Issued 14 January 2000

ENGLISH NATURE

FAL AND HELFORD

European marine site

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

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Preface

This draft 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 Fal and Helford 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 Fal and Helford European marine site is part of a candidate Special Area of Conservation. It is Government policy that such sites should be protected as if they were already designated and, where appropriate, it is desirable to establish voluntary management schemes at an early stage, before the formal statutory obligations apply, and to act in the spirit of the Directive in the meantime (DETR & The Welsh Office, 1998). In light of this policy, we have worked with many of you to develop this advice in advance of statutory obligations applying.

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 under the Habitats Directive, which support certain natural habitats and species of European importance, and Special Protection Areas 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.

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;
- develop a management scheme to ensure that the ecological requirements of the site's interest features are met; and
- set the standards against which the condition of the site's interest features can be determined and compliance monitoring undertaken to establish whether they are in favourable condition.

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 during the European Union's moderation process qualifying interest features are added to this European marine site, English Nature will add to this advice, as appropriate.

Tim Bines
English Nature
January 2000

English Nature's advice for the Fal and Helford 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 agreements 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, especially 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 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 has 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 Fal and Helford European marine site issued in fulfilment of Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994 (the 'Regulation 33 package'). Copies of key references quoted in this document are held at the English Nature local office.

[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.

In addition to providing such advice, the Regulation 33 package will inform on 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). In the future, 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 relevant authorities to exercise their functions so as to secure compliance with the Habitats Directive. The single management scheme which the relevant authorities are drawing up under Regulation 34 for the Fal and Helford European marine site will provide the framework through which this will be done and it should be based on the advice in this package. In this respect, relevant authorities must, within their areas of jurisdiction, have regard to both direct and indirect effects on an interest feature of the site. This may include consideration of issues outside the boundary of the European marine site.

Relevant authorities should ensure that all plans for the area integrate with the management scheme for the European marine site. Such plans may include shoreline management plans, local Environment Agency plans, SSSI management plans, local and national 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 SAC and SPA and may therefore need to modify the management scheme and/or 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 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 Fal and Helford European marine site a SAC Management Group has already been set up and 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

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

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 candidate SAC status, parts of the Fal and Helford are also designated and subject to agreements under other conservation legislation (e.g. SSSIs notified under the Wildlife and Countryside Act 1981). 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 7 of this document sets out the conservation objectives for the Fal and Helford European marine site. They are the starting point from which management schemes and monitoring programmes are to be developed as they provide the basis for determining what is likely to 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 9 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 have been generally presumed to have been in favourable condition at the time they were identified. This assumption will be tested during the 2000 - 2006 reporting period. 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, when issued, will need to be supplemented through further detailed discussions with the management and advisory groups in formulating and agreeing a management scheme, where required, to agreed timescales for the European marine site.

2 Identification of interest features under the EU Habitats and Birds Directives

2.1 Introduction

The Fal and Helford European marine site in Cornwall is a complex site comprised of the two ria (drowned river valley) systems of the Fal and Helford Rivers and adjacent Falmouth Bay. The rias receive a low freshwater input and therefore contain a notable range of fully marine habitats which are affected by the degree of wave exposure ranging from extremely sheltered within the inlets to the wave-exposed, tide-swept open coast. The Helford is one of very few locations where the fan mussel *Atrina fragilis* survives in Britain. The whole inlet is a statutory nursery area for bass *Dicentrarchus labrax* and twaite shad have recently been recorded from the Helford. The European marine site supports Biodiversity Action Plan (BAP) species and habitats; fan mussel *Atrina fragilis*, the native oyster *Ostrea edulis* (subject to a traditional fishery) the pink sea fan *Eunicella verrucosa* and maerl bed habitat. As well as the ria systems being of importance as a whole, the sediment communities in the intertidal and subtidal are of note in their own right because of extensive maerl (*Phymatolithon calcareum* and *Lithothamnion corallioides*) beds in the lower Fal and Falmouth Bay, the diversity of communities including those associated with eelgrass, rich algal flora and many south-western species. The maerl beds, for example, are the most south-westerly in Britain and the largest in England. They harbour a rich variety of both epifaunal and infaunal species, including some rarely encountered species such as Couch's goby *Gobius couchi*.

2.2 Interest features under the EU Habitats Directive

The Fal and Helford qualifies as a SAC for the following Annex I habitats as listed in the EU Habitats Directive:

- **Large shallow inlets and bays**
- **Atlantic salt meadows**
- **Mudflats and sandflats not covered by seawater at low tide**
- **Sandbanks which are slightly covered by seawater all the time**

The Fal and Helford SAC also qualifies for the Annex II species shore dock *Rumex rupestris*. This does not however occur within the European marine site, and therefore within this document, as it occurs above Highest Astronomical Tide. Objectives to maintain shore dock in favourable condition are found within English Nature's conservation objectives for the relevant SSSI within the SAC 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.

Where these habitats and species occur within the European marine site they are referred to as interest features. Sub-features have also been identified to highlight the ecologically important components of each interest feature. The interest features and sub-features for the Fal and Helford European marine site are discussed in more detail below and are mapped at Figures 1, 2 and 3 to show their distribution and extent. The complete boundary of the SAC, of which the European marine site is a component, together with relevant location names, is given in Figures 1 and 2.

3 Large shallow inlets and bays

3.1 Definition

Large shallow inlets and bays are large indentations of the coast where, in contrast to estuaries, the influence of freshwater is generally limited. These shallow indentations are generally sheltered from wave action and contain a great diversity of sediments and substrates with a well developed zonation of benthic communities. These communities have generally a high biodiversity. The diversity of habitats and species within these interest features varies according to their geographic location, size, form and geology.

3.2 Importance of the feature

The rias of the Fal and Helford have a low freshwater input and as a result the area contains an unusual range of fully marine habitats from extremely sheltered in the inlets to the wave-exposed, tide-swept open coast. Of the twelve rias in England the Fal and Helford is one of only two sites selected for large shallow inlets and bays (the other being the Plymouth Sound and estuaries complex), and supports a wide diversity of habitats and species. The site supports a wide diversity of habitats and species because of a number of factors:

- the variety of wave exposures from open to sheltered coast, providing the differing environments required by a range of habitats and species;
- the different rate of tidal flow within the embayment, contributing to the variety of marine environments;
- the south western location, with seawater temperature allowing species to occur that are usually more southern in their distribution;
- the varying topography, with vertical faces, overhangs, gullies and rockpools all increasing habitat and community diversity over uniform areas of rock.

3.3 Key sub-features

Rocky shore communities - The majority of the open coast within the site including the mouths of both the Fal and Helford is rocky, with a wide variety of habitats such as overhangs and rocky platforms, rock pools and boulder shores, important for their high diversity of communities and species richness, as well as their high productivity. Throughout the Percuil River and in the Carrick Roads, lower shore overhangs and gullies support communities characterised by red algae and a rich sponge fauna, in addition to bryozoans, hydroids and spirorbid worms; a similar community is found further upstream at Tom's Rock. Castle Point is an area of fucoid dominated semi-exposed bedrock with a rich biota, particularly in pools and under dense algal cover. The shores at Penarrow Point are characterised by their slight gradient and low outcropping bedrock ridges. The lower mid-shore is dominated by serrated wrack *Fucus serratus*, with rockpools and gullies present throughout. Extensive platforms of broken bedrock are also found on both the north and south shores of the entrance to the Helford River. Rockpools are present on the lower shore, which have extremely rich algal communities. One of the most notable features is the abundant growth of the algae *Cystoseira tamariscifolia*, *Jania rubens* and *Corallina officinalis*. South of Prisk Cove and at Padagarrack Cove, rich animal communities are associated with boulders or overhanging surfaces on the lower shore. The animals present include serpulid worms, the barnacle *Verruca stroemia*, the broad-clawed porcelain crab *Porcellana platycheles*, the sea urchin *Psammechinus miliaris* and the cushion star *Asterina gibbosa* (Moore *et al.*, 1999).

Subtidal rock and boulder communities - Sublittoral bedrock, which is mostly limited to the coastal fringe in the Fal and the vicinity of the Helford River mouth, supports important animal dominated habitats. Some deeper circalittoral bedrock outcrops and boulders are found to the south of Nare Point, and are particularly important for the fragile and rare species such as Ross coral *Pentapora foliacea*, the slow growing, long lived, nationally important sea fan *Eunicella verrucosa* and dead man's fingers *Alcyonium digitatum* (Davies & Sotheran, 1995). Subtidal rock also occurs further up the inlet, north of Turnaware Point, under variable salinity conditions providing a habitat for epifauna and flora such as the brown algae *Laminaria saccharina*, red algae such as *Hypoglossum hypoglossoides* and *Polysiphonia* spp. and ascidians. The steep rock faces at Tom's Rock are covered with the sponges *Halichondria panicea* and *Hymeniacidon perleve*.

Subtidal mud communities - The deep-water channel which runs through Carrick Roads consists entirely of muddy substrata, except for a few outcrops of bedrock. Muddy sediments continue upstream and in the uppermost parts of the Fal are typically soft and estuarine (Moore, 1999). The extensive subtidal muddy sediments, forming a significant proportion of the shallow inlet and bay, are productive, contributing significantly to the overall functioning of the system. They are also integral to maintaining the intertidal areas and are important feeding grounds for fish.

Kelp forest communities - Kelp forests are highly productive ecosystems, found in the shallow subtidal and are the major primary producers in the coastal waters of the UK. They have been compared with rainforests in terms of their productivity and species richness. Kelp forests also have considerable conservation value because they harbour a very high diversity of organisms, confined to a narrow coastal fringe. For example, a single kelp holdfast may be home to several thousand small animals and the habitat plays a significant role as nursery areas for a wide variety of species, including commercial species such as crab and lobster. They are therefore key structural and functional components of this embayment and several different types can be found. The moderately exposed bedrock fringing the entrance to the Fal supports *Laminaria hyperborea* kelp forest. In more sheltered conditions further up the inlet, at St Mawes' Castle, the south western kelp *Laminaria ochroleuca* forms a forest on broken bedrock with a dense understorey of red algae. Broken bedrock below, interspersed with sandier patches, is covered by *Laminaria saccharina* kelp forest. At the entrance to the Helford the subtidal rock is also dominated by kelp.

Subtidal sandbank communities - Subtidal sandbanks occur in the area but are classified in the Directive as an interest feature in their own right and are therefore described separately below **(see Section 4)**.

Intertidal mudflat and sandflat communities - Intertidal mudflats and sandflats occur in the area but are classified in the Directive as an interest feature in their own right and are therefore described separately below **(see Section 5)**.

Saltmarsh communities - Atlantic salt meadows occur in the area but are classified in the Directive as an interest feature in their own right and are therefore described separately below **(see Section 6)**.

4 Sandbanks which are slightly covered by seawater all the time

4.1 Definition

This habitat consists of soft sediment seabeds which are covered by shallow seawater all the time. Shallow in this context is identified by the European Commission as seldom more than 20 m below Chart Datum. Key features of these subtidal areas are the range of invertebrate animals and seaweeds that colonise the seabed, or which live in the seabed sediment. Shallow sandy sediments are typically colonised by a burrowing fauna of worms, crustaceans, bivalve molluscs and echinoderms. Mobile species at the surface of the sandbanks include shrimps, crabs and fish. Where coarse stable material such as shells or maerl is present, epifaunal attached species include foliose algae, hydroids, bryozoans and ascidians. Some shallow sandy sediments are known to be important nursery areas for fish and feeding grounds for seabirds.

4.2 Importance of the feature

Within the Fal and Helford a full range of sublittoral sandy sediments are found, including extensive areas of maerl gravel throughout the embayment which comprise the largest known living maerl bed in England and Wales. The extent and variety of these subtidal sediments supports a wide diversity of habitats and species. This diversity is the result of a number of factors:

- the extent and naturalness of geomorphological processes;
- the unimpeded tidal regime;
- the extent and range of sediment substrates;
- the scarcity of sublittoral rock habitats; and
- the presence of a wide variety of mobile and stable sediment types.

4.3 Key sub-features

Maerl bed communities - Maerl beds are composed of accumulations of living and dead unattached coralline algae. They can harbour a very high diversity of organisms, particularly when compared to adjacent sediments, including some species more or less confined to this habitat. Maerl beds may also be an important source of calcareous material for other maritime habitats. The Fal maerl bed is the most south-westerly in Britain and largest outside Scotland, Brittany or Ireland. Two species of maerl occur, *Lithothamnion corallioides* which is nationally scarce and *Phymatolithon calcareum*. Exceptionally diverse biological communities are associated with the maerl; over fifty species of seaweed and many animal species are associated with the St Mawes Bank live maerl bed, including many rarities, for example *Gracilaria multipartita, Halymenia* spp. and the rarely recorded Couch's goby *Gobius couchi*. More common species include the burrowing anemone *Cerianthus lloydii*, other anemones, crabs, polychaetes, fish and crustaceans. Another live maerl bed has been recorded in the mouth of the Helford, off Bosahan Point, comprising up to 80% live *Lithothamnion corallioides* (Moore *et al*., 1999). There are extensive areas of dead and crushed maerl, found south of Penarrow Point out into Falmouth Bay. These sediments are also rich in species and provide an important habitat for, amongst others, deep burrowing species, attached seaweed, bivalves and crustaceans (Moore *et al*., 1999).

Eelgrass bed communities - Eelgrass beds are important not only as a habitat for a diverse community of species but also as nursery areas for various fish species, as stabilisers of sediment and as contributors to productivity. Subtidal eelgrass *Zostera marina* beds and their rich associated flora and

fauna are found in the shallow sands bordering the St Mawes maerl bed, between Penarrow and Trefusis Point, between Durgan and Toll Point (Helford) and between Carricknath Point and Amsterdam Point (St Mawes Harbour) (Rostron, 1985; Rostron, 1987). Eelgrasses provide an important source of attachment for many small animals and plants. Animals commonly found include anemones, swimming crabs, hermit and shore crabs, heart urchins, brittlestars, cuttlefish and more unusually seahorses. Eelgrasses were once abundant and widespread around the British coasts, but serious declines have occurred, in particular as a consequence of a severe outbreak of 'wasting disease' in the early 1930s. Recovery of eelgrass beds since the 1930s has been slow and patchy, and this habitat is now considered a nationally scarce habitat in the UK, with the south-west providing an important stronghold.

Gravel and sand communities - Fine sand and gravel is found in the mouth of the Helford, east of The Gew and Toll Point and supports rich fauna including bivalves, molluscs and other typical sand-dwelling species such as the polychaete worm *Owenia fusiformis* and the sea potato *Echinocardium cordatum*. In Gillan Harbour the sand mason worm, *Lanice conchilega* reaches high abundances in shallow sandy substrates, and in some areas dense growths of the red algae *Ceramium nodulosum* cover the sand. Shell gravel and shells are found in the shallow subtidal and due to the shelter provided within the river, algal communities are able to develop large expanses during summer, with many associated species. The common fauna includes the starfish *Asterias rubens*, hermit crabs *Pagurus bernhardus*, razor shells *Ensis* spp. and terebellid worms (Moore *et al.*, 1999).

Mixed sediment communities - At the entrance to the Fal, the deep channel consists of muddy sand and shells, with the bedrock on the west side of the Fal entrance grading to boulders, and finally a flat plain of muddy shell gravel with cobbles. The central north bank is an extensive muddy shell gravel plain in Carrick Roads. Dead native oyster *Ostrea edulis* shells provide hard substrata for encrusting organisms. The habitat supports a species-poor algal meadow where the main species include *Laminaria saccharina, Chorda filum* and *Gracilaria gracilis*. Similar species occur at Passage Cove on muddy sandy plains with scattered shells and pebbles (Moore *et al.*, 1999).

5 Mudflats and sandflats not covered by seawater at low tide

5.1 Definition

Intertidal mudflats and sandflats are submerged at high tide and exposed at low tide. They form a major component of estuaries and embayments in the UK but also occur along the open coast. The physical structure of the intertidal flats can range from the mobile, coarse sand beaches of wave-exposed coasts to the stable, fine sediment mudflats of estuaries and embayments. This habitat type can be divided into three broad categories: clean sands, muddy sands and muds, although in practice there is a continuous gradient between them. Within this range the plant and animal communities present vary according to the type of sediment, its stability and the salinity of the water.

5.2 Importance of the feature

Most of the shores of the Fal and Helford rias, and their upper reaches, are fringed by sheltered intertidal sandflats and mudflats representative of the south-west of England and recognised for the importance of the species living in the sediments. Owing to its sheltered nature, the sediments which include muds, muddy sand and clean sand, are relatively stable and support a particularly rich and diverse range of infaunal species. For example, a nationally important range of sediment communities is found in the Fal/Ruan estuary, and diverse invertebrate communities in the Percuil River and Passage Cove. This habitat makes a vital dynamic contribution to the structure and function of the Fal and Helford system. The mudflats and sandflats support a wide range of invertebrate and bird communities. The importance of the intertidal mudflat and sandflat interest feature can be summarised as follows:

- the variety and extent of different sediment types;
- the size and uninterrupted nature of geomorphological processes;
- the low input of freshwater;
- the presence of nationally rare species and communities;
- the unimpeded tidal regime and physiographic processes that maintain the habitat structures and overall functioning of the system; and
- the quality of the water.

5.3 Key sub-features

Intertidal sand and gravel communities - In the fully marine conditions at the mouth of the Fal, sheltered sandy shores are very species rich. Many species are found only at Amsterdam Point, including certain amphipods and polychaete worms, the sea cucumber *Leptopentacta elongata* and some bivalve molluscs. Many other species including the brittlestars *Ophiura ophiura* and *Amphiura brachiata* and the sea potato *Echinocardium cordatum* are found around St Mawes. In Passage Cove, areas of pebbles and gravel on the lower shore support dense populations of burrowing polychaetes, mostly *Myxicola infundibulum* and *Branchiomma bombyx.*

Intertidal muddy sand communities - Dense beds of the sand mason worm *Lanice conchilega* are found in the lower shore muddy sand at Amsterdam Point and at Treath on the Helford. In Place Cove

the muddy sand is dominated by lugworm *Arenicola*. These extensive and productive sediment areas are important to both the structure and function of the interest feature. They also support nationally important bird populations.

Intertidal mud communities - The extensive mudflats present throughout the complex are a highly productive system forming a critical part of the food chain. The mudflats contain extensive and varied infaunal communities, rich in bivalves and other invertebrates, and provide important feeding grounds for nationally important numbers of waterfowl. Lower shore muds are dominated by ragworm *Hediste diversicolor* and the peppery furrow shell *Scrobicularia plana* and *Abra alba.*

6 Atlantic salt meadows

6.1 Definition

Atlantic salt meadows (*Glauco-Puccinellietalia*) occur on North Sea, English Channel and Atlantic shores. Atlantic salt meadows develop when halophytic vegetation colonises soft intertidal sediments of mud and sand in areas protected from strong wave action. This vegetation forms the middle and upper reaches of saltmarshes, where tidal inundation still occurs but with decreasing frequency and duration. A wide range of community types is represented and the saltmarsh can cover large areas, especially where there has been little or no enclosure on the landward side. The vegetation varies with climate and the frequency and duration of tidal inundation. Grazing by domestic stock can be particularly significant in determining the structure and species composition of the habitat type and in determining its relative value for plants, for invertebrates and for wintering or breeding waterfowl. The upper saltmarsh is regarded as particularly important and there is considerable variation of this habitat type in different parts of the UK. The upper saltmarsh has transitions to a number of habitats, including sand dune, coastal shingle, freshwater marshes and woodland. This part of the saltmarsh succession has been particularly vulnerable to destruction by enclosure, and remaining areas are particularly valuable.

6.2 Importance of the feature

This site is chosen to provide an example of saltmarsh vegetation in a ria. Examples of saltmarsh vegetation in rias are restricted to south-west England and west Wales. There is a narrow saltmarsh zonation typical of rias, from pioneer to upper marsh, and transitions to woodland where the fringing trees overhang the tidal river, an unusual juxtaposition of vegetation in the UK. Such transitional areas need to be maintained in order to maintain the character of the saltmarsh zonation.

The ria system of the Fal and Helford includes fringing saltmarsh vegetation, typical of rias and the community type in the extreme south west of the UK. The natural transition between pioneer saltmarsh, the more diverse communities of mature saltmarsh, scrub and woodland, is an unusual feature, increasingly uncommon in Britain. The main areas of saltmarsh occur in the Fal Estuary at the heads of Restronguet Creek, Calenick Creek, the Tresillian and Fal Ruan Rivers, with smaller patches in the Helford. Typical plant species include common saltmarsh grass *Puccinellia maritima*, red fescue *Festuca rubra*, thrift *Armeria maritima*, sea couch *Elytrigea atherica*, sea aster *Aster tripolium*, sea arrow grass *Triglochin maritima* and sea rush *Juncus maritimus*. The vegetation composition of the different zones of the saltmarsh is dependent on a combination of factors, predominantly related to tidal influence.

This habitat makes a vital contribution to the structure and function of the Fal and Helford system. Saltmarshes and mudflats form two elements of an interconnected and dynamic system which is able to interact with the physical processes operating within the estuary. Saltmarshes support a range of plant, invertebrate and bird communities as well as providing a natural form of sea defence. The erosion or loss of intertidal mud will directly impact the saltmarsh that is dependent upon it.

6.3 Key sub-features

Low marsh communities -the lower levels of the saltmarsh, landward of the pioneer zone of *Salicornia*, experience a greater number of tidal inundations, usually more than 360 per year. Because of this, the vegetation communities of the low marsh and low-mid marsh are often species poor, composed of halophytes that can withstand such conditions. Characterising species of low marsh and low-mid marsh communities include transitional low marsh vegetation with *Puccinellia maritima*, annual *Salicornia* species and *Sueda maritima*, *Aster tripolium var. discoides* saltmarsh, and *Puccinellia maritima* saltmarsh.

Mid marsh communities - The mid marsh zone comprises a transition between low and upper marsh. As the number of tidal inundations becomes less frequent, the vegetation becomes more diverse with a more complex structure, and a greater proportion of herbs. Depending on the degree of representation of each community, this zone may also be referred to as low-mid or mid-upper marsh.

High marsh communities - At the upper levels of the marsh, with much fewer than 360 tidal inundations per year and the surface levels are even higher, tidal inundation only occurs at the highest spring tides, and the vegetation communities present reflect this, with some species being restricted to this zone. The upper marsh communities will grade into the transitional communities at around extreme high water spring tide, these may be freshwater habitats, woodland or grassland. Where the upper saltmarshes have been truncated by sea walls, these transitions are lost. Such truncations can also affect the succession of saltmarshes and their ability to respond to changing sea levels. Characterising species of mid and mid-upper marsh communities include *Juncus maritimus-Triglochin maritima* saltmarsh, *Festuca rubra* saltmarsh and *Juncus maritimus* saltmarsh

7 Conservation objectives for all 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 Fal and Helford European marine site 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 various interest features and 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 each of the features and which will act as a basis from which the monitoring programme will be developed.

7.1 The conservation objective for the large shallow inlets and bays is:

Subject to natural change, maintain the **large shallow inlets and bays** in favourable condition[5], in particular:

- Saltmarsh communities
- Rocky shore communities
- Intertidal mudflat and sandflat communities
- Subtidal rock and boulder communities
- Kelp forest communities
- Subtidal mud communities
- Subtidal sandbank communities

7.2 The conservation objective for sandbanks which are slightly covered by seawater all the time is:

Subject to natural change, maintain the **sandbanks which are slightly covered by seawater all the time** in favourable condition[5], in particular:

- Eelgrass bed communities
- Maerl bed communities
- Gravel and sand communities
- Mixed sediment communities

[5] For a detailed definition of how to recognise favourable condition see table 1 (Section 8)

7.3 The conservation objective for the mudflats and sandflats not covered by seawater at low tide is:

Subject to natural change, maintain the **mudflats and sandflats not covered by seawater at low tide** in favourable condition[5], in particular:

- Sand and gravel communities
- Muddy sand communities
- Mud communities

7.4 The conservation objective for the Atlantic salt meadows is:

Subject to natural change, maintain the **Atlantic salt meadows** in favourable condition[5], in particular:

- Low marsh communities
- Mid-marsh communities
- Upper marsh communities

[5] For a detailed definition of how to recognise favourable condition see table 1 (Section 8)

8 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 established and ongoing activities and future reporting 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 far less about habitat condition and find it difficult to predict what favourable condition may look like. 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.

Detailed scientific information on the marine biotopes and saltmarsh vegetation which form the basis of this favourable condition table can be found in Appendices III and IV respectively.

Table 1 Glossary of terms used in the favourable condition table

Feature	The habitat or species interest selected.
Sub-feature	An ecologically important sub-division of the feature.
Attribute	Selected characteristic of an interest feature/sub-feature which provides an indication of the condition of the feature to which it 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 1 Favourable Condition Table for the Fal and Helford 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 characterise the site and establish the baseline.

Feature	Sub-feature	Attribute	Measure	Target	Comments
Large shallow inlet and bay		Extent	Area (ha) of the large shallow inlet and bay, measured periodically (frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Extent is an attribute on which reporting is required by the Habitats Directive. The extent of the large shallow inlet and bay will not change significantly over time unless due to some human activity but nevertheless needs to be measured periodically.
		Water clarity	Average light attenuation measured periodically throughout the reporting cycle (frequency to be determined).	Average light attenuation should not deviate significantly from the established baseline, subject to natural change.	Water clarity is important for maintaining extent and density of algal and plant dominated communities. Clarity decreases through increases in amounts of suspended organic/inorganic matter.
		Nutrient status - phytoplankton concentration	Average phytoplankton concentration in summer measured annually.	No significant increase in phytoplankton concentration from the established baseline, subject to natural change.	Nutrient enrichment stimulating excessive growth of phytoplankton is a common factor contributing to a reduction in water clarity. Single species-dominated phytoplankton blooms can also have harmful effects on shellfish and are known to occur in the Fal.
	Saltmarsh communities	Attributes and targets for this sub-feature are listed under the 'Atlantic Salt Meadows' interest feature covered in other sections of this table.			
	Intertidal mudflat and sandflat communities	Attributes and targets for this sub-feature are listed under the 'Intertidal mudflats and sandflats' interest feature covered in other sections of this table.			
Large shallow	Rocky shore	Distribution of	Distribution of intertidal	No decrease in littoral	The relative distribution of the biotopes listed under

Feature	Sub-feature	Attribute	Measure	Target	Comments
inlet and bay (cont.)	communities	characteristic rocky shore communities	rocky shore communities measured using littoral extent (in particular those biotopes listed at Appendix III). Measured during summer, once during the reporting cycle.	extent of range of rocky shore communities from an established baseline value (intertidal biotope mapping survey 1998), subject to natural change.	this sub-feature in Appendix III is an important structural aspect of the site. Changes in extent and distribution may indicate long term changes in the physical conditions at the site.
		Species composition of low-shore boulder communities	Presence and abundance of composite species from biotope MLR.Fse.Bo. Measured during summer, twice during reporting cycle.	Presence and abundance of composite species should not deviate significantly from the established baseline, subject to natural change.	The presence and relative abundance of characterising species gives an indication of the quality of MLR.Fse.Bo *(Fucus serratus* and under-boulder fauna on lower eulittoral boulders) and change in composition may indicate cyclic change/trend in rocky shore communities. Change in composition may also indicate changes in hydrography, salinity and or siltation.
		Species composition of rockpool communities	Presence and abundance of composite species and percentage cover of *Sargassum muticum* (Japweed) from a representative series of rockpools, measured during summer twice during reporting cycle.	Presence and abundance of composite species should not deviate significantly from the established baseline, subject to natural change. Average percentage cover of *Sargassum* should not increase from the established baseline**.**	Composite species of rockpools include many southwestern species, their relative abundance gives an indication of the quality of the rockpools and are key structural components of the intertidal rocky shores. Increased *Sargassum* is believed to compete with native species and would thus be detrimental to favourable condition.
	Subtidal sandbank communities	Attributes and targets for this sub-feature are listed under the 'Subtidal sandbanks' interest feature covered in other sections of this table.			
Large shallow	Kelp forests	Algal species	Presence and abundance of	Presence and abundance of	Changes in the floral composition within the kelp

Feature	Sub-feature	Attribute	Measure	Target	Comments
inlet and bay (cont.)	communities	composition	composite of algal species from kelp zone. Measured during summer, twice during reporting cycle.	composite of algal species should not deviate significantly from an established baseline, subject to natural change.	forests may serve as long-term indicators of change in water clarity, temperature or wave exposure. Red algae act as an indicator of reductions in the entire algal population.
		Characteristic species - *Laminaria hyperborea & L. ochroleuca* population size	Relative proportions and density of each species in kelp forests at representative series of sites. Measure during summer, twice during reporting cycle.	Average ratio of *Laminaria hyperborea: L. ochroleuca* should not deviate significantly from an established baseline, subject to natural change. Average density of each species should not deviate significantly from an established baseline, subject to natural change.	*L. ochroleuca* is a south-western species, the relative proportion of this species to *L. hyperborea*, may also be indicative of long-term changes in water temperature, clarity or wave exposure. Both species contribute to the productivity and structure of the feature.
		Characteristic species - *Distomus variolosus* population size	Average abundance on kelp stipes (percentage of stipe length over which present and density of cover) measured twice during reporting cycle.	Average percentage cover should not deviate significantly from an established baseline, subject to natural change.	This is a south-western species of colonial tunicate and is indicative of the supporting processes as it is sensitive to deviations in salinity and siltation.
Large shallow inlet and bay (cont.)	Subtidal rock and boulder communities	Species composition of characteristic biotopes MCR.ErSEun and ECR.AlcMas	Presence and abundance of composite species from biotopes MCR.ErSEun and ECR.AlcMas. Measured during summer, once during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change.	Species composition is an important contributor to the structure of the sub-feature and is indicative of the health of the feature as a whole. The presence and relative abundance of characterising species gives an indication of the quality of the biotopes and changes in composition may indicate cyclic change/trend in communities. One of the characterising species is *Eunicella*, which is a long-

Feature	Sub-feature	Attribute	Measure	Target	Comments
					lived and nationally important species.
	Subtidal mud communities	Species composition of characteristic biotopes	Presence and occurrence of composite species from some or all of the biotopes listed in Appendix III. Measured during summer, once during reporting cycle	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change.	Species composition is an important contributor to the structure of the biotopes within the sub-feature. The presence and relative abundance of characterising species gives an indication of the quality of the biotopes and change in composition may indicate cyclic change/trend in subtidal mud communities
Subtidal sandbanks		Extent	Area (ha) of the subtidal sandbanks measured periodically (frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Extent of the feature is a reporting requirement of the Habitats Directive. Monitoring will need to take account of the dynamic nature of the feature but reduction in extent may indicate long term changes in the physical conditions influencing the feature.
Subtidal sandbanks (cont.)		Sediment character	Particle size analysis (PSA). Parameters include percentage sand/silt/gravel, mean and median grain size, and sorting coefficient, used to characterise sediment type. Sediment character to be measured during summer once during reporting cycle.	Average PSA parameters should not deviate significantly from an established baseline, subject to natural change.	Sediment character defined by PSA is key to the structure of the feature, and reflects all of the physical processes acting on it. Particle size composition varies across the feature and can be used to indicate spatial distribution of sediment types thus reflecting the stability of the feature and the processes supporting it.
		Topography	Depth distribution of sandbanks from selected sites, measured periodically (frequency to be determined).	Depth distribution should not deviate significantly from an established baseline, subject to natural change.	Depth and distribution of the sandbanks reflects the energy conditions and stability of the sediment, which is key to the structure of the feature. Depth of the feature is a major influence on the distribution of communities throughout.

Feature	Sub-feature	Attribute	Measure	Target	Comments
		Water density	Average temperature/ salinity in the subtidal measured periodically throughout the reporting cycle (frequency to be determined).	Average temperature/ salinity should not deviate significantly from an established baseline, subject to natural change.	Temperature and salinity are characteristic of the overall hydrography of the area. Changes in temperature and salinity influences the presence and distribution of species (along with recruitment processes and spawning behaviour) including those at the edge of their geographic ranges and non-natives.
Subtidal sandbanks (cont.)	Eelgrass bed communities (*Zostera marina)*	Extent	Area (ha) of eelgrass beds measured during peak growth period twice during reporting cycle.	No decrease in extent from an established baseline, subject to natural change.	The extent and distribution of eelgrass beds provides a long-term integrated measure of environmental conditions.
	Eelgrass bed communities (*Zostera marina)* (cont.)	Characteristic epiphytic species - density of *Zostera marina*	Average density, measured during peak growth period twice during reporting cycle.	Average density should not deviate significantly from an established baseline, subject to natural change.	An early indicator of seagrass under stress is a reduction in biomass, ie the number and length of leaves. Density is preferred as a surrogate for biomass, being less destructive, based on baseline survey to establish the relationship between density and biomass at a site.
		Characteristic species - epiphytic community	Presence and abundance of epiphytic species measured during summer twice during reporting cycle.	Presence and abundance of epiphytic species should not deviate significantly from the established baseline, subject to natural change.	The occurrence and frequency of epiphytes is indicative of the structure of the eelgrass bed communities. It gives an indication of their quality and changes in epiphytic composition may indicate cyclic change/trend in the host biotope or the subtidal sandbank communities as a whole.
		Nutrient status - green algal mat	Extent across whole or parts of site, measured during peak growth period every 3 years during reporting cycle.	No increase in extent of green algal mats from an established baseline, subject to natural change.	Nutrient status is a key functional factor that influences the sub-feature as opportunistic macroalage compete with seagrass and affect the associated species. Increase in filamentous green algae may be a related natural phenomenon or may

Feature	Sub-feature	Attribute	Measure	Target	Comments
					indicate eutrophication.
	Maerl bed communities	Extent	Area (ha) of maerl (live & dead maerl), measured once during reporting cycle.	No decrease in extent of maerl as whole, or of either dead or live maerl, from an established baseline, subject to natural change.	The extent of maerl beds (and distribution of live and dead components within the beds) is key to their structural and functional importance. Extent provides a long-term integrated measure of environmental conditions and any loss is likely to be long-term.
		Distribution of maerl bed communities	Distribution of maerl bed communities (listed in appendix III). Measured once per reporting cycle.	Distribution of maerl bed communities should not deviate significantly from an established baseline, subject to natural change.	The relative distribution of the biotopes listed in appendix III is an important structural aspect of the feature. Changes in relative extent and distribution may indicate long term changes in the physical conditions influencing the feature.
Subtidal sandbanks (cont.)	Maerl bed communities (cont.)	Species composition of maerl bed communities	Presence and abundance of composite species of biotopes from maerl areas. Measured during summer, one during reporting cycle.	Presence and abundance of composite species should not deviate significantly from an established baseline, subject to natural change.	Species composition is an important contributor to the structure of the live maerl bed. The presence and relative abundance of characterising species gives an indication of the quality of the biotopes and change in composition may indicate cyclic change/trend in sediment communities. Live maerl is species rich and contains rare algal species which are relatively stable, making this habitat a good indicator of the condition of the subtidal sandbanks.
		Nutrient status - green algal mats	Extent measured during peak growth period. Measured once during reporting cycle.	No increase in extent of algal mats from an established baseline, subject to natural change.	Heavy overgrowth of filamentous green algae, in response to nutrient enrichment, will reduce light levels to maerl and is therefore likely to affect maerl growth rates and may affect associated algal diversity.
	Gravel and	Species	Presence and abundance of	Presence and abundance of	Species composition is an important contributor to

Feature	Sub-feature	Attribute	Measure	Target	Comments
	sand communities	composition of characteristic biotopes	composite species from some or all of the biotopes listed in Appendix III. Measured during summer, once during reporting cycle.	composite species should not deviate significantly from an established baseline, subject to natural change.	the structure of the biotopes within the sub-feature. The presence and relative abundance of characterising species gives an indication of the quality of the biotopes and change in composition may indicate cyclic change/trend in subtidal sandbank communities.
	Mixed sediment communities	Species composition of characteristic biotopes	Frequency and occurrence of composite species from some or all of the biotopes listed in Appendix III. Measured during summer, once during reporting cycle.	Presence and abundance of composite species from some or all of the biotopes listed in Appendix III. Measured during summer, once during reporting cycle.	Species composition is an important contributor to the structure of the biotopes within the sub-feature. The presence and relative abundance of characterising species gives an indication of the quality of the biotopes and change in composition may indicate cyclic change/trend in subtidal sandbank communities.
Intertidal mudflats and sandflats		Extent	Area of intertidal mudflats and sandflats measured periodically (frequency to be determined).	No decrease in extent from an established baseline, subject to natural change.	Extent is an attribute on which reporting is required by the Habitats Directive. Loss of intertidal mud communities is likely to be detrimental to the structure of the feature, eg associated with a change in sediment budget or geomorphological regime, and may indicate long term changes in the physical conditions of the feature.
		Sediment character	1. Particle size analysis. Parameters include percentage sand/silt/gravel, mean and median grain size, and sorting coefficient, used to characterise sediment type. Measured in summer once during reporting cycle.	Particle size parameters should not deviate significantly from an established baseline, subject to natural change.	Sediment character defined by particle size analysis is key to the structure of the feature, and reflects all of the physical processes acting on it. Particle size composition varies across the feature and can be used to indicate spatial distribution of sediment types thus reflecting the stability of the feature and the processes supporting it.

Feature	Sub-feature	Attribute	Measure	Target	Comments
			2. Sediment penetrability Degree of sinking.	Average measure should not deviate significantly from an baseline, subject to natural change.	Penetrability is an indicator of sediment stability, degree of compaction indicates the shear strength of the sediment and thus the susceptibility of that sediment type to erosion. Compaction of the sediment influences the biological community within the sediment.
Intertidal mudflats and sandflats (cont.)		Topography	Tidal elevation and shore slope, measured periodically (frequency to be determined).	Shore profile measurements should not deviate significantly from an established baseline, subject to natural change.	In the intertidal topography reflects the energy conditions and stability of the sediment, which is key to the structure of the feature. Topography is a major influence on the distribution of communities throughout the feature. Measuring topography may also indicate the position of channels through the feature, which is another important indicator of the processes influencing the feature.
		Nutrient status - green algal mats	Extent of green algal mats, measured during summer, annually throughout the summer.	Extent of green algal mats should not increase from an established baseline, subject to natural change.	Nutrient status is a key functional factor that influences biota associated with sediments including infauna as well as plants/algae at the surface. Green algae provide an indication of elevated nutrient levels since they respond by increased extent or abundance. Further, mats of green algae, where they increase, both directly and indirectly affect sediment structure and function, primarily through smothering and associated deoxygenation.
	Sand and gravel communities	Extent and distribution of characteristic biotopes	Extent and distribution of biotopes listed at appendix III. Measured during summer, once during reporting cycle.	Extent and distribution of the biotopes should not deviate significantly from an established baseline, subject to natural change.	The extent and distribution of biotopes listed at appendix III are an important structural aspect of the sub-feature and therefore feature. Changes in extent and distribution may indicate long term changes in the physical conditions influencing the feature such as changes in sediment distribution.

Feature	Sub-feature	Attribute	Measure	Target	Comments
	Muddy sand communities	Extent and distribution of characteristic biotopes	Extent and distribution of biotopes listed at appendix III. Measured during summer, once during reporting cycle.	Extent and distribution of the biotopes should not deviate significantly from an established baseline, subject to natural change.	The extent and distribution of biotopes listed at appendix III are an important structural aspect of the sub-feature and therefore feature. Changes in extent and distribution may indicate long term changes in the physical conditions influencing the feature such as changes in sediment distribution.
Intertidal mudflats and sandflats (cont.)	Mud communities	Extent and distribution of characteristic biotopes	Extent and distribution of biotopes listed at appendix III. Measured during summer, once during reporting cycle.	Extent and distribution of the biotopes should not deviate significantly from an established baseline, subject to natural change.	The extent and distribution of biotopes listed at appendix III are an important structural aspect of the sub-feature and therefore feature. Changes in extent and distribution may indicate long term changes in the physical conditions influencing the feature such as changes in sediment distribution.
Atlantic salt meadows		Extent	Area (ha) of Atlantic salt meadows measured once during the reporting cycle.	No decrease in extent of Atlantic salt meadows from an established baseline, subject to natural change.	Monitoring will need to take account of the dynamic nature of some of these habitats. A reduction in extent could be further indicated by ground survey to assess for signs of erosion-toppled vegetated blocks; stepping of saltmarsh edge; signs of stress/damage to plants. Extent needs to be measured at low tide.
		Creek patterns	Creek density and morphology measured periodically during reporting cycle (frequency to be determined).	No significant alteration of creek patterns from an established baseline, subject to natural change.	Creeks absorb tidal energy and assist with the delivery of sediment into saltmarshes. The efficiency of this process depends on creek pattern. Density is controlled by vegetation cover, suspended sediment load and tidal influence. Creeks allow pioneer vegetation to be established along their banks higher into the saltmarsh system.
		Range and distribution of	Presence and distribution of characteristic saltmarsh	Range and distribution of characteristic saltmarsh	Sites with the greatest range of community types considered typical for the site from low, mid to

Feature	Sub-feature	Attribute	Measure	Target	Comments
		characteristic NVC saltmarsh communities. (listed in Appendix IV).	communities measured once during reporting cycle.	communities should not deviate significantly from the established baseline, subject to natural change.	upper saltmarsh and transition to other habitats are in most favourable condition. (NVC communities: SM8, SM10, SM11, SM13, SM15, SM16, SM18, SM24).
Atlantic salt meadows (cont.)		Vegetation structure	Range and distribution of varying heights of vegetation measured periodically (frequency to be determined).	Vegetation structure should not deviate significantly from an established baseline, subject to natural change.	Vegetation structure is largely affected by the impact of grazing interacting with different vegetation communities. Not all saltmarshes are grazed, removal or introduction of grazing can result in changes to plant community composition.
Low, mid and upper saltmarsh and zonations between these are considered to be subfeatures of **Atlantic salt meadows**. These may exhibit considerable variation, and NVC communities have been assigned to each subfeature, according to The Saltmarsh Survey of Great Britain (Burd 1989). The presence of these on an individual site and their position within the saltmarsh zonation will need to be established by surveys which may also identify sub-communities typical of that site					
	Low Marsh and Low-Mid Marsh communities	Characterising species of: 1.Transitional low marsh vegetation with *Puccinellia maritima*, annual *Salicornia* species and *Sueda maritima* SM10.	Frequency and abundance of characterising species, particularly of: 1. *Puccinellia maritima*, annual *Salicornia* species and *Sueda maritima*. Measured once during reporting cycle	Frequency and abundance of characteristic species of low and low-mid marsh communities should not deviate significantly from an established baseline subject to natural change	1. Tends to be species -poor, with the three main species often co-dominant. Cover of vegetation can be quite variable and may have up to 50% cover of an algal mat. Grazing can affect stands by selective removal of some species and causing loss of structural diversity.
		2. *Aster tripolium var. discoides* saltmarsh SM11.	2. *A.tripolium var. discoides*.		2. Occurs in extensive stands in low marsh or on creek sides throughout the marsh. Usually on ungrazed sites.
		3. *Puccinellia maritima* saltmarsh SM13	3. *P. maritima* with *Triglochin maritima*, *Plantago maritima*,		3. Most widespread type of saltmarsh vegetation in the UK. Grazing determines species composition and type of sub-community and structural variation.

Feature	Sub-feature	Attribute	Measure	Target	Comments
			Armeria maritima		Can often develop after damage, turf -cutting etc. Also found in mid-upper marsh.
Atlantic salt meadows (cont.)	Mid and Mid-Upper marsh	Characterising species of: 1. *Juncus maritimus-Triglochin maritima* saltmarsh SM15. 2 .*Festuca rubra* saltmarsh SM16 3. *Juncus maritimus* saltmarsh SM18	Frequency and abundance of characterising species, particularly of: 1. *Juncus maritimus* 2. *Festuca rubra* and *Juncus gerardii* 3. *Juncus maritimus*	Frequency and abundance of characteristic species of low and low-mid marsh communities should not deviate significantly from an established baseline subject to natural change.	1. Can occur at all levels in a saltmarsh. Tussocky nature of *J. maritimus* discourages grazing by stock. Widespread in England. 2. Covers extensive areas of saltmarsh. Usually present on grazed marshes. Can be variable according to local conditions. 3. Widespread on West coast but only local in SE England. Tends to be at upper levels of saltmarsh but can also be present in mid-upper marsh.

9 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 9.2, and on how it may be reviewed and updated in the future, in Section 9.4.

The advice is provided in summary form in Table 2 and Section 9.5 and with more detail in Table 4 and section 9.6, including advice in relation to specific interest features and their sub-features.

9.1 Purpose of advice

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

9.2 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 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 categorisation to minimise 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).

9.2.1 Sensitivity assessment

The sensitivity assessment used is an assessment of the relative sensitivity of the interest features or the

component sub-features of the Fal and Helford 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). As an example, seagrass beds are highly sensitive to increases in turbidity of the surrounding water. This reduces the light penetration which in turn, prevents adequate photosynthesis.

The sensitivity assessments of the interest features or their component sub-features of the Fal and Helford European marine site are based primarily upon a series of UK Marine SACs *Life* Project Task Reports 'An overview of dynamic and sensitivity characteristics for conservation and management of marine SACs' (see references).

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).

9.2.2 Exposure assessment

This has been undertaken for the Fal and Helford European marine site by assessing the relative exposure of the interest features or their component sub-features on the site to the effects of broad categories of human activities currently occurring on the site (see Table 4). For example, the exposure of interest features within the site to changes in the thermal regime as a result of human activities is negligible but exposure of some of the interest features to nutrient enrichment is high.

9.2.3 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 context therefore, 'vulnerability' has been defined as the exposure of a habitat, community or individual (or individual colony) of a species to an external factor [human activity] 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. However, the eelgrass beds in the Fal and Helford are not 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 II.

9.3 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 effect 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.

These broad categories provide a clear framework against which relevant authorities can assess activities under their responsibility. The more detailed information in Table 4 provides relevant authorities with a context against which to consider an assessment of 'significant effect' of 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 formally consult English Nature over individual plans and projects where required to do so under the Regulations.

9.4 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 Fal and Helford European marine site. English Nature expects that the information on current activities and patterns of site usage (which was used to derive Table 4) will be refined as part of the process of developing the management scheme 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 4) 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 discussions 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.

9.5 Summary of advice on operations

9.5.1 Large shallow inlets and bays

In pursuit of the conservation objective for the large shallow inlet and bay (Section 7.1) the relevant and competent authorities for the Fal and Helford European marine site are advised to manage human activities within their remit such that they do not result in deterioration or disturbance through any of the following:

- Removal of embayment habitats
- Physical damage resulting from abrasion
- Increased synthetic and/or non-synthetic toxic contamination
- Nutrient and/or organic enrichment
- Biological disturbance through the introduction of non-native species and/or translocation

9.5.2 Sandbanks which are slightly covered by seawater all the time

In pursuit of the conservation objective for the sandbanks which are slightly covered by seawater all the time (Section 7.2) the relevant and competent authorities for the Fal and Helford European marine site are advised to manage human activities within their remit such that they do not result in deterioration or disturbance through any of the following:

- Removal and/or smothering of subtidal sandbank habitats
- Physical damage resulting from siltation, abrasion and/or selective extraction
- Increased synthetic and/or non-synthetic toxic contamination
- Nutrient and/or organic enrichment and/or increases in turbidity

9.5.3 Mudflats and sandflats not covered by seawater at low tide

In pursuit of the conservation objective for the mudflats and sandflats not covered by seawater at low tide (Section 7.3) the relevant and competent authorities for the Fal and Helford European marine site are advised to manage human activities within their remit such that they do not result in deterioration or disturbance through any of the following:

- Removal of intertidal sediment habitats
- Physical damage resulting from selective extraction
- Increased synthetic and/or non-synthetic toxic contamination
- Nutrient and/or organic enrichment

9.5.4 Atlantic salt meadows

In pursuit of the conservation objective for the Atlantic salt meadows (Section 7.4) the relevant and competent authorities for the Fal and Helford European marine site are advised to manage human activities within their remit such that they do not result in deterioration or disturbance through any of the following:

- Removal of saltmarsh habitats
- Increased synthetic and/or non-synthetic toxic contamination
- Nutrient enrichment

Table 2 showing operations which may cause deterioration or disturbance to the Fal and Helford European marine site interest features at current levels of use[6]

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 measures(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 (or some component of them) that are considered to be highly or moderately vulnerable to the effects of the operations.

Standard list of categories of operations which may cause deterioration or disturbance	**Large shallow inlets and bays**	**Sandbanks which are slightly covered by seawater at all times**	**Mudflats and sand flats not covered by seawater at low tide**	**Atlantic salt meadows**
Physical Loss Removal (e.g. land claim, development, maerl extraction) Smothering (e.g. structures, disposal of dredge spoil, outfalls)	_	_ _	_	_
Physical Damage Siltation (e.g. from dredging, outfalls, agricultural run-off) Abrasion (e.g. mobile benthic fishing, anchoring) Selective extraction (e.g. maerl extraction, entanglement)	_	_ _ _	_	
Non-physical disturbance Noise (e.g. boat activity) Visual presence (e.g. recreational activity)				
Toxic contamination Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors) Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons) Introduction of radionuclides	_ _	_ _	_ _	_ _
Standard list of categories of operations which may cause	**Large shallow**	**Sandbanks which are slightly**	**Mudflats and sand flats not covered**	**Atlantic salt**

deterioration or disturbance	inlets and bays	covered by seawater at all times	by seawater at low tide	meadows
Non-toxic contamination				
Nutrient enrichment (e.g. agricultural run-off, outfalls)	–	–	–	
Organic enrichment (e.g. mariculture, outfalls)	–	–	–	
Changes in thermal regime (e.g. outfalls, power stations)				
Changes in turbidity (e.g. dredging)		–		
Changes in salinity (e.g. water abstraction, outfalls)				
Biological disturbance				
Introduction of microbial pathogens				
Introduction of non-native species and translocation	–			
Selective extraction of species (e.g. bait collection, commercial & recreational fishing)				

6. This advice has been developed using best available scientific information and informed scientific interpretation and judgement (as at November 1999). 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 4. 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 precise impact of any category of operation occurring on the site will be dependent 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 the management scheme by the management group and 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 November 1999). 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.

9.6 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 Fal and Helford European marine site.

This advice relates to the vulnerability of the interest features and sub-features of the Fal and Helford European marine site to current levels of human usage as set out in Tables 3 & 4 and summarised in Table 2. Further explanation of the sensitivity of the interest features or sub-features follows with examples of their exposure and therefore their vulnerability to damage or disturbance from the listed categories of operations. This enables links to be made between the categories of operation and the ecological requirements of the European marine site's interest features, as set out in Section 3.

Where sub-features of an interest feature are also interest features in their own right, their sensitivity and vulnerability is covered in separate sections.

9.6.1 Large shallow inlets and bays

I) Physical loss

- The Fal and Helford is one of only two ria systems in England selected for large shallow inlets and bays (Plymouth Sound and estuaries complex is the other) and supports a wide diversity of habitats and species, including abundant southern Mediterranean-Atlantic species rarely found in Britain. The loss of the inlet and bay or parts of it could jeopardise the survival of some of these habitats and species and would therefore be detrimental to favourable condition.

- All the sub-features of the embayment are sensitive to removal and loss of any of the marine plant and animal communities, through direct removal or smothering, due to their long recovery times and their international importance. Many communities are also interdependent upon the ecological functioning of others and this link must be not be overlooked when the potential impact of loss or removal is considered.

- Whilst none of these habitats is currently considered to be highly vulnerable, any land reclamation or coastal defence projects will need careful assessment. Similarly dredging requirements will need to be assessed and where necessary measures put in place to mitigate against the impact of smothering.

- Only the rocky intertidal areas have been identified as moderately vulnerable, in some instances due to their proximity to urban and developed areas and in others due to the existence of coastal defences. With current management patterns and levels of use the other sub-features are not considered vulnerable to physical loss.

- Deterioration or disturbance by physical removal or smothering can be the result of either one-off events or the cumulative effect of continuous

activities.

ii) Physical damage

- All the sub-features of the embayment are sensitive to physical damage. However, only the subtidal rock and boulder communities are indicated as moderately vulnerable. This is due to the possible damage caused by fisheries activity (scallop dredging), occurring periodically in the bay.

ii) Toxic contamination

- Heavy metals and synthetic compounds such as tributyl tin (TBT) are known to occur at varying concentrations across the site, the former primarily due to historic mining practises (Environment Agency, 1997) and the latter still of concern, together with antifoulants currently used in shipping. Many of these synthetic compounds, including Polychlorinated biphenols (PCBs), are known to have toxic effects even in low concentrations and to be capable of high levels of bioaccumulation. All sub-features are sensitive and are considered vulnerable due to current activities, to the effects of these toxic compounds. Many of the metals and compounds are bound within sediments and any resuspension of them within the water column is to be avoided or mitigated against, as this could compound the problem.

- The toxic effects of TBT on molluscs, especially the dogwhelk *Nucella lapillus* are well documented (Bryan *et al*., 1987). An impact on a particular species within a rocky shore community, such as an important predator like the dogwhelk, can potentially affect the structure of the whole community.

- Communities are also sensitive to acute events, such as oil spills, due to both their toxicity and smothering effects. Whilst some of the more robust species such as the kelps may be relatively insensitive to oil pollution, other faunal elements of the habitat may be seriously damaged. For example oil is known to interfere with the ability of lobsters to detect the sex pheromone that triggers mating, and with the normal feeding behaviour of sea-anemones (Beveridge *et al*., 1997).

iv) Non-toxic contamination

- Nutrient pollution can reduce the diversity of communities. Some species may be tolerant of eutrophication with the result that they thrive at the expense of the more sensitive species and the community composition is altered. Some of the more sheltered areas, due to their sheltered nature and low flushing capacity, are sensitive to increased effluent discharge, agricultural run-off, or increases in freshwater input, which encourage the growth of ephemeral green algae.

22) Biological disturbance

- Many species and communities are sensitive to the introduction of non-native species, which can out-compete native species for space, light or food. The non-native (Japweed) *Sargassum muticum* is known to occur in rock pools and the shallow subtidal, including amongst the eelgrass beds, across the site (Rostron, 1985). Whilst there is a fear that it has the ability to replace native species there is currently no evidence that this is occurring within the Fal and Helford. However, it is an issue which should receive continued surveillance.

9.6.2 Sandbanks which are slightly covered by seawater at all times

i) Physical loss

- The Fal and Helford encompasses a wide range of subtidal sediment communities all of which are sensitive to physical loss through either removal or smothering. Loss of any one or more biotopes through removal of sediment habitat would decrease the diversity of the site and could have direct or indirect impacts on the functioning of adjacent habitats. Maerl beds are currently considered highly vulnerable to physical loss and moderately vulnerable to smothering. Oyster dredging occasionally occurs over the live maerl bed. Research on scallop dredging has shown that this activity can result in the removal of living maerl thalli from the bed surface, the loss of the stabilising algae and the disruption of the structure of both the physical habitat and the community structure (Hall-Spencer, 1995; Hall-Spencer, 1998). It is believed that oyster dredging poses a similar risk to the live maerl.

ii) Physical damage

- The sub-features of the subtidal sandbanks are considered vulnerable to physical damage. This may be through increased siltation from dredging operations or abrasion from anchoring at particularly sensitive sites where eelgrass and live maerl occurs. Eelgrass can be easily dislodged and uprooted from the sediment during physical disturbances such as anchoring or mobile fishing gear. Once damaged or removed in this way eelgrasses have difficulty in re-establishing or colonising the area, due to broken or damaged rhizomes, the removal of seeds or seed which has been buried too deeply for successful germination (Davidson & Hughes, 1998). The eelgrass beds present on the subtidal sandy sediments in the Fal and Helford are considered highly vulnerable to this form of damage and work to monitor the potential impact will continue.

- Extraction of maerl may have an indirect impact on the St Mawes bank due to be the settling out of the dredge plume (Anon., 1993). Although attempts to minimise this impact have been taken by dredging only on the ebb tide so that the plume is taken out to sea. Reports on the maerl beds made over the last 15 years (Farnham & Bishop, 1985) have indicated that the flora and fauna are very diverse. Perrins *et al.*, (1995) reported that between 1982 and 1992 the proportion of dead maerl on the St Mawes bank increased significantly, from 12% to 23%.

- Mooring or anchor chains can have a scouring effect upon the seabed, potentially damaging maerl and eelgrass beds.

iii) Toxic contamination

- All sub-features are considered to be sensitive to toxic contamination and are also moderately vulnerable to them for the reasons already stated at 9.6.1 above. Subtidal sandbanks will be less vulnerable to the risk of oil spills, unless dispersants are used in clean-up operations, or if wave action allows sediment mobility and thus oil to be incorporated into the sediments.

- Eelgrasses can readily take up heavy metals and tributyl tin (TBT) and other antifoulants but damage has, to date, not been observed (Davidson & Hughes 1998). However eelgrasses provide a habitat for a host of invertebrate communities which could be adversely affected by metal contamination. Eelgrasses are also sensitive to hydrocarbon spills, however again their associated communities may be more vulnerable to oil pollution than the seagrass beds themselves.

- Some sediment species display a tolerance of heavy metal contamination, but the larval and juvenile stages can be very sensitive (Davidson & Hughes, 1998).

iv) Non-toxic contamination

- Eelgrass and maerl beds are highly sensitive to nutrient and organic enrichment which can lead to phytoplankton blooms increasing turbidity, increased growth of blanketing, floating or attached algae and lack of light penetration (Davidson & Hughes, 1998).

9.6.3 Mudflats and sandflats not covered by seawater at low tide

I) Physical loss

- The Fal and Helford supports examples of intertidal sediment communities all of which are sensitive to physical loss through either removal or smothering. Loss of any one or more biotopes through removal of sediment habitat would decrease the diversity of the site and could have direct or indirect impacts on the functioning of adjacent habitats.

- Intertidal sediment habitats are considered moderately vulnerable to physical loss. More particularly, loss of habitat through land development can lead to change in the physical processes within an estuary which may exacerbate any direct loss. This, together with sea level rise, results in coastal squeeze which may lead to loss of important intertidal habitats, which themselves are natural sea defences and which contribute significantly to the reduction of tidal and wave energy.

ii) Physical damage

- Digging for bait disturbs the sediment allowing for the transport of fine sediment and previously buried contaminants at the surface. Additionally the effect of collection on the shore means that previously undisturbed sediments are trampled.

iii) Toxic contamination

- All sub-features are considered to be sensitive to toxic contamination and are also moderately vulnerable to them for the reasons already stated at 9.6.1 above. Intertidal sediments are vulnerable to the risk of oil spills. Oil covering intertidal muds prevents oxygen transport to the substratum and produces anoxia resulting in the death of infauna species. Tidal action will serve to push oil into intertidal sands. In both cases the changes will favour the development of opportunistic communities (Elliott *et al.,* 1998)

iv) Non-toxic contamination

- Activities or operations, usually the result of diffuse sources or chronic input, which significantly alter the physical and chemical regime of the waters of the rias have the potential to disrupt their characteristic community structures and species diversity and would therefore be detrimental to favourable condition.

- Nutrient pollution can reduce diversity of communities. Some species may be tolerant to eutrophication with the result that they thrive at the expense of the more sensitive species and the community composition is altered. Some sediment communities are also sensitive to non-toxic contamination which can result in excessive blanketing of green algae. Sediment communities can also act as nutrient sinks, trapping nutrients within the sediments and if they are subsequently disturbed these nutrients can then be released back into the system again. This in turn could lead to elevated nutrient loadings in the water column and subsequent eutrophication.

- Since the toxic bloom of *Alexandrium tamarense* that occurred in 1995 in the Fal Estuary, similar blooms have become an annual event. The Upper Fal estuary has been designated as a sensitive area (Eutrophic) under the Urban Waster Water Treatment Directive by the DETR. Monitoring on behalf of MAFF by the Falmouth & Truro Port Health Authority has been ongoing since 1995. This monitoring is primarily related to the quality of shellfish and public health, but the wider biological implications will also require consideration.

9.6.4 Atlantic salt meadows

I) Physical loss

- Saltmarshes are sensitive to physical loss through direct land reclamation and construction. Sea level rise may squeeze this habitat against sea walls and may result in the replacement of mid-marsh by pioneer saltmarsh. Plant communities are sensitive to smothering by the disposal of dredge spoil or refuse. Saltmarsh communities are considered moderately vulnerable to physical loss.

ii) Physical damage

- Saltmarsh communities are sensitive to damaging activities such as trampling and grazing, but they are not considered vulnerable to them at current levels of use.

iii) Toxic contamination

- All sub-features are considered to be sensitive to toxic contamination and are also moderately vulnerable to them for the reasons already stated at 9.6.1 above. Saltmarsh communities are also very sensitive to contamination with oil and other pollution.

9.7 Plans and Projects

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

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

An appropriate assessment is required by law for all European Sites (Regulation 48). A European Site is any classified SPA and any SAC from the point where the Commission and the Government agree the site as a Site of Community Importance. Appropriate assessment is also required, as a matter of Government policy, for potential SPAs, candidate SACs and listed Ramsar Sites for the purpose of considering development proposals affecting them. (PPG 9 paras 13 and C7).

English Nature's guidance note HNGN1 'The Appropriate Assessment (Regulation 48), is at Appendix V for further information.

Tables 2, 3 & 4 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.

9.8 Review of consents

Regulation 50 of The Conservation (Natural Habitats, &c.) Regulations 1994 requires competent authorities to undertake a review of all existing consents and permissions affecting cSAC and SPAs, as soon as possible after the site officially becomes a Site of Community Importance. 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 Assessment of the relative exposure of interest features and sub-features of the Plymouth Sound and Estuaries European marine site to different categories of operations. Relative exposure (this table) and sensitivity scores (table 4) when combined are used to derive relative vulnerability using the table in Appendix III.

Key

High	High exposure
Med	Medium exposure
Low	Low exposure
None	No current exposure

Categories of operations which may cause deterioration or disturbance	**Large shallow inlets and bays**					
	Intertidal rocky shore communities	**Kelp forest communities**	**Subtidal rock and boulder communities**	**Intertidal mudflat and sandflat communities**	**Subtidal sandbank communities**	**Saltmarsh communities**
Physical Loss						
Removal (e.g. land claim, development)	**Low**	**None**	**None**	(For sensitivity and vulnerability information for these sub-features see the sections of this table which relate to the following interest features: *Mudflats and sandflats not covered by seawater at low tide*; *Sandbanks which are slightly covered by seawater all the time*; and *Atlantic salt meadows*)		
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	**None**	**None**	**None**			
Physical Damage						
Siltation (e.g. from dredging, outfalls, agricultural run-off, outfalls)	**Low**	**Low**	**Low**			
Abrasion (e.g. mobile benthic fishing, anchoring)	**Low**	**Low**	**Low**			
Selective extraction (e.g. boulder turning, entanglement)	**Low**	**Low**	**Low**			
Non-physical disturbance						
Noise (e.g. boat activity)	**None**	**None**	**None**			

Visual presence (e.g. recreational activity)	**None**	**None**	**None**

Categories of operations which may cause deterioration or disturbance	**Large shallow inlets and bays**					
	Intertidal rocky shore communities	**Kelp forest communities**	**Subtidal rock and boulder communities**	**Intertidal mudflat and sandflat communities**	**Subtidal sandbank communities**	**Saltmarsh communities**
Toxic contamination						
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	**Med**	**Med**	**Med**	(For sensitivity and vulnerability information for these sub-features see the sections of this table which relate to the following interest features: *Mudflats and sandflats not covered by seawater at low tide*; *Sandbanks which are slightly covered by seawater all the time*; and *Atlantic salt meadows*)		
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	**Med**	**Med**	**Med**			
Introduction of radionuclides	**Low**	**Low**	**Low**			
Non-toxic contamination						
Nutrient enrichment (e.g. agricultural run-off, outfalls)	**High**	**Med**	**Med**			
Organic enrichment (e.g. mariculture, outfalls)	**High**	**Med**	**Med**			
Changes in thermal regime (e.g. outfalls, power stations)	**Low**	**Low**	**Low**			
Changes in turbidity (e.g. agricultural run-off, dredging)	**Low**	**Low**	**Low**			
Changes in salinity (e.g. water abstraction, outfalls)	**Low**	**Low**	**Low**			
Biological disturbance						
Introduction of microbial pathogens	**Low**	**Low**	**Low**			
Introduction of non-native species & translocation	**Low**	**Low**	**Low**			
Selective extraction of species (e.g. bait collection, commercial & recreational fishing)	**Low**	**Low**	**Low**			

Categories of operations which may cause deterioration or disturbance	Mudflats and sandflats not covered by seawater at low tide		
	Sand and gravel communities	Muddy sand communities	Mud communities
Physical Loss			
Removal (e.g. land claim, development, dredging)	**Low**	**Low**	**Low**
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	**None**	**None**	**None**
Physical Damage			
Siltation (e.g. dredging outfalls, agricultural run-off)	**Low**	**Low**	**Low**
Abrasion (e.g. anchoring, trampling**)**	**Low**	**Low**	**Low**
Selective extraction (e.g. aggregate dredging)	**Low**	**High**	**High**
Non-physical disturbance			
Noise (e.g. boat activity)	**None**	**None**	**None**
Visual presence (e.g. recreational activity)	**None**	**None**	**None**

Categories of operations which may cause deterioration or disturbance	Mudflats and sandflats not covered by seawater at low tide		
	Sand and gravel communities	Muddy sand communities	Mud communities
Toxic contamination			
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	**Med**	**Med**	**Med**
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	**Med**	**Med**	**Med**
Introduction of radionuclides	**Low**	**Low**	**Low**
Non-toxic contamination			
Nutrient enrichment (e.g. agricultural run-off, outfalls)	**Low**	**Med**	**Med**
Organic enrichment (e.g. mariculture, outfalls)	**Low**	**High**	**High**
Changes in thermal regime (e.g. outfalls, power stations)	**Low**	**Low**	**Low**
Changes in turbidity (e.g. agricultural run-off, dredging)	**Low**	**Med**	**Med**
Changes in salinity (e.g. water abstraction, outfalls)	**Low**	**Low**	**Low**
Biological disturbance			
Introduction of microbial pathogens	**Low**	**Low**	**Low**
Introduction of non-native species & translocation	**Low**	**Low**	**Low**
Selective extraction of species (e.g. bait digging, commercial & recreational fishing)	**Low**	**Low**	**Low**

Categories of operations which may cause deterioration or disturbance	Sandbanks which are slightly covered by seawater all the time			
	Eelgrass bed communities	**Maerl bed communities**	**Sand and gravel communities**	**Mixed sediment communities**
Physical Loss				
Removal (e.g. land claim, development, maerl extraction)	**Low**	**High**	**None**	**None**
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	**Low**	**Low**	**Low**	**Low**
Physical Damage				
Siltation (e.g. dredging, outfalls, agricultural run-off)	**Med**	**Med**	**Low**	**Low**
Abrasion (e.g. mobile benthic fishing anchoring)	**High**	**High**	**Low**	**Low**
Selective extraction (e.g. maerl extraction, entanglement)	**None**	**High**	**Low**	**Low**
Non-physical disturbance				
Noise (e.g. boat activity)	**None**	**None**	**None**	**None**
Visual presence (e.g. recreational activity)	**None**	**None**	**None**	**None**

Categories of operations which may cause deterioration or disturbance	Sandbanks which are slightly covered by seawater all the time			
	Eelgrass bed communities	Maerl bed communities	Sand and gravel communities	Mixed sediment communities
Toxic contamination				
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	**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				
Nutrient enrichment (e.g. agricultural run-off, outfalls)	**Low**	**Low**	**Med**	**Med**
Organic enrichment (e.g. mariculture, outfalls)	**Med**	**Med**	**Med**	**Med**
Changes in thermal regime (e.g. outfalls, power stations)	**None**	**None**	**None**	**None**
Changes in turbidity (e.g. agricultural run-off, dredging)	**Low**	**Low**	**Low**	**Low**
Changes in salinity (e.g. water abstraction, outfalls)	**Low**	**Low**	**Low**	**Low**
Biological disturbance				
Introduction of microbial pathogens	**Low**	**Low**	**Low**	**Low**
Introduction of non-native species & translocation	**Low**	**Low**	**Low**	**Low**
Selective extraction of species (e.g. commercial & recreational fishing)	**Low**	**Low**	**Low**	**Low**

Categories of operations which may cause deterioration or disturbance	Atlantic salt meadows		
	Low marsh communities	Mid marsh communities	Upper marsh communities
Physical Loss			
Removal (e.g. land claim, development)	**Low**	**Low**	**Low**
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	**None**	**None**	**None**
Physical Damage			
Siltation (e.g. dredging, agricultural run-off, outfalls)	**Low**	**Low**	**Low**
Abrasion (e.g. boating, anchoring, trampling)	**Low**	**Low**	**Low**
Selective extraction (e.g. dredging)	**Low**	**Low**	**Low**
Non-physical disturbance			
Noise (e.g. boat activity)	**None**	**None**	**None**
Visual presence (e.g. recreational activity)	**None**	**None**	**None**

Categories of operations which may cause deterioration or disturbance	Atlantic salt meadows		
	Low marsh communities	Mid marsh communities	Upper marsh communities
Toxic contamination			
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	**Med**	**Med**	**Med**
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	**Med**	**Med**	**Med**
Introduction of radionuclides	**Low**	**Low**	**Low**
Non-toxic contamination			
Nutrient enrichment (e.g. agricultural run-off, outfalls)	**Low**	**Low**	**Low**
Organic enrichment (e.g. mariculture, outfalls)	**Low**	**Low**	**Low**
Changes in thermal regime (e.g. outfalls, power stations)	**Low**	**Low**	**Low**
Changes in turbidity (e.g. run-off, dredging)	**Low**	**Low**	**Low**
Changes in salinity (e.g. water abstraction, outfalls)	**Low**	**Low**	**Low**
Biological disturbance			
Introduction of microbial pathogens	**Low**	**Low**	**Low**
Introduction of non-native species & translocation	**Low**	**Low**	**Low**
Selective extraction of species (e.g. bait digging, commercial & recreational fishing)	**Low**	**Low**	**Low**

This table of current exposure is provided in light of what English Nature knows about current activities and patterns of usage in the Fal and Helford European marine site (as at November 1999). English Nature expects that the information on current activities and patterns of usage to be refined further as a part of the process of developing the management scheme through further discussion with the relevant authorities. As such it is important that future consideration of English Nature's operations advice by relevant authorities takes account of changes in usage patterns (relative exposure) that have occurred on the site since the advice was issued.

Table 4. **Assessment of the relative vulnerability of interest features and sub-features of the Fal and Helford 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.**

Key

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

Categories of operations which may cause deterioration or disturbance	**Large shallow inlets and bays**					
	Intertidal rocky shore communities	**Kelp forest communities**	**Subtidal rock and boulder communities**	**Intertidal mudflat and sandflat communities**	**Subtidal sandbank communities**	**Saltmarsh communities**
Physical Loss						
Removal (e.g. land claim, development)	••••	••••	••••	(For sensitivity and vulnerability information for these sub-features see the sections of this table which relate to the following interest features: *Mudflats and sandflats not covered by seawater at low tide*; *Sandbanks which are slightly covered by seawater all the time*; and *Atlantic salt meadows*)		
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	••	•••	••••			
Physical Damage						
Siltation (e.g. from dredging, outfalls, agricultural run-off)	••	••	•••			
Abrasion (e.g. mobile benthic fishing, anchoring)	•••	•••	••••			
Selective extraction (e.g. boulder turning, entanglement)	••	••	••			
Non-physical disturbance						
Noise (e.g. boat activity)	•	•	•			
Visual presence (e.g. recreational activity)	•	•	•			

Categories of operations which may cause deterioration or disturbance	Large shallow inlets and bays					
	Intertidal rocky shore communities	**Kelp forest communities**	**Subtidal rock and boulder communities**	**Intertidal mudflat and sandflat communities**	**Subtidal sandbank communities**	**Saltmarsh communities**
Toxic contamination						
Introduction of synthetic compounds (e.g.TBT, PCBs, endocrine disruptors)	••••	••••	••••	(For sensitivity and vulnerability information for these sub-features see the sections of this table which relate to the following interest features: *Mudflats and sandflats not covered by seawater at low tide*; *Sandbanks which are slightly covered by seawater all the time*; and *Atlantic salt meadows*)		
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	•••	•••	•••			
Introduction of radionuclides	•	•	•			
Non-toxic contamination						
Nutrient enrichment (e.g. agricultural run-off, outfalls)	••	••	••			
Organic enrichment (e.g. mariculture, outfalls)	••	••	••			
Changes in thermal regime (e.g. outfalls, power stations)	••••	•••	•••			
Changes in turbidity (e.g. agricultural 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 collection, commercial & recreational fishing)	•••	•••	•••			

Categories of operations which may cause deterioration or disturbance	Mudflats and sandflats not covered by seawater at low tide		
	Sand and gravel communities	Muddy sand communities	Mud communities
Physical Loss			
Removal (e.g. land claim, development, dredging)	••••	••••	••••
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	•••	••••	••••
Physical Damage			
Siltation (e.g. dredging, outfalls agricultural run-off)	••	••	••
Abrasion (e.g. anchoring, trampling)	•••	••	••
Selective extraction (e.g. aggregate dredging)	••	••	••
Non-physical disturbance			
Noise (e.g. boat activity)	•	•	•
Visual presence (e.g. recreational activity)	•	•	•

Categories of operations which may cause deterioration or disturbance	Mudflats and sandflats not covered by seawater at low tide		
	Sand and gravel communities	Muddy sand communities	Mud communities
Toxic contamination			
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	••••	••••	••••
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	•••	•••	•••
Introduction of radionuclides	•	•	•
Non-toxic contamination			
Nutrient enrichment (e.g. agricultural run-off, outfalls)	•••	•••	•••
Organic enrichment (e.g. mariculture, outfalls)	•••	••	••
Changes in thermal regime (e.g. outfalls, power stations)	•••	•••	•••
Changes in turbidity (e.g. agricultural 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, commercial & recreational fishing)	•••	•••	•••

Categories of operations which may cause deterioration or disturbance	Sandbanks which are slightly covered by seawater all the time			
	Eelgrass bed communities	Maerl bed communities	Sand and gravel communities	Mixed sediment communities
Physical Loss				
Removal (e.g. land claim, development, maerl extraction)	••••	••••	••••	••••
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	• •••	••••	•••	•••
Physical Damage				
Siltation (e.g. dredging, outfalls, agricultural run-off)	•••	•••	•••	•••
Abrasion (e.g. mobile benthic fishing, anchoring)	••••	•••	•••	•••
Selective extraction (e.g. maerl extraction, entanglement)	••••	••••	•••	•••
Non-physical disturbance				
Noise (e.g. boat activity)	•	•	•	•
Visual presence (e.g. recreational activity)	•	•	•	•

Categories of operations which may cause deterioration or disturbance	Sandbanks which are slightly covered by seawater all the time			
	Eelgrass bed communities	Maerl bed communities	Sand and gravel communities	Mixed sediment communities
Toxic contamination				
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	••••	••••	••••	••••
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	•••	•••	•••	•••
Introduction of radionuclides	•	•	•	•
Non-toxic contamination				
Nutrient enrichment (e.g. agricultural run-off, outfalls)	••••	••••	•••	•••
Organic enrichment (e.g. mariculture, outfalls)	•••	•••	•••	•••
Changes in thermal regime (e.g. outfalls, power stations)	•••	••••	•••	•••
Changes in turbidity (e.g. agricultural 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. commercial & recreational fishing)	•••	•••	•••	•••

Categories of operations which may cause deterioration or disturbance	Atlantic salt meadows		
	Low marsh communities	Mid marsh communities	Upper marsh communities
Physical Loss			
Removal (e.g. land claim, development)	••••	••••	••••
Smothering (e.g. by artificial structures, disposal of dredge spoil, outfalls)	• •••	••••	••••
Physical Damage			
Siltation (e.g. dredging, outfalls, agricultural run-off)	••	••	••
Abrasion (e.g. anchoring, trampling)	•••	•••	•••
Selective extraction (e.g. dredging)	••	••	••
Non-physical disturbance			
Noise (e.g. boat activity)	•	•	•
Visual presence (e.g. recreational activity)	•	•	•

Categories of operations which may cause deterioration or disturbance	Atlantic salt meadows		
	Low marsh communities	Mid marsh communities	Upper marsh communities
Toxic contamination			
Introduction of synthetic compounds (e.g. TBT, PCBs, endocrine disruptors)	●●●●	●●●●	●●●●
Introduction of non-synthetic compounds (e.g. heavy metals, hydrocarbons)	●●●	●●●	●●●
Introduction of radionuclides	●	●	●
Non-toxic contamination			
Nutrient enrichment (e.g. agricultural run-off, outfalls)	●●	●●	●●
Organic enrichment (e.g. mariculture, outfalls)	●●●	●●●	●●
Changes in thermal regime (e.g. outfalls, 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, commercial & recreational fishing)	●●●	●●●	●●●

English Nature's advice on operations (as at November 1999) is derived from an assessment combining relative sensitivity of the features or sub-features with information on human usage of the site (see table 4), 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 contrast, 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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11 Glossary

Advisory Group	The body of representatives from local interests, user groups and conservation groups, formed to advise the management group
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 most economically 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 of 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 is dominated by algae (Animal dominated subtidal zone)
Community	A group of 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 (see also relevant authority).
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.
Epifauna	Benthic animals living on the seabed
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.

European marine site	A European site (SAC or SPA) which consists of, or in so far as it consists of, marine areas.
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 for *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.
Halophytic	(Of vegetation) Tolerant of saline influence.
Infauna	Benthic animals which live within the seabed.
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' (*qv*)

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	In general, any operation which requires an application to be made for specific statutory consent, authorisation, licence or other permission. Specifically, 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.
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 (see also competent authority).
Restore	The action required for an interest feature when it is not considered to be in a favourable condition.
Ria	A drowned river valley (not of glacial origin) with relatively deep narrow well-defined channels which are predominantly marine throughout.
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 II Matrix of relative vulnerability

The relative vulnerability of an interest feature or sub-feature is determined by multiplying the scores for relative sensitivity and exposure, and classifying that total into categories of relative vulnerability.

		Relative sensitivity of the interest feature			
		High (3)	**Medium (2)**	**Low (1)**	**None detectable (0)**
Relative exposure of the interest feature	**High (3)**	**9**	**6**	**3**	**0**
	Medium (2)	6	4	2	0
	Low (1)	3	2	1	0
	None (0)	0	0	0	0

Categories of relative vulnerability

High	6 - 9
Medium	3 - 5
Low	1 - 2
None detectable	0

Appendix III

Summary of key biotopes **(Connor *et al.* 1997) - reference Favourable Condition Table**

Interest feature	**Sub-feature**	**Biotope code**	**Biotope description**
Large shallow inlet and bay	Rocky shore communities	LR.Cor.Bif	Brown algae *Cystoseira* spp. in shallow mid-shore rockpools
		LR.Cor	*Corallina officinalis* and coralline crusts in shallow eulittoral rockpools. These 'coralline' pools have a striking appearance as they are dominated predominantly by red algae
		LR.FK1	Fucoids and kelps in deep eulittoral rockpools
		LR.SByAs	Sponges, sea-mats and sea squirts on deeply overhanging lower shore bedrock
		FserX.T	Serrated wrack with sponges, sea squirts and red seaweeds on tide-swept lower shore
		MLR.Fser.Bo	Serrated wrack and under-boulder fauna on lower shore boulders. The shaded sides of boulders are often colonised by a variety of red algae and where space is available beneath the boulders a rich assemblage of animals also occur
	Kelp forest communities	EIR.LhypFa	Upper infralittoral bedrock with dense *Laminaria hyperborea* forest
		MIR.Lhyp.Ft	Moderately exposed infralittoral rock with *Laminaria hyperborea* forest
		EIR.LhypR.Loch	Mixed *Laminaria hyperborea* and *Laminaria ochroleuca* forest on exposed infralittoral rock
Large shallow inlet and	Subtidal rock and boulder communities	LsacRS.FiR	Sparse sugar kelp with dense filamentous red seaweeds, sponges and

Interest feature	Sub-feature	Biotope code	Biotope description
bay			barnacles *Balanus crenatus* on tide-swept variable salinity shallow subtidal rock
		MCR.ErS.Eun	Erect sponges, *Eunicella verrucosa* and *Pentapora foliacea* on slightly tide-swept moderately exposed circalittoral rock
		ECR.AlcMas	Dead mans fingers *Alcyonium digitatum* with large sponges *Cliona celata* and the sea fir *Nemertesia antennina* on moderately tide-swept exposed deep subtidal rock
		CUSH	Cushion sponges, sea firs and sea squirts on tide-swept sheltered animal dominated (deep) subtidal rock
	Subtidal mud	MarMu	Shallow marine mud communities
		EstMu	Estuarine sublittoral mud communities
		AphTub	*Aphelochaeta marioni* and *Tubificoides* spp. In variable salinity infralittoral mud
		VsenMtru	*Venerupis senegalensis* and *Mya truncata* in lower shore or infralittoral muddy gravel
Subtidal sandbanks	Maerl	Phy	Maerl beds in shallow subtidal clean gravel or coarse sand
		Phy.R	Maerl beds with red seaweeds in shallow subtidal clean gravel or coarse sand
			Maerl beds with hydroids (sea firs) and sea urchins in deeper subtidal clean gravel or coarse sand
		Lcor	Maerl (*Lithothamnion corallioides)* beds on shallow subtidal muddy gravel
	Eelgrass bed communities	ZMar	Eel grass *(Zostera marina/angustifolia)* beds in lower shore or shallow subtidal clean or muddy sand

Interest feature	Sub-feature	Biotope code	Biotope description
	Gravel and sand communities	IGS.Lcon	Dense *Lanice conchilega* and other polychaetes in tide swept infralittoral sand
		IGS.FabMag	*Fabulina fabula* and *Magelona mirabilis* with venerid bivalves in infralittoral compacted fine sand
		IGS.Sell	*Spisula elliptica* and venerid bivalves in infralittoral clean sand or shell gravel
		IMS.EcorEns	Medium to fine grained sand with *Echinocardium cordatum*
		IGS.Lcon	Dense *Lanice conchilega* and other polychaetes in tide swept infralittoral sand
	Mixed sediment communities	IMX.PolMtru	*Polydora ciliata, Mya truncata* and solitary ascidians in variable salinity shallow subtidal mixed sediment
		IMX.Ost	*Ostrea edulis* beds on shallow sublittoral muddy sediment
		IMX.LSacX	*Laminaria saccharina, Chorda filum* and filamentous red seaweeds on sheltered infralittoral sediment
		IMX. VsenMtru	*Venerupis senegalensis* and *Mya truncata* in lower shore or infralittoral muddy gravel
		IMX.LSacX	*Laminaria saccharina, Chorda filum* and filamentous red seaweeds on sheltered infralittoral sediment
Intertidal mudflats and sandflats	Muddy sand communities	LGS.Lan	Dense *Lanice conchilega* in tide-swept lower shore sand
		LMS.Mac.Are	*Macoma balthica* and *Arenicola marina* in intertidal muddy sand
		LMS.PCer	Polychaetes and *Cerastoderma edule* in fine sand or muddy sand shores

Interest feature	Sub-feature	Biotope code	Biotope description
	Mud communities	LMU.HedOl	*Hediste diversicolor* and oligochaetes in low salinity mud shores
		LMU.HedScr	*Hediste diversicolor* and *Scrobicularia plana* in reduced salinity mud shores
		LMU.HedStr	*Hediste diversicolor* and *Streblospio shrubsolii* in sandy mud or soft mud shores

Appendix IV

Saltmarsh NVC communities occurring within the Fal and Helford European marine site (according to The Saltmarsh Survey of Great Britain, Burd, 1989) - reference Favourable Condition Table

MAIN ZONE	NCC (BURD 1989)	NVC COMMUNITIES	SALTMARSH PLANT SPECIES
PIONEER MARSH	2a Salicornia/Suaeda	SM8	Annual glasswort (Annual *Salicornia* saltmarsh)
LOW-MID MARSH	2a Aster	SM11	Saltmarsh Aster (*Aster tripolium var. discoides*)
	3a Puccinellia	SM10	Common saltmarsh grass (Transitional low marsh vegetation with *Puccinellia maritima*, annual *Salicornia* species and *Suaeda maritima*)
MID-UPPER/ UPPER MARSH	4a Limonium/Armeria	SM13	Sea lavender or Sea thrift (*Puccinellia maritima* saltmarsh)
	4b Puccinellia/Festuca	SM16	Red-fescue (*Festuca rubra* saltmarsh)
	4c Juncus gerardii	SM16	Saltmarsh rush (*Festuca rubra* saltmarsh)
	4d Juncus maritimus	SM15 SM18	Sea rush (*Juncus maritimus - Tiglochin maritima* saltmarsh) (*Juncus maritimus* saltmarsh)
DRIFTLINE	5a Agropyron (Elytrigia)	SM24	Sea couchgrass (*Elymus pycnanthus* saltmarsh)

Appendix VI Relevant Authorities for the Fal and Helford European marine site

A & P (Falmouth) Ltd The Docks Falmouth Cornwall, TR11 4NR	Carrick District Council Carrick House Pyder Street Truro, TR1 1EB
Carrick District Council Ports of Truro & Penryn Harbour Office Town Quay Truro,TR1 2HJ	Cornwall County Council Planning Dept County Hall Truro TR1 3AY
Cornwall Sea Fishery Committee Old Bonded Warehouse Quay Street Penzance Cornwall, TR18 4BD	English Nature Trevint House Strangways Villas Truro TR1 2PA
Environment Agency Sir John Moore House Victoria Square Bodmin Cornwall, PL31 1EB	Falmouth Harbour Commissioners 44 Arwenack Street Falmouth Cornwall TR11 3JQ
Falmouth and Truro Port Health Authority The Docks Falmouth Cornwall, TR11 4NR	Kerrier District Council Council Offices Dolcoath Avenue Camborne Cornwall, TR14 8RY
St Mawes Pier and Harbour Co St Mawes Cornwall	South West Water Services Ltd Peninsula House Rydon Lane Exeter, EX2 7HR