway)

An internationally important assemblage of waterfowl.

Importance	Population (5yr peak mean 1985/86 -1989/90)*
Benfleet and Southend Marshes supports large populations of wintering waterfowl.	30,400 individual birds.

Nationally important populations of regularly occurring migratory bird species within the internationally important assemblage of water fowl.

Species	Population (5yr peak mean 1985/86 -1989/90*
Dunlin (*Calidris alpina*)	11,100 birds (3% of British Population)
Ringed plover *(Charadrius hiaticula)*	430 birds (2% of British population)

* SPA citation held on Register of European marine sites for GB. The site was classified as an SPA on 14 February 1994

[7] Benfleet and Southend Marshes is regularly used by 1% or more of the biogeographical population of a regularly occurring species (other than those listed on annex 1) in any season (Cranswick *et al.*, 1995).

5. Favourable condition table

The favourable condition table is supplied as an integral part of English Nature's Regulation 33 advice package. It is intended to supplement the conservation objectives only in relation to management of activities and requirements on monitoring the condition of the site and its features. The table does not by itself provide a comprehensive basis on which to assess plans and projects as required under Regulations 20 and 48-50, but it does provide a basis to inform the scope and nature of any 'appropriate assessment' that may be needed. It should be noted that appropriate assessments are, by contrast, a separate activity to condition monitoring requiring consideration of issues specific to individual plans or projects. English Nature will provide more detailed advice to competent and relevant authorities to assess the implications of any given plan or project under the Regulations, where appropriate, at the time a plan or project is being considered.

The favourable condition table is the principle source of information that English Nature will use to assess the condition of an interest feature and as such comprises indicators of condition. On many terrestrial European sites, we know sufficient about the preferred or target condition of qualifying habitats to be able to define measures and associated targets for all attributes to be assessed in condition monitoring. Assessments as to whether individual interest features are in favourable condition will be made against these targets. In European marine sites we know less about habitat condition and find it difficult to specify favourable condition. Individual sites within a single marine habitat category are also all very different, further hampering the identification of generic indicators of condition. Accordingly, in the absence of such information, condition of interest features in European marine sites will be assessed against targets based on the existing conditions, which may need to be established through baseline surveys in many cases.

The assumption that existing interest features on European marine sites are in favourable condition will be tested in the 2000 - 2006 reporting period and the results subsequently fed back into our advice and site management. Where there is more than one year's observations on the condition of marine habitats, all available information will need to be used to set the site within long-term trends in order to form a view on favourable condition. Where it may become clear that certain attributes are a cause for concern, and if detailed studies prove this correct, restorative management actions will need to be taken to return the interest feature from unfavourable to favourable condition. It is the intention of English Nature to provide quantification of targets in the favourable condition table during the 2000 - 2006 reporting period.

This advice also provides the basis for discussions with management and advisory groups, and as such the attributes and associated measures and targets may be modified over time. The aim is to produce a single agreed set of attributes that will then be monitored in order to report on the condition of features. Monitoring of the attributes may be of fairly coarse methodology, underpinned by more rigorous methods on specific areas within the site. To meet UK agreed common standards, English Nature will be committed to reporting on each of the attributes subsequently listed in the final version of the table, although the information to be used may be collected by other organisations through agreements.

The table will be an important, but not the only, driver of the site monitoring programme. Other data, such as results from compliance monitoring and appropriate assessments, will also have an important role in assessing condition. The monitoring programme will be developed as part of the management scheme process through discussion with the relevant authorities and other interested parties. English Nature will be responsible for collating the information required to assess condition and will form a judgement on the condition of each feature within the site, taking into account all available information and using the favourable condition table as a guide.

Box 1 Glossary of terms used in the favourable condition table

Interest Feature	**The habitat or species for which the site has been selected.**
Sub-feature	**An ecologically important sub-division of the interest feature.**
Attribute	**Selected characteristic of an interest feature/sub-feature which provides an indication of the condition of the feature to which is applies.**
Measure	**What will be measured in terms of the units of measurement, arithmetic nature and frequency at which the measurement is taken. This measure will be attained using a range of methods from broad scale to more specific across the site.**
Target	**This defines the desired condition of an attribute, taking into account fluctuations due to natural change. Changes that are significantly different from the target will serve as a trigger mechanism through which some further investigation or remedial action is taken.**
Comments	**The rationale for selection of the attribute.**

Table 2 Favourable Condition Table for Benfleet and Southend Marshes European marine site.

NB - Many of the attributes will be able to be monitored at the same time or during the same survey. The frequency of sampling for many attributes may need to be greater during the first reporting cycle in order to characterize the site and establish the baseline.

FEATURE	SUB-FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENTS
Internationally important assemblage of waterfowl and internationally and nationally important populations of regularly occurring migratory species.	All Sub-features	Disturbance	Reduction or displacement of wintering birds	No significant reduction in numbers or displacement of wintering birds attributable to disturbance from an established baseline, subject to natural change.	Significant disturbance attributable to human activities can result in reduced food intake and / or increased energy expenditure. Five year peak mean information on populations will be used as the basis for assessing whether disturbance is damaging.
		Absence of obstruction to view lines	Openness of terrain unrestricted by obstructions.	No increase in obstructions to existing view lines, subject to natural change.	Waders require unrestricted views over >200m and dark-bellied brent geese require unrestricted views over >500m to allow early detection of predators when feeding and roosting.
	Shell banks	Extent	Area (ha), measured once per reporting cycle.	No decrease in extent from an established baseline, subject to natural change.	Shell banks are important roosting areas.
	Intertidal Mudflat and sandflat communities	Extent	Area (ha), measured once per reporting cycle.	No decrease in extent of intertidal sediment from an established baseline, subject to natural change.	Intertidal sediments and their communities provide important feeding areas for the migratory species of birds.
Internationally important assemblage of waterfowl and internationally and nationally important populations of regularly occurring migratory species.	Intertidal Mudflat and sandflat communities	Food Availability	Presence and abundance of invertebrates measured periodically (frequency to be determined).	Presence and abundance of prey species should not deviate from an established baseline, subject to natural change.	These species are an important food supply for birds. This food source is also important for a nationally important breeding population of ringed plover. For specialist feeders it may be necessary to record to species level for important prey items. Food availability will be affected by freezing conditions.
			Presence and abundance of green algae.	Presence and abundance of prey species should not deviate from an established baseline, subject to natural change.	*Enteromorpha* is important for dark-bellied brent geese.
	Saltmarsh	Extent	Area (ha), measured once per reporting cycle.	No decrease in extent of Atlantic salt meadows from an established baseline, subject to natural change.	Important roosting and feeding areas.

		Food Availability	Presence and abundance of soft-leaved and seed-bearing plants	Presence and abundance of food species should not deviate from an established baseline, subject to natural change.	Important for feeding dark-bellied brent geese.
Internationally important assemblage of waterfowl and internationally and nationally important populations of regularly occurring migratory species.	Saltmarsh	Vegetation characteristics	Short vegetation predominating (roosting)	Vegetation height throughout areas used for roosting should not deviate significantly from an established baseline, subject to natural change.	Vegetation of <10cm is required throughout areas used by roosting waders.
	Eelgrass bed communities	Extent	Area (ha), measured once per reporting cycle.	No decrease in extent and distribution of *Zostera* from an established baseline, subject to natural change.	Eelgrass beds are an important feeding area for dark-bellied brent geese.
		Food availability	Presence and abundance of Eel grass	Presence and abundance of food species should not deviate from an established baseline, subject to natural change.	Eelgrass beds are an important food source for dark-bellied brent geese.

NB .Extreme events (such as storms reducing or increasing salinities, exceptionally cold winters or warm summers) also need to be recorded as they may be critical in influencing ecological issues in the Fleet and may well be missed by routine monitoring

6. Advice on operations

English Nature has a duty under Regulation 33(2)(b) of the Conservation (Natural Habitats &c.) Regulations 1994 to advise other relevant authorities as to any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated. Information on how English Nature has developed this advice is given in section 6.2, and on how it may be reviewed and updated in the future, in Section 6.4.

The advice is provided in summary form in Table 3 and Section 6.5 and with more detail in Table 5 and Section 6.8, including advice in relation to specific interest features and their sub-features.

6.1 Purpose of advice

The aim of this advice is to enable all relevant authorities to direct and prioritize their work on the management of activities that pose the greatest potential threat to the favourable condition of interest features on the Benfleet and Southend Marshes European marine site. The advice is linked to the conservation objectives for interest features and, may help provide the basis for detailed discussions within the management group to formulate and agree a management scheme to agreed time scales for the site. The advice given here will inform on, but is without prejudice to, any advice given under Regulation 48 or Regulation 50 on operations that qualify as plans or projects within the meaning of Article 6 of the Habitats Directive.

6.2 Methods for assessment

To develop this advice on operations English Nature has used a three step process involving:

- an assessment of the **sensitivity** of the interest features or their component sub-features to operations;
- an assessment of the **exposure** of each interest feature or their component sub-features to operations; and
- a final assessment of **current vulnerability** of interest features or their component sub-features to operations.

This three step process builds up a level of information necessary to manage activities in and around the European marine site in an effective manner. Through a consistent approach, this process enables English Nature to both explain the reasoning behind our advice and identify to competent and relevant authorities those operations which pose the most current threats to the favourable condition of the interest features on the European marine site.

All the scores of relative sensitivity, exposure and vulnerability are derived using best available scientific information and informed scientific interpretation and judgement. The process uses sufficiently coarse categorization to minimize uncertainty in information, reflecting the current state of our knowledge and understanding of the marine environment. Information has been gathered from a range of sources including reports such as ABP Research (1999).

6.2.1 Sensitivity assessment

The sensitivity assessment used is an assessment of the relative sensitivity of the interest features or the component sub-features of the Benfleet and Southend Marshes European marine site to the effects of broad categories of human activities. In relation to this assessment, sensitivity has been defined as the intolerance of a habitat, community or individual (or individual colony) of a species to damage, or death, from an external factor (Hiscock, 1996). The sensitivity has been assessed in relation to the use of habitats by birds. As an example, wintering birds are highly sensitive to loss of their roosting or feeding grounds.

The sensitivity assessments of the interest features or their component sub-features of the Benfleet and Southend Marshes European marine site are based upon a series of scientific review documents. These include reports produced for the UK Marine SAC LIFE project (Davison & Hughes 1998; Elliott *et al* 1998), the Countryside Council for Wales Science Report (Holt *et al*, 1995) and the Marine Habitats Reviews (Jones *et al*, 2000).

The sensitivity assessments are based on current information but may develop with improvements in scientific knowledge and understanding. In particular, English Nature and Scottish Natural Heritage have commissioned the Marine Biological Association of the UK, through its Marine *Life* Information Network (MarLIN) to provide detailed sensitivity information to underpin this advice, over the next three years, and available to all over the World Wide Web (www.marlin.ac.uk).

6.2.2 Exposure assessment

This has been undertaken for the Benfleet and Southend Marshes European marine site by assessing the relative exposure of the interest features of their component sub-features on the site to the effects of broad categories of human activities currently occurring on the site as at July 2000 The exposure has been assessed in relation to the use of habitats by birds. As an example, wintering birds' feeding and roosting grounds may be considered highly exposed to toxic contamination from synthetic compounds due to the locations and intensity of discharges into an area.

6.2.3 Vulnerability assessment

The third step in the process is to determine the vulnerability of interest features or their component sub-features to operations. This is an integration of sensitivity and exposure. Only if a feature is both sensitive and exposed to a human activity will it be considered vulnerable. In this contact therefore, 'vulnerability' has been defined as the exposure of a habitat, community or individual (or individual colony) of a species to an external factor to which it is sensitive (Hiscock, 1996). For example, eelgrass beds are highly sensitive to physical loss, through coastal development or dredging which would result in the complete removal of the habitat. The eelgrass beds in the Benfleet and Southend Marshes European marine site are currently considered vulnerable to such activities, due to their location and existing site management. The process of deriving and scoring relative vulnerability is provided in Appendix I.

6.3 Format of advice

The advice is provided within six broad categories of operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species. This approach therefore:

- enables links to be made between human activities and the ecological requirements of the habitats or species, as required under Article 6 of the Habitats Directive;
- provides a consistent framework to enable relevant authorities in England to assess the effects of activities and identify priorities for management within their areas of responsibility; and

•is appropriately robust to take into account the development of novel activities or operations which may cause deterioration or disturbance to the interest features of the site and should have sufficient stability to need only infrequent review and updating by English Nature.

Sensitivity and vulnerability have been assessed in relation to the use of habitats by birds.

These broad categories provide a clear framework against which relevant authorities can assess activities under their responsibility. The more detailed information in Table 5 provides relevant authorities with a context against which to consider an assessment of 'significant effect' or any plans or projects which may affect the site and a basis to inform on the scope and nature of appropriate assessments required in relation to plans and projects. It is important to note that this advice is only a starting point for assessing impacts. It does not remove the need for the relevant authorities to consult English Nature formally over individual plans and projects where required to do so under the Regulations.

6.4 Update and review of advice

Information as to the operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated, is provided in light of what English Nature knows about current activities and patterns of usage at the Benfleet and Southend Marshes European marine site. English Nature expects that the information on current activities and patterns of usage (which was used to derive table 4) will be supplemented as part of the process of developing the management of the site, and through further discussion with the relevant authorities. The option of zoning this information may be appropriate. As such, it is important that future consideration of this advice by relevant authorities and others takes account of changes in the usage patterns that have occurred at the site, over the intervening period, since the advice was issued. In contrast, the information provided in this advice on the sensitivity of interest features or sub-features (Table 5) is relatively stable and will only change as a result of an improvement in our scientific knowledge, which will be a relatively long term process. Advice for sites will be kept under review and may be periodically updated through discussion with relevant authorities and others to reflect significant changes in our understanding of sensitivity together with the potential effects of plans and projects on the marine environment.

6.5 Summary of advice on operations

6.5.1 Internationally important assemblage of waterfowl (including internationally important populations of regularly occurring migratory species).

In pursuit of the conservation objective for "habitats supporting internationally important populations of regularly occurring migratory species" (Section 4.1), the relevant and competent authorities for Benfleet and Southend Marshes European marine site are advised to manage human activities within their remit such that they do not result in deterioration or disturbance to habitats or species for which the site has been selected, through any of the following:

- •Physical loss through removal and/or smothering
- •Physical damage from siltation and/or abrasion and/or selective extraction
- •Non-physical disturbance through noise and/or visual disturbance
- •Toxic contamination through increased synthetic and/or non-synthetic toxic contamination
- •Non-toxic contamination from changes in nutrient and/or organic loading and/or turbidity

•Biological disturbance through introduction of microbial pathogens and/or introduction of non-native species and translocation and/or selective extraction

6.6 Plans and Projects

Under Regulation 48(1), an appropriate assessment must to be undertaken in respect of any plan or project which:

a. either alone or in combination with other plans or projects is likely to have a *significant effect* on a European Site; and
b. is not directly connected with or necessary to, the management of the site for nature conservation.

This legal requirement applies to all European Sites (Regulation 48). Regulation 48 is also applied, as a matter of Government policy, to potential SPAs and listed Ramsar sites.

English Nature's 'Habitats regulations guidance note 1: The Appropriate Assessment (Regulation 48)', is at Appendix II for further information.

Tables 4 and 5 provide relevant authorities with a guide against which to initiate an assessment of the 'significance' of any plans or projects (and ongoing operations or activities) proposed for the site although this will only be the starting point for assessing impacts and does not remove the need for relevant authorities to formally consult English Nature over individual plans and projects where required under the Regulations.

6.7 Review of consents

Regulation 50 of the Conservation (Natural Habitats, &c.) Regulations 1994 requires competent authorities to undertake a review of any existing consent or permission to which Regulation 48 (1) would apply if it were being reconsidered as of the date on which the site became a European site. Where a review is required under these provisions it must be carried out as soon as reasonably practicable. This will have implications for discharge and other consents, which will need to be reviewed in light of these objectives and may mean that lower targets for background levels of contaminants etc. will need to be set.

Table 3 Summary of operations which may cause deterioration or disturbance to the Benfleet and Southend Marshes European marine site interest features at current levels of use[8]

The advice below is not a list of prohibitions but rather a checklist for operations for discussion with the management group, which may need to be subject to some form of management measure(s) or further measures where actions are already in force. Examples of activities under relevant authority jurisdiction are also provided. Operations marked with a _indicate those features that are considered to be highly or moderately vulnerable to the effects of the operations.

Standard list of categories of operation which may cause deterioration or disturbance	**Internationally important assemblage of waterfowl and internationally and nationally important populations of regularly occurring migratory species.**
Physical loss	
Removal (e.g. harvesting, coastal development)	_
Smothering (e.g. by artificial structures, disposal of dredge spoil)	_
Physical damage	
Siltation (e.g. run-off, channel dredging, outfalls)	_
Abrasion (e.g. boating, anchoring, trampling)	_
Selective extraction (e.g. aggregate dredging, entanglement)	_
Non-physical disturbance	
Noise (e.g. boat activity)	_
Visual (e.g. recreational activity)	_
Toxic contamination	
Introduction of synthetic compounds (e.g. pesticides, TBT, PCBs)	_
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	_
Introduction of radionuclides	
Non-toxic contamination	
Changes in nutrient loading (e.g. agricultural run-off, outfalls)	_
Changes in organic loading (e.g. mariculture, outfalls)	_
Changes in thermal regime (e.g. power stations)	
Changes in turbidity (e.g. run-off, dredging)	_
Changes in salinity (e.g. water abstraction, outfalls)	
Biological disturbance	
Introduction of microbial pathogens	_
Introduction of non-native species & translocation	_
Selective extraction of species (e.g. bait digging, wildfowling, commercial & recreational fishing)	_

[8]This advice has been developed using best available scientific information and informed scientific interpretation and judgement as at July 2000. This process has used a coarse grading of relative sensitivity, exposure and vulnerability of each interest feature to different categories of operation based on the current state of our knowledge and understanding of the marine environment. This is shown in the sensitivity and vulnerability matrices at Table 5. The advice is indicative only, and is given to guide relevant authorities and others on particular operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species for which the site has

been designated. The advice, therefore, is not a list of prohibitions but rather a check list for operations which may need to be subject to some form of management measure(s) or further measures where actions are already in force.

The precise impact of any category of operation occurring on the site will be dependant upon the nature, scale, location and timing of events. More detailed advice is available from English Nature to assist relevant authorities in assessing actual impacts and cumulative effects. Assessment of this information should be undertaken in the development of management of the site through wider consultation.

In accordance with Government policy guidance, the advice on operations is feature and site specific, and provided in the light of current activities and patterns of usage at the site as at July 2000. As such, it is important that future consideration of this advice by relevant authorities, and others, takes account of changes in usage patterns that have occurred at the site over the intervening period. Advice for sites will be kept under review and may be periodically updated through discussions with relevant authorities, and others, to reflect significant changes in our understanding of sensitivity together with the potential effects of plans or projects on the marine environment. The provision of the statutory advice given here, on operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, for which the site has been designated, under Regulation 33(2), is provided without prejudice to specific advice given under Regulation 48(3) or Regulation 50 on individual operations that qualify as plans or projects within the meaning of Article 6 of the Habitats Directive.

6.8 Interest feature and sub-feature specific advice on operations

This section provides information to help relate general advice to each of the specific interest features of the Benfleet and Southend Marshes European marine site.

This advice relates to the vulnerability of the interest features and sub-features of the Benfleet and Southend Marshes European marine site as summarised in Table 3 and set out in more detail in Table 5. An explanation of the sensitivity of the interest features or sub-features follows with an explanation of their exposure and therefore their vulnerability to damage or disturbance from the listed categories of operations. This enables links between the categories of operation and the ecological requirements of the European marine site's interest features, as set out in Section 3, to be made.

6.8.1 Internationally important assemblage of waterfowl (including internationally and nationally important populations of regularly occurring migratory species).

i) Physical loss

Removal

- All features supporting the important bird assemblages are vulnerable to physical loss by removal. Sea level rise, exacerbated by coastal squeeze, is the main threat to loss of intertidal (and shallow subtidal) feeding habitats. Mud and muddy sand communities cover extensive areas and support an abundance of invertebrate communities including cockle beds and eelgrass (*Zostera* spp.) communities. Sea level is rising at 6mm annually. Saltmarshes are important roosting habitats for internationally important assemblages of regularly occurring migratory species. This habitat is also subjected to coastal squeeze. If current rates of saltmarsh loss continue in Essex , the majority of the saltmarsh resource may be lost by the middle of this century.

Smothering

- All sub-features are naturally prone to smothering by sediments driven by storm tides. Re-use of clean dredged silts over saltmarsh, to raise the level and try and combat erosion has not been undertaken in Essex. Should this be considered, as the leaves and seeds of saltmarsh plants are a food source for certain wildfowl, the impact on saltmarsh as a food source would have to be taken into account A moderate sensitivity rating has been assigned to the saltmarsh feature for this reason. Raising saltmarshes would also benefit roosting birds, reducing their reliance on non-estuarine habitats for roosting. Smothering of intertidal habitats by siltation would be likely to temporarily reduce the extent and suitability of feeding areas. Recolonization by mud dwelling invertebrates could however, be fairly rapid. Sand and gravel recharge over mudflats alters the species composition representing a loss of finer-sediment intertidal feeding habitat. This may be sustainable if small areas are involved. However, excessive siltation of cockle beds and eelgrass beds (on the intertidal flats and in the shallow subtidal) could lead to the overall loss of these communities which are an important food source for birds.

ii) Physical damage

Siltation

- Prey items of birds feeding on intertidal mudflats live on the surface of the mud or within the sediment. Siltation is unlikely to affect availability of prey species as burrowing worms and shellfish would tend migrate upwards through deposited silts. Filter-feeding shellfish may be stressed by increased siltation and this may affect prey availability to waterfowl. Similarly, eelgrass (*Zostera* spp.), which occurs on muddy sands, is an important food source for internationally important numbers of brent geese. This is also sensitive to siltation, requiring an equilibrium between sediment deposition and erosion. Any disruption to this process, such as coastal defense structures (sea walls or groynes) and channel dredging, may alter the sediment flow and destabilise the eelgrass beds. The turbidity caused by silt plumes from dredging or alteration of current flow may also reduce light availability which is essential for

photosynthesis, though intertidal eelgrass may not be as susceptible to the latter as its subtidal counterpart. Due to the possible impacts of sea defense structures on eel grass beds and channel dredging, the intertidal mud and sandflats have been assigned a high vulnerability rating

Abrasion

- Eelgrass beds (*Zostera* spp.) are also highly vulnerable to damage by abrasion. This community can be abraded by the action of moored boats. Marine communities comprising shellfish have received moderate vulnerability ratings as they may be impinged upon by moorings. A combination of human influences can cause abrasion of saltmarshes: use of personal water craft, boat wash, groynes, scour due to land drainage outfalls. These activities and operations occur within the European marine site and the feature is considered moderately vulnerable. Roosting, feeding and nesting birds rely on saltmarsh habitat.

Selective extraction

- Selective extraction of minerals would be damaging to all habitats on the site. The extraction would destroy habitats and species. The process itself may result in further problems associated with disturbance and siltation/smothering. Finally the removal of the minerals would further accelerate the process of coastal squeeze.

iii) Non-physical disturbance

Noise and visual disturbance

- All bird species using the site are sensitive to disturbance. Much of the site is accessible to the public. In most areas the sea wall is a public right of way and there are zones of high public activity particularly during the spring and summer. The site is also easily accessible from the water. For this reason a moderate to high vulnerability rating to non-physical disturbance has been given. Birds are particularly sensitive to disturbance during severe weather when energy reserves are at a premium.. Refuge areas are usually outside the site on grazing marshes, landward of the sea wall. Disturbance causes birds to expend energy at a time when feeding rates are likely to be reduced by lack of food availability; foraging is impossible on frozen mudflats and on near freezing intertidal flats, burrowing animals are more deeply embedded in the sediment, thus requiring birds to use more energy to obtain food, reducing the frequency of feeding in the process.

- Noise from boats engines appears to disturb feeding birds, depending on distance from the mudflat margins.

- Wildfowling areas are leased by wildfowling clubs affiliated to the British Association of Shooting and Conservation. All wildfowling within the site requires the consent of English Nature and the landowners.

- There is public access to virtually all the sea walls around the site. Where these are adjacent to urban conurbations disturbance to feeding birds is likely. Another factor may be that there is a sufficient buffer of sediment flats between the feeding birds and the shoreline. A study on the Crouch (Moroney, 1998) reported that numbers of feeding shelduck and redshank tended to be higher away from urban areas. These birds were particularly sensitive to disturbance from dog walkers and car movement (Moroney, 1998). Dog walkers on the sea wall on the Blackwater have also been reported to be the greatest cause of disturbance to feeding birds and roosting birds (Beecroft, 1997).

iv) Toxic contamination

- Industrial and domestic effluent discharges contain contaminants which build up in the food chain and may have toxic effects on birds and their prey. These contaminants include heavy metals

such as copper, zinc, mercury, cadmium, radionuclides, and synthetic organic compounds (e.g. dieldrin, TBT, PCBs - polychlorinated biphenyls). These may have lethal and sub-lethal effects on marine invertebrates predated by birds. Specialist feeders could be affected by the loss of a prey species, while generalist feeders could benefit from an abundance of opportunistic prey species. This may however, result in a reduced diversity of species in the bird assemblage and may affect internationally important populations. Sub-lethal effects on food sources reduce the fitness of individual prey species by affecting reproduction, genetics, physiology and general health, though, initially this may result in an abundance of food as invertebrate prey behavior may be altered making them more available to feeding populations. Ultimately the prey populations would start to reduce in number. Birds feeding on contaminated food sources are directly at risk from those containing substances with the potential to accumulate in the food chain. All sub-features have moderate to high vulnerability ratings for toxic contamination by synthetic and non-synthetic compounds due to their proximity to industrial areas or boat moorings.

- Large oil spills over intertidal mud and sandflats can cause large scale deterioration of invertebrate communities and this would have a significant impact on an important food source. Eel grass growth may be reduced or halted by oil coverage. Acute oil spills over saltmarsh would render this food source unpalatable and birds alighting to roost or feed would become oiled and contaminated. Oil over the water column would present a threat to diving and dabbling wildfowl. Any proposals tp use chemical dispersant to treat oil spills would need to be considered carefully with MAFF (who are responsible for agreeing to any use of dispersants in shallow water in England), particularly in view of the sensitivity of local saltmarsh and mudflats. There is a very large oil refinery just west of the site.

- Although concentrations of organic micro pollutants have been found to be low along the Essex Coast, saltmarsh seedlings could be affected adversely by shock loadings discharged directly onto the saltmarsh, via sluices and storm water outfall, at the time of seedling germination. This could have the potential to affect birds that feed on the saltmarsh plants.

v) Non-toxic contamination

Changes in nutrient loading

- Agricultural run-off is likely to be a major source of nutrient input to the Benfleet and Southend Marshes. This may lead to a proliferation of blanketing algae (*Enteromorpha* spp.) on eelgrass beds (*Zostera* spp.) which can cause shading of eelgrass inhibiting photosynthesis. Nutrient enrichment may also break down the eelgrass immune system making it more susceptible to disease. Brent geese rely on this as a food source on arrival in early November after their migratory flight. Conversely, brent geese may benefit from an increase in opportunist macro algae such as *Enteromorpha* spp. and *Ulvae* spp. However other waders and wildfowl which feed on mud-dwelling invertebrates will experience a reduction in feeding areas. Furthermore, the covering of algae over the surface can reduce the water exchange between the sediment and the water column, resulting in deoxygenation of the sediment. This may alter the composition of the sediment fauna and may lead to death of prey species in severe cases. Increased algal growth may cause smothering of saltmarsh plants and prevent germination of glasswort (*Salicornia* spp.) seedlings (Boorman, 2000). A moderate vulnerability rating is assigned to the intertidal sub-features.

Changes in organic loading

- Sewage effluent discharges into the estuary may organically enrich the sediments benefitting invertebrate prey species that can tolerate low oxygen levels. Though there may be an abundance of marine worms (oligochaetes), which thrive in these conditions, there are usually few other species present. While it may appear that birds benefit under these circumstances because large numbers visit such areas to feed, it could indicate opportunism by a limited number of bird species. In the absence of such organically enriched areas, birds may be more

widely dispersed within the site. Intertidal mud and sandflats and eel grass are rated as having medium sensitivity to organic enrichment because of the potential to cause a reduction in species richness. Saltmarshes have been assigned a moderate vulnerability score due to the medium exposure of the feature to enrichment through sewage outfall. However, saltmarshes have a low sensitivity to organic enrichment.

Changes in Turbidity

- Most prey communities are not used to turbid conditions and increases from man-induced sources are not likely to be tolerated. The exceptions are however: filter-feeding shellfish inhabiting the foreshore and shallow waters, which may lose condition if turbidity levels increase above background levels clogging feeding or respiratory structures; and eelgrass (*Zostera* spp.) which may be affected as increased turbidity of tidal waters may reduce light penetration and consequently inhibit photosynthesis. The vulnerability score reflects the medium sensitivity of eelgrass to the need for turbidity in this dynamic environment..

vi) Biological disturbance

Introduction of microbial pathogens

- As pathogens are species specific, specialist feeders, such as brent geese on eelgrass or knot on shellfish, could be affected if an epidemic disease severely depleted these important food sources. Brent geese were able to slowly recover their populations by switching to alternative food sources when eelgrass was depleted by a wasting disease in the 1930s, but this took several decades.

Introduction of non-native species & translocations

- An introduced species may affect the availability of pray items to birds either through predation of favoured pray or by out-competing them for food, leading to loss of the pray population.

Selective extraction of species

- Bird populations may be affected if they are in competition with humans in exploiting a food species. Shellfish can be damaged by benthic trawls. Repeated trawling has the potential to impact on prey populations. Over exploitation of shellfish stocks could have a serious impact on birds such as knot and oystercatcher. Gathering of samphire plants (glasswort) in pioneer saltmarsh takes place commercially. The plants are picked before flowering so the seedbank for recolonization of sediments will be reduced. The impact of this is not fully known. Potentially, this could deplete a food source for seed-eating birds. There is also the selective extraction of shell fish by cockle dredging. Eelgrass beds are highly sensitive to this form of harvesting. For the reasons described above, the shallow coastal water, intertidal mudflats and sandflats, eelgrass beds and saltmarsh features are considered vulnerable to selective extraction.

Table 4 Assessment of the relative exposure of interest features and sub-features of Benfleet and Southend Marshes European Marine site to different categories of operations based on current level of activities July 2000

Key High= High exposure (3) Med =Medium exposure (2) Low= Low exposure (1)

Categories of operation which may cause deterioration or disturbance	**Internationally important assemblage of waterfowl and internationally important populations of regularly occurring migratory species**			
	Intertidal mudflat and sandflat communities	***Shell banks***	***Saltmarsh communities***	***Eelgrass beds***
Physical loss				
Removal (e.g. harvesting, land claim)	High	Low	Low	Med
Smothering (e.g. by artificial structures, disposal of dredge spoil)	High	Low	High	Low
Physical damage				
Siltation (e.g. run-off, dredging, outfalls)	High	Med	Low	Med
Abrasion (e.g. boating, anchoring, trampling).	Med	Low	Med	High
Selective extraction (e.g. aggregate dredging).	Med	Low	Med	Low
Non-physical disturbance				
Noise (e.g. boat activity)	Med	Med	Med	Med
Visual (e.g. recreational activity)	Med	Med	Med	Med
Toxic contamination				
Introduction of synthetic compounds (e.g. Pesticides, antifoulants, PCBs)	Med	Med	Med	Med
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	Med	Med	Med	Med
Introduction of radionuclides	Low	Low	Low	Low
Non-toxic contamination				
Changes in nutrient loading (e.g. agricultural run-off, outfalls)	Med	Med	Med	Med
Changes in organic loading (e.g. mariculture, outfalls)	Med	Med	Med	Med
Changes in thermal regime (e.g. outfalls, power stations)	Low	Low	Low	Low
Changes in salinity (e.g. water abstraction, outfalls)	Low	Low	Low	Low
Changes in turbidity (e.g. run-off, dredging)	High	Low	High	High
Biological disturbance				
Introduction of microbial pathogens	Med	Med	Med	Med

Introduction of non-native species & translocation	Med	Med	Med	Med
Selective extraction of species (e.g. bait digging, wildfowling, commercial & recreational fishing)	Med	Med	Low	Med

Table 5 Assessment of the relative vulnerability of interest features and sub-features of Benfleet and Southend Marshes European Marine site to different categories of operations. Categories of operations to which the features or sub-features of the site are highly or moderately vulnerable are indicated by shading. Table also incorporates relative sensitivity scores used in part to derive vulnerability.[9]

are highly or moderately vulnerable are indicated by shading. Table also incorporates relative sensitivity scores used in part to derive vulnerability.[9]

Key

	High vulnerability	••••	**High sensitivity**
	Moderate vulnerability	•••	**Medium sensitivity**
	Low vulnerability	••	**Low sensitivity**
	No vulnerability	•	**No detectable sensitivity**

Categories of operations which may cause deterioration or disturbance	**Internationally important assemblage of waterfowl, including the internationally important populations of regularly occurring migratory species**			
	Intertidal mudflat and sandflat communities	**Shell banks**	**Saltmarsh communities**	**Eelgrass beds**
Physical Loss Removal (e.g. harvesting, land claim, coastal defence)	••••	••••	••••	••••
Smothering (e.g. artificial structures, disposal of dredge spoil)	•••	•••	•••	•••
Physical Damage Siltation (e.g. run-off, channel dredging, outfall)	•••	••	••	••
Abrasion (e.g. boating, anchoring, trampling)	•••	•••	•••	••••
Selective extraction (e.g. aggregate dredging, entanglement)	•••	••••	•••	•••
Non-physical disturbance	••••			
Noise (e.g. boat activity)		••••	••••	••••
Visual presence (e.g. recreational activity)	••••	••••	••••	••••
Toxic contamination Introduction of synthetic compounds (e.g. pesticides, TBT, PCBs)	••••	•	•••	•••
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	••••	•	•••	•••
Introduction of radionuclides	••	•	••	••
Non-toxic contamination Changes in nutrient loading(e.g. agricultural run-off,	••••	•	••	•••

outfall)				
Changes in organic loading (e.g. mariculture, outfall)	•••	••	••	•••
Changes in thermal regime (e.g. outfall, power stations)	••	•	•	••
Changes in turbidity (e.g. run-off, dredging)	•••	•	••	••
Changes in salinity (e.g. water abstraction, outfall)	•••	•	•••	•••
Biological disturbance Introduction of microbial pathogens	•••	•	••	••
Introduction of non-native species & translocation	•••	•	•••	•••
Selective extraction of species (e.g. bait digging, wildfowling, commercial & recreational fishing)	••••	•	••••	•••

[9] English Nature's advice on operations is derived from an assessment combining relative sensitivity of the features or sub-features with information on human usage of the site as at July 2000, to identify relative vulnerability to categories of operations. In accordance with Government policy guidance this advice is provided in the light of current activities and patterns of usage at the site. It is important therefore that future consideration of this advice by relevant authorities, and others, takes account of changes in the usage patterns at the site. In contract the sensitivity of interest features, or sub-features, is relatively stable with alterations reflecting improvement in our scientific knowledge and understanding. To this end, information on sensitivity has been included in this table to assist the management and advisory groups with the future management of the site.

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8. Glossary

Advisory Group	The body of the representatives from local interests, user groups and conservation groups, formed to advise the management group
Annex 1 Bird species	The species listed in Annex 1 of the Birds Directive are the subject of special conservation measures concerning their habitat. These measures ensure the survival and reproduction of the birds in their area of distribution. Species listed on Annex 1 are in danger of extinction, rare or vulnerable
Annex I habitat type(s)	A natural habitat(s) listed in Annex I of the Habitats Directive for which Special Areas of Conservation can be selected.
Annex II species	A species listed in Annex II of the Habitats Directive for which Special Areas of Conservation can be selected.
Annex V	The listing, in the Habitats Directive, of the animal and plant species whose taking in the wild and exploitation may be subject to management measures.
Assemblage	A collection of plants and/or animals characteristically associated with a particular environment.
Attribute	Characteristic of an interest feature/sub-feature which provides an indication of the condition of the feature or sub-feature to which it applies.
BAP	Biodiversity Action Plan.
Benthos	Those organisms attached to, or living on, in or near, the seabed, including that part which is exposed by tides.
Biotope	The physical habitat with its biological community; a term which refers to the combination of physical environment and its distinctive assemblage of conspicuous species.
Biodiversity	The total variety of life on earth. This includes diversity within species, between species and ecosystems.
Characteristic	Special to, or especially abundant in, a particular situation or biotope. Characteristic species should be immediately conspicuous and easily identified.
Circalittoral	The rocky subtidal zone below that which is dominated by algae (Animal dominated subtidal zone).
Community	A group or organisms occurring in a particular environment, presumably interacting with each other and with the environment, and identifiable by means of ecological survey from other groups.
Competent authority	Any Minister, government department, public or statutory undertaker, public body or person holding a public office that exercises legislative powers.
Conservation objective	A statement of the nature conservation aspirations for a site, expressed in terms of the favourable condition that we wish to see the species and/or habitats for which the site has been selected to attain. Conservation objectives for European marine sites relate to the aims of the Habitats Directive.
Eulittoral	The main part of the intertidal zone characterised by limpets, barnacles, mussels, fucoid algae and with red algae often abundant on the lower part.
Epifauna	Benthic animals living on the seabed.
European site **European marine site**	A classified SPA, designated SAC, site of community importance (a site selected as a candidate SAC, adopted by the European Commission but not yet designated) a candidate SAC (in England only) or a site hosting a priority natural habitat or priority species in respect of which Article 5 of the Habitats Directive applies A European marine site which consists of, or in so far as it consists of, areas covered intermittently or continuously by seawater.
Favourable conservation status	A range of conditions for a natural habitat or species at which the sum of the influences acting upon that habitat or species are not adversely affecting its distribution, abundance, structure or function throughout the EC in the long term. The condition in which the habitat or species is capable of sustaining itself on a long-term basis.
Favourable condition	A range of conditions for a natural habitat or species at which the sum of the influences acting upon that habitat or species are not adversely affecting its distribution, abundance, structure or function within an individual Natura 2000 site in the long term. The condition in which the habitat or species is capable of sustaining itself on a long-term basis.
Habitat	The place in which a plant or animal lives.

Habitats Directive	The abbreviated term of *Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora*. It is the aim of this Directive to promote the conservation of certain habitats and species within the European Union.
Infauna	Benthic animals which live within the sediment.
Infralittoral	The subtidal zone in which upward facing rocks are dominated by erect algae, typically kelps.
Interest feature	A natural or semi-natural feature for which a European site has been selected. This includes any Habitats Directive Annex I habitat, or specific component of their fauna and flora, or any Annex II species and any population of a bird species for which and SPA has been designated under the Birds Directive. Any habitat of a species for which a site has been selected, or typical species of an Annex I habitat are also considered to be interest features.
Maintain	The action required for an interest feature when it is considered to be in favourable condition.
Management group	The body of relevant authorities formed to manage the European marine site.
Management scheme	The framework established by the relevant authorities at a European marine site under which their functions are exercised to secure, in relation to that site, compliance with the requirements of the Habitats Directive.
Nationally scarce/rare	For marine purposes, these are regarded as species of limited national occurrence.
Natura 2000	The European network of protected sites established under the Birds Directive and the Habitats Directive.
Notable species	A species that is considered to be notable due to its importance as an indicator, and may also be of nature conservation importance, and which is unlikely to be a 'characteristic species' .
Operations which may cause deterioration or disturbance	Any activity or operation taking place within, adjacent to, or remote from a European marine site that has the potential to cause deterioration to the natural habitats for which the site was designated, or disturbance to the species and its habitats for which the site was designated.
Plan or project	Any proposed development that is within a relevant authority's function to control, or over which a competent authority has a statutory function to decide on applications for consents, authorisations, licences or permissions.
Peak mean counts (5 yr)	Benfleet and Southend Marshes is broken down into count sectors. Over the winter months WeBs volunteers count all the birds which are visible within each sector. The yearly figures for each species in Benfleet and Southend Marshes are then averaged over a five year period to give the 5 yr peak mean count.
Relevant authority	The specific competent authority which has powers or functions which have, or could have, an impact on the marine environment, or adjacent to, a European marine site.
Restore	The action required for an interest feature when it is not considered to be in a favourable condition.
Sensitivity	The intolerance of a habitat, community or individual species to damage from an external force.
Sub-feature	An ecologically important sub-division of an interest feature.
Vulnerability	The exposure of a habitat, community or individual of a species to an external factor to which it is sensitive.
WEBs	Wetland Bird Survey: a collaborative national surveillance scheme of the UK's waterfowl based on counts undertaken once per month outside of the breeding season.

Appendix I Matrix of relative vulnerability

The relative vulnerability of an interest feature or sub-feature is determined by combining the relative sensitivity and exposure assessments according to the table below.

		Relative sensitivity of the interest feature		
		High	**Moderate**	**Low**	**None detectable**
Relative exposure of the interest feature	**High**	**Categories of relative vulnerability**			
	Medium	High			
		Moderate			
	Low	Low			
	None	None detectable			

Appendix II English Nature's "Habitats regulations guidance note: The Appropriate Assessment (Regulation 48)"

Appendix III List of Relevant Authorities

Appendix III List of Relevant Authorities

Association of Sea Fisheries Committees	
Castle Point District Council	
Countryside Agency	
Crown Estate	
English Heritage	
English Nature	
Environment Agency	
Essex County Council	
Department of Environment, Transport and the Regions	
Department of Trade and Industry	
Joint Nature Conservation Committee	
Ministry of Agriculture, Fisheries and Food	
Ministry of Defense	
Port of London Authority	
Sea Fish Industry Authority	
Southend-on-Sea Borough Council	
Trinity House	

Figure 1. SPA location map

Figure 2. Map showing sub-features in Benfleet and Southend Marshes European marine site