Strangford Lough | Management Scheme

Special Area of Conservation (SAC)
Special Protection Area (SPA)

Produced by Environment and Heritage Service in conjunction with the Department of Agriculture and Rural Development, Ards Borough Council, and Down District Council, with the support of the Strangford Lough Office.

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1 Introduction to the Strangford Lough SAC / SPA Management Scheme

1.1 OVERVIEW

Socio-economic Change

People have inhabited the shores of Strangford Lough and used its resources for 9000 years. Today local people continue to play a very important role in shaping and managing the area. The past 20 years, however, have witnessed some dramatic changes in terms of the area's socio-economic development. This is partly because Strangford Lough, one of the most important environmental sites in Europe, is not a remote wilderness but lies within an hour's drive of Belfast city centre.

The proximity of Strangford Lough to the Belfast urban area provides ready access to an attractive environment and to recreational opportunities for a large population. The northern end of the Lough is becoming increasingly urbanised. Agricultural land coming onto the market is likely to attract interest from developers or people for whom farming is not a primary activity. How and where development will be located, its scale, the possible effect of sewage on water quality, and the implications for road infrastructure have to be carefully assessed in order to minimise their impact upon the Lough.

Farming and fishing have both been important in shaping the local economy but changing circumstances are encouraging diversification away from traditional activities in both cases. There is particular interest in developing aquaculture around the Northern Ireland coast and a demand for substantial growth is expected in Strangford Lough.

At the same time tourism, recreation and environmental management are witnessing a significant growth on and around Strangford Lough. The Lough's many attractions and its accessibility have increased the numbers of people using the countryside. Rural economies may increasingly depend on revenue from visitors.

The Need for Sustainable Development

Most of the activities mentioned rely, to a great extent, on the high environmental quality and visual appeal of the Lough and the surrounding area. It is therefore in everyone's long term interest to maintain the environment. With sensitive management there is no reason why local people and visitors should not continue to enjoy the Lough's resources in a way that is sustainable both environmentally and economically.
A co-ordinated approach to management will also help achieve compatibility between the differing human interests.

A number of important strategies and plans have been produced in the past decade, or are being developed, which seek to ensure that the changes facing Strangford Lough do not destroy the quality of the environment and the heritage on which the socio-economic development of the area depends.

The emerging Regional Development Strategy, together with a series of regional Planning Policy Statements, will provide a strategic policy framework for development plans. The Strategy is likely to indicate that the Ards and Down Area Plan 2015, now in the course of preparation, should provide in the order of 15,500 new housing units by the end of the plan period. It suggests that much of that growth is likely to be accommodated in the main towns of Newtownards and Downpatrick with the possibility of substantial growth in Comber and Ballynahinch.

The Strategy promotes a strong and diversified economy for rural areas through its Strategic Policy Guidelines, and it is strongly supportive of sustainable, environmentally sensitive tourism as an economic resource. It also recognises the importance of conserving high quality environments such as Strangford Lough. The forthcoming Area Plan will be required to accommodate and to regulate changes in urban and rural environments closely associated with Strangford Lough without adversely affecting the conservation status of the Lough.

The Strangford Lough Sustainable Development Strategy was commissioned by Ards Borough Council, Down District Council, Environment and Heritage Service, the Northern Ireland Tourist Board, Planning Service, and the Sports Council for Northern Ireland, with advice from the Strangford Lough Management Committee, in response to public demand for a framework for sustainable development. The Strategy was launched in 1998 following public consultation over a two year period. It highlights the need to monitor and regulate some activities to maintain the balance between the desire for economic growth and the need to conserve the Lough's natural resources.

1.2 BACKGROUND AND AIMS OF THE HABITATS AND BIRDS DIRECTIVES

Within the European Union efforts are being made to identify and conserve the Community's most valued environmental resources. The Habitats and Birds Directives are important measures introduced by the European Commission in support of this objective.

The main aim of the Habitats Directive is to ensure that biodiversity is maintained through conservation of important, rare or threatened species and the habitats of certain species. The Directive also aims to make a contribution to the sustainable development of protected sites. Sites designated under this Directive are called Special Areas of Conservation (SACs). Strangford Lough has been submitted to the European Commission as a candidate SAC.

The main aim of the Birds Directive is to protect bird species within the European Union through the conservation of birds and important habitats for birds. Sites designated under this Directive are called Special Protection Areas (SPAs). Strangford Lough has been designated as an SPA.

Sites designated under these two Directives together form a network of protected sites across the European Union known as Natura 2000. They may also be referred to as European sites. Designation as an SAC or SPA is intended to safeguard the key conservation features but does not mean that human activities cannot be accommodated.

The recognition of Strangford Lough as a European site comes on top of several other statutory nature conservation designations. The foreshore plus some islands have been declared as Areas of Special Scientific Interest (ASSIs). The Marine Nature Reserve (MNR) includes all the waters, seabed and shores up to mean tide high water mark and an area around the mouth of the Lough. Parts of the Lough are National Nature Reserves (NNRs) under the management of Environment and Heritage Service or the National Trust. Strangford Lough is also a Ramsar site under the Convention on Wetlands of International Importance.

The LIFE Programme is the financial instrument used to support European Community environmental policy. LIFE funding matched by funding from the UK's nature conservation bodies supported the 'UK Marine SACs Project'. This Project involved twelve *Natura 2000* sites selected as pilot areas for the development of SAC / SPA Management Schemes. Strangford Lough was one of these sites. The Marine SACs Project was a partnership between Environment and Heritage Service, the Countryside Council for Wales, English Nature, Scottish Natural Heritage, the Joint Nature Conservation Committee and the Scottish Association for Marine Science.

The Marine SACs Project commenced in May 1996 and ended in May 2001. During this time each site should have developed and established an operational management scheme.

1.3 AIMS OF THE MANAGEMENT SCHEME

Strangford Lough is a complex area with a mixture of recreational and commercial activities. Its future well-being rests in having a co-ordinated system of management that is supported by all those with an interest in, or responsibility for, different aspects of the Lough. Local councils, government departments, conservation bodies, Lough users and the owners of adjoining property all have a role to play.

In Northern Ireland the requirements of the Habitats and Birds Directives have been transposed into domestic legislation by the Conservation (Natural Habitats etc) Regulations (NI) 1995, usually referred to as the Habitats Regulations. These Regulations introduce specific measures for the management of marine areas; notably the provision to develop management schemes for European marine sites.

This management scheme is intended to safeguard the conservation status of those features for which Strangford Lough has been selected as a candidate SAC and designated as a SPA. The Scheme sets the framework through which activities will be managed, either voluntarily or through regulation, so as to achieve the conservation objectives of the European marine site. Management of the conservation interests will work to accommodate, and may in some cases encourage, appropriate human activities.

The management scheme establishes a benchmark of environmental sustainability which should underpin other plans and strategies. However, only those operations that may cause deterioration or disturbance to the conservation features of the site may be subject to restrictions under a management scheme. It is therefore unlikely that activities which are not causing significant damage to the marine interest of the site will be adversely affected by management measures.

The Environment and Heritage Service (EHS) of the Department of the Environment is the lead agency in developing the management scheme for Strangford Lough. It has been assisted in this work by the Strangford Lough Office.

In summary this management scheme will:

- Identify the conservation features
- Set standards to which the features should be maintained
- Establish a programme to monitor the features
- Highlight where there is a need to regulate activities affecting the conservation features, in consultation with local interests
- Clarify where statutory responsibilities lie
- Provide a structure for better management co-ordination between bodies
- Facilitate better communication on management

Many of the components of effective management are already in place or are being put in place. The emphasis of the management scheme is thus on providing a strategic framework for these and on co-ordination of activities across a range of government and non-government bodies to achieve agreed objectives. The scheme builds upon the designation of the Lough as a Marine Nature Reserve in 1995. It also complements existing management plans for National Nature Reserves and National Trust properties on the Lough.

An important aspect of the management scheme is the provision of objective environmental information through monitoring and research. This information may be applied in other areas of activity and thus the management scheme can make an important contribution to the wider strategic management of the Strangford Lough area.

1.4 RESPONSIBILITY FOR MANAGEMENT

Section 5.2 describes in greater detail how existing initiatives contribute to the management of Strangford Lough's wildlife interests. The following paragraphs outline where the key responsibilities for managing the SAC and SPA lie.

Relevant and Competent Authorities

The designation of Strangford Lough as a European marine site brings with it obligations for both central and local government.

The Habitats Regulations make statutory authorities responsible for the conservation and management of European marine sites. The Regulations also define responsibilities for what are termed competent and relevant authorities (see Appendix 1). The Regulations state that the Secretary of State shall advise the relevant authorities as to the conservation objectives for that site, (see Section 3) and any operations which cause deterioration of natural habitats or disturbance of species for which the site has been designated (see Section 4). The Secretary of State may also direct relevant authorities to exercise their powers in accordance with the needs of the SAC / SPA.

The Regulations do not affect the statutory powers of relevant authorities, but require that they apply them to ensure the protection of the site. The appropriate relevant authority should undertake any agreed management measure required to ensure that the conservation objectives are met.

Government advice on the development of management schemes states that there should be a management group established by the relevant authorities (see Figure 1). It also states that an advisory group should be established to involve non-statutory bodies in the preparation of a management scheme. The existing Strangford Lough Management Committee (SLMC) fulfils this role.

Strangford Lough Management Committee

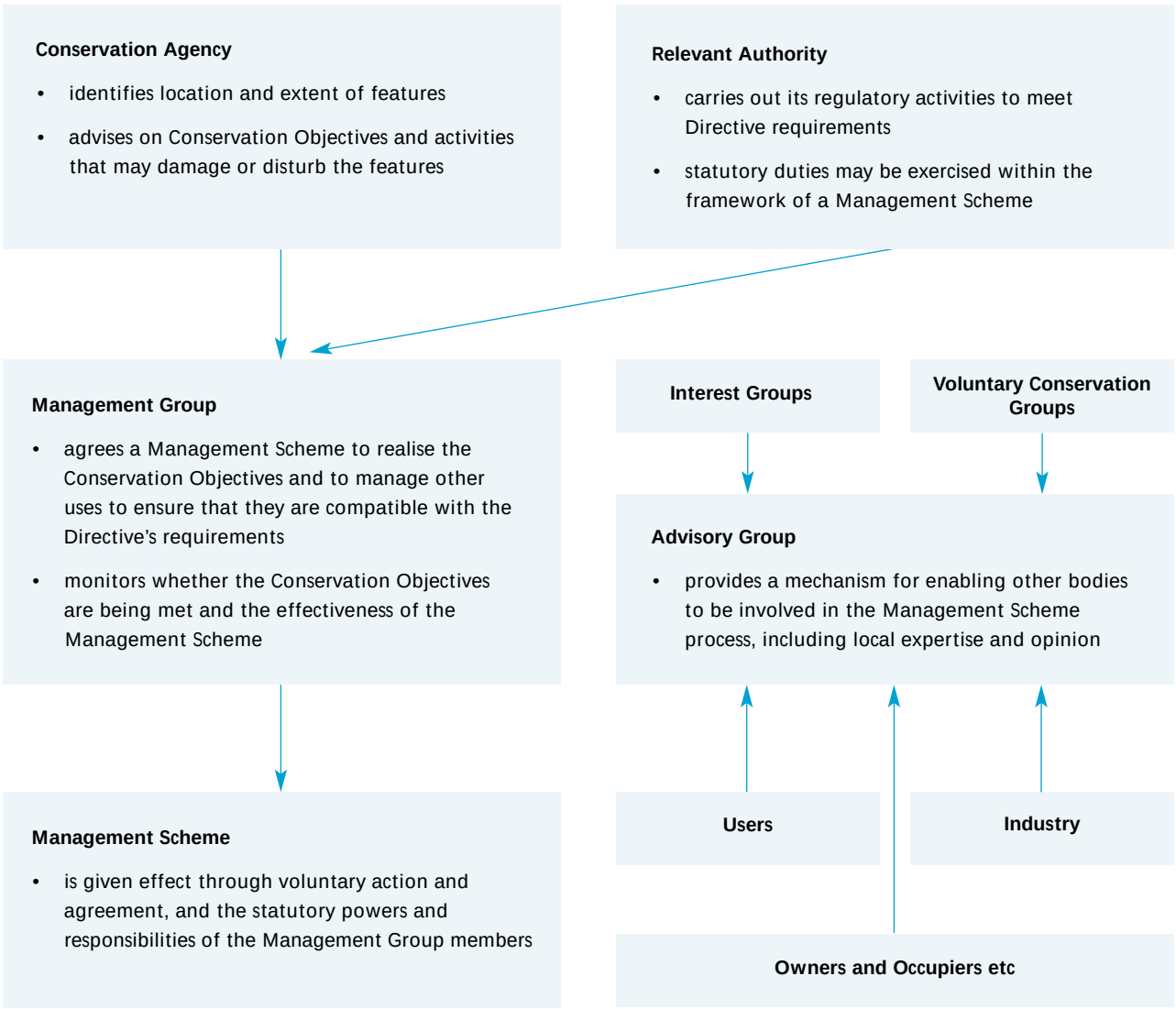
The effective management of Strangford Lough's wildlife interests requires input and co-operation from local people and Lough users. The Strangford Lough Management Committee represents local and special interest groups on and around the Lough. It was established in 1992 to provide advice to Government at a strategic level. The Committee raises issues and advises government on a wide range of topics. The Committee has no executive role in the management of the Lough but works with bodies that have such responsibilities.

The National Trust

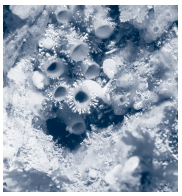
Since the origins of the Strangford Lough Wildlife Scheme in the 1960s, the National Trust's conservation remit has grown considerably. Over 6000 hectares of foreshore and seabed as well as some 50 islands in the Lough, adjacent wetlands and woodlands and a number of car parks and picnic sites are now owned or leased and cared for by the Trust. This amounts to about half the shores being in Trust ownership with a further quarter on a full lease from the Crown Estate Commissioners. The National Trust's role in wardening includes carrying out bird counts and a variety of conservation and educational activities. Many of these activities meet objectives within the management scheme. The Trust is, therefore, an important player in the delivery of management needed to sustain the Lough's international wildlife interests.

Figure 1: DEVELOPING A MANAGEMENT SCHEME FOR A EUROPEAN MARINE SITE

(from *European Marine Sites in England and Wales,* Department of the Environment, Transport and the Regions, 1998).



In Northern Ireland, Environment and Heritage Service fulfils the role of the Conservation Agency.



2 Reasons for Designation and Description of the Conservation Features

2.1 SITE DESCRIPTION

Location

Strangford Lough is a large (150km^2) shallow sea lough on the east coast of County Down, Northern Ireland, of which about 50 km^2 lies between high and low water mark mean tide. Its northern end lies some 15 km east of Central Belfast (6 km from the outskirts). Downpatrick lies 5 km west of the southwest corner.

The candidate SAC and the SPA include all the sub-tidal area of the Lough and its foreshore up to the landward boundary of the Strangford Lough (Parts 1-3), Killard and Ballyquintin Point ASSIs (see page 49). This includes small areas of terrestrial habitat. The site is bounded across the Narrows by a straight line from Killard Point to Ballyquintin Point. The SPA also includes the primarily freshwater area of the Quoile Pondage National Nature Reserve.

Physical Description

Almost land-locked, Strangford Lough is separated from the Irish Sea by the Ards Peninsula to the east and is bounded to the south by the Lecale coast. The Strangford Narrows, an 8 km long channel with a minimum width of 0.5km, connects it to the open sea. This narrow entrance channel has extremely strong currents of up to 8 knots (4m/s). The Lough is 30km long from head to mouth and up to 8km wide.

The main characteristic of the SAC and SPA is the sea inlet of Strangford Lough itself. This sea inlet emerged from under the melting ice-sheets of the Ice Age and is for the most part less than 10 m in depth. There is a deeper Y-shaped channel (possibly an old river-valley or geological fault-line) up to 66 m deep which extends from the Narrows up the central portion of the Lough. The underlying rock is largely Silurian. The surface of the bed and shore of the Lough ranges from bedrock in areas with strong currents to fine mud in sheltered waters.

The Lough has an indented shoreline and a great variety of subtidal and intertidal habitats. The west shore has numerous islands typical of flooded drumlin topography. The Lough contains extensive areas of mudflat and also sandflats (mainly at the northern end), with gravel, cobble, boulder and rocky shores as one moves further south. It also has areas of saltmarsh, the most extensive being in the Comber river estuary.

The water in the Lough is virtually fully saline except at the mouths of the two moderate-sized rivers, the Comber and the Quoile, and where several streams drain into it from the catchment of about 900km^2, where it may be somewhat brackish. The area has a mild climate with relatively low rainfall compared with other areas of Ireland, infrequent frosts and prevailing west to southwest winds.

Strangford Lough supports an impressive range of marine habitats and communities with over 2,000 recorded species. It is important for marine invertebrates, algae and saltmarsh plants, for wintering and breeding wetland birds, and for marine mammals.

2.2 EVALUATION OF THE CONSERVATION FEATURES

A long history of scientific research has confirmed the importance of Strangford Lough to nature conservation. These studies include littoral, sub-littoral and coastal vegetation surveys as well as field work carried out by staff of organisations such as the Ulster Museum, Environment and Heritage Service and Queen's University, Belfast. Its ornithological interest was confirmed in "Ireland's Internationally Important Bird Sites" published by the Joint Nature Conservation Committee (JNCC) in 1993.

Advice on the importance and significance of conservation features has been sought from JNCC, the Council for Nature Conservation and the Countryside (CNCC) and the Strangford Lough Management Committee (SLMC).

2.2.1 STRANGFORD LOUGH SPECIAL AREA OF CONSERVATION

Under the Habitats Directive, Strangford Lough has been submitted as a candidate Special Area of Conservation (SAC).

The importance of Strangford Lough is evident in the remarkable range of natural habitats, many of which are species-rich and contain local rarities.

The features for which the SAC has been selected are listed below:

- Large shallow inlet and bay
- Coastal lagoons
- Mudflats and sandflats not covered by sea water at low tide
- Reefs
- Annual vegetation of drift lines
- Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)
- *Salicornia* and other annuals colonising mud and sand
- Common Seal *Phoca vitulina*
- Perennial vegetation of stony banks.
  Although this community occurs above the highest astronomical tide and is therefore outside of the statutory definition of a marine site, it is included in the management scheme for completeness.

Each of these features contributes to the overall integrity of the Lough and are described in more detail in Section 3.

The physical regime of the Lough, with its high water quality, complex current systems and varying topography, substrata and water depths, is also important.

2.2.2 STRANGFORD LOUGH SPECIAL PROTECTION AREA

Under the Birds Directive, Strangford Lough has been classified as a Special Protection Area. This designation gives recognition to its importance in a European context for overwintering and breeding birds.

Strangford Lough is Northern Ireland's most important coastal site for wintering waterfowl. This interest is dependent upon the Lough continuing to have extensive areas of mud and sandflats which remain largely free from disturbance and have adequate supplies of food, notably eelgrass and shellfish and other invertebrates, to support the very large numbers of visiting birds. Thus water quality and sediment characteristics can influence the Lough's status as an SPA.

The criteria for SPA selection are set out in Articles 4.1 and 4.2 of the Birds Directive and in the JNCC publication, "The Birds Directive - Selection Guidelines for Special Protection Areas." There are seven features for which Strangford Lough has been classified as an SPA:

Nationally and internationally important populations of regularly occurring species listed on Annex 1 of the Directive (Article 4.1)

SPA feature 1: *Internationally important populations of breeding Sandwich Tern (Sterna sandvicensis)*

SPA feature 2: *Internationally important populations of breeding Common Tern (Sterna hirundo)*

SPA feature 3: *Nationally important populations of breeding Arctic Tern (Sterna paradisaea)*

Nationally and internationally important populations of regularly occurring wintering and migratory species. (Article 4.2)

SPA feature 4: *Internationally important populations of wintering Light-bellied Brent Goose. (Branta bernicla hrota)*

SPA feature 5: *Internationally important populations of wintering Knot (Calidrus canutus)*

SPA feature 6: *Internationally important populations of wintering Redshank (Tringa totanus)*

SPA feature 7: *The wintering waterfowl population*

Note: Bar-tailed Godwit was not included on the original citation for the SPA because it did not reach a qualifying level at that time. It has now reached a qualifying level and will be considered for inclusion when the citation is formally revised.

2.2.3 RAMSAR SITE

The *Convention on Wetlands of International Importance especially as Waterfowl Habitat* (otherwise known as the Ramsar Convention) is an international convention which was signed by the UK Government in 1973. It allows for, and encourages, signatories to make contributions to an international network of protected Ramsar sites. Such sites may be designated for their waterfowl populations, important plant and animal assemblages, wetland interest or a combination of these. Governments are also encouraged to promote the conservation and 'wise use' of wetlands in general.

Strangford Lough satisfies several criteria under the Convention and has been formally listed as a Ramsar site. The boundary of the Ramsar site is identical to that of the SPA.



3 Conservation Objectives and Favourable Condition Tables

Conservation objectives are required for European marine sites under Regulation 28(2)(a) of the Habitats Regulations. This Section provides formal advice on the conservation objectives associated with each of the SAC and SPA features. It also identifies the attributes of each of the SAC and SPA features that will be used to assess the on-going condition of the site.

Strangford Lough is not a static system, but is subject to natural change both in terms of its biological communities and its geomorphology. The conservation objectives are designed to accommodate the dynamic nature of the site. In overall terms, Strangford Lough was deemed to be in favourable condition at the time of its designation. This does not rule out setting targets that will enhance the condition of any feature or sub-feature.

Attributes have been selected that fulfil the following criteria:

(a) they represent important characteristics of the features in terms of their nature conservation value;

(b) they are indicators of the condition of the features;

(c) they are measurable.

The attributes selected fall into two main categories:

(a) broadscale indicators of the range and diverse characteristics of the features across the site;

(b) more specific characteristics, such as individual biotopes and their species composition.

For the qualifying SAC and SPA features and sub-features, the identification of attributes is by and large complete. However, for some attributes further surveys are required to establish the current condition and quantify targets. Further definition of targets, and possibly attributes, will be addressed as part of the development of the detailed monitoring programme to include monitoring protocols, methodologies, scheduling of survey work, and quality assurance.

Under the monitoring programme, alert limits will be established which will act as 'triggers' for action or further investigation. The favourable condition tables (see page 12-29) will inform the scope and nature of any "appropriate assessment" required under the Habitats Regulations. The tables are, however, unlikely to provide a comprehensive basis on which to assess plans or projects under the Regulations.

3.1 CONSERVATION OBJECTIVES FOR THE SAC FEATURES AND SUB-FEATURES

The marine habitats as listed in the Habitats Directive are very broadly defined features that are often represented by large and complex sites. To effectively describe, monitor and manage such complex features, it has been necessary to divide some of them into smaller units called sub-features. Sub-features are distinctive biological communities (for example, eelgrass beds, and horse-mussel reefs), or particular structural or geographical elements of the feature. The use of sub-features has been found to be particularly helpful for those marine features that are represented by whole physiographic units.
Appendix 2 contains descriptions of the main communities associated with the SAC features and sub-features. It is

recognised that for some communities, the information available is very limited and related biotopes have not been fully identified. For this reason the completion of broadscale surveys is a priority under the management scheme (see Section 3.3).

SAC Feature: Large Shallow Inlet and Bay

Conservation Objective: To maintain the large shallow inlet and bay and its characteristic species and habitats in favourable condition, allowing for natural change.

The physical regime of the Lough including water quality is essential to the favourable condition of the overall feature and the following selected attributes will be measured:

Attributes:

- extent of the feature
- water clarity
- water salinity and temperature
- nutrient status

The assessment of the biodiversity and abundance of plankton is still under consideration.

All the marine SAC features will contribute to the overall condition assessment of the large shallow inlet and bay as they are all part of a single system. In addition, the favourable condition of the feature will be informed by the condition of selected attributes for the following two key contributory sub-features:

Sub-features: Subtidal gravel and sand communities
Subtidal fine sand and mud communities

Attributes:

- extent of the sub-features
- the presence of a selection of characteristic biotopes for each of the above communities at sites chosen to indicate the distribution and extent of each sub-feature
- species composition of selected biotopes at monitoring sites

SAC Feature: Coastal Lagoons

The prime example of this feature in Strangford Lough is the Dorn at Ardkeen.

Conservation Objective: To maintain the coastal lagoons and their characteristic species and habitats in favourable condition, allowing for natural change.

Attributes:

- extent of the feature
- the presence of a selection of characteristic biotopes at sites chosen to indicate the distribution and extent of the feature
- species composition of selected biotopes at monitoring sites

SAC Feature: Mudflats and Sandflats not Covered by Sea Water at Low Tide

Conservation Objective: To maintain the mudflats and sandflats not covered by sea water at low tide and their characteristic species in favourable condition, allowing for natural change.

Sub-features: Intertidal sand and gravel communities
Intertidal fine sand and mud communities

Attributes:

- extent of the feature and sub-features
- the presence of a selection of characteristic biotopes at sites chosen to indicate the distribution and extent of each sub-feature
- species composition of selected biotopes at monitoring sites
- substrate mobility
- substrate availability

Sub-feature: Eelgrass (*Zostera* spp.) beds

Attributes:

- distribution of *Zostera* beds
- extent of *Zostera* beds
- biomass
- density

SAC Feature: Reefs

Conservation Objective: To maintain the reefs and their characteristic species in favourable condition, allowing for natural change.

Sub-features: Subtidal rock and boulder communities
Subtidal rocky reef communities
Intertidal rock and boulder communities

Attributes:

- extent of the feature and sub-features
- the presence of a selection of characteristic biotopes at sites chosen to indicate the distribution and extent of each sub-feature
- species composition of selected biotopes at monitoring sites

Sub-feature: Horse Mussel (*Modiolus modiolus*) beds

Attributes:

- distribution of *Modiolus* beds
- extent and percentage cover of *Modiolus* beds
- structure of *Modiolus* beds
- species index of *Modiolus* beds

SAC Feature: Annual Vegetation of Drift Lines

Conservation Objective: To maintain the annual vegetation of drift lines and their characteristic species in favourable condition, allowing for natural change.

Attributes:

- extent of the feature
- substrate mobility
- substrate availability
- presence of characteristic species
- presence of rare and notable species

SAC Feature: Atlantic Salt Meadows (*Glauco-puccinellietalia maritimae*)

Conservation Objective: To maintain the Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) and their characteristic species in favourable condition, allowing for natural change.

Attributes:

- extent of the feature
- substrate mobility
- vegetation composition
- vegetation structure

SAC Feature: *Salicornia* and Other Annuals Colonising Mud and Sand

Conservation Objective: To maintain the *Salicornia* and other annuals colonising mud and sand and their characteristic species in favourable condition, allowing for natural change.

Attributes:

- extent of the feature
- substrate mobility
- vegetation composition
- vegetation structure

SAC Feature: Common Seal *Phoca vitulina*

Conservation Objective: To maintain the population of *Phoca vitulina* in favourable condition, allowing for natural change.

Attributes:

- number of adults
- number of pups
- mother and pup resident time
- habitat availability

SAC Feature: Perennial Vegetation of Stony Banks

Conservation Objective: To maintain the perennial vegetation of stony banks and their characteristic species in favourable condition, allowing for natural change.

Attributes:

- extent of the feature
- substrate mobility
- vegetation structure
- vegetation composition

3.1.1 FAVOURABLE CONDITION TABLES FOR THE SAC FEATURES

Some of the attributes, measures and targets given in the following 'condition tables' are more detailed than others. This tends to reflect the more advanced nature of 'terrestrial' habitat management and in particular terrestrial monitoring when compared to knowledge of such issues in the marine environment. Detail will be added when the necessary information from broadscale surveys and biotope mapping has been collected.

SAC Feature: Large shallow inlet and bay

SUB-FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
	Extent of the feature.	Area of the large shallow inlet and bay, measured once per reporting cycle.	No decrease in extent from an established baseline, subject to natural change.	
	Water clarity.	Light attenuation measured regularly.	Seasonal light attenuation should not deviate from the baseline, subject to natural change.	The extent and diversity of plant and algal communities is affected by water clarity. Clarity is reduced through increases in the suspension of organic or inorganic material in the water column. Temperature, salinity and nutrient concentrations are characteristics of the overall hydrography of the area, and thus the Lough's overall functioning. Nutrient enrichment stimulating excessive growth of phytoplankton* is a common factor contributing to a reduction in water clarity. Baselines to be established.
	Water salinity and temperature.	Salinity and water temperature measured regularly.	Temperature and salinity should not deviate significantly from the long-term trends, subject to natural change.	
	Nutrient status.	Measure nutrient concentrations on a regular basis.	Nutrient concentrations should not deviate significantly from baseline, subject to natural change.	
Sub-tidal Sand and Gravel Communities. **Subtidal Fine Sand and Mud Communities.**	Extent of the sub-features.	Area of communities measured at least once per reporting cycle.	No decrease in extent from an established baseline, subject to natural change.	Changes in extent and distribution may indicate long term changes in the physical conditions at the site. The species composition of some biotopes may provide further information on changes/trends in these communities. Baseline surveys required.
	Characteristic biotopes at sites chosen so as to provide some indication of the distribution and extent of the communities.	Presence of selected biotopes at chosen sites measured at least once during the reporting cycle.	Results should not deviate significantly from the established baseline, subject to natural change.	
	Species composition of selected biotopes at monitoring sites.	Species composition of selected biotopes measured at least once during the reporting cycle.	Species composition of selected biotopes should not deviate significantly from the established baseline, subject to natural change.	

*The assessment of the biodiversity and abundance of plankton is still under consideration.

As they are all part of a single system, the condition of other features which occur within a large shallow inlet and bay will also contribute to the overall assessment of the large shallow inlet and bay

SAC Feature: Coastal lagoons

ATTRIBUTE	MEASURE	TARGET	COMMENT
Extent of the feature.	Area of lagoons measured at least once per reporting cycle.	No decrease in extent from an established baseline, subject to natural change.	The Dorn at Ardkeen is the prime example of a coastal lagoon in Strangford Lough.
Characteristic biotopes at sites chosen so as to provide some indication of the distribution and extent of the communities.	Presence of selected biotopes at selected sites measured at least once during the reporting cycle.	Results should not deviate significantly from the established baseline, subject to natural change.	Tide-swept communities are among the most important characteristics of inlet lagoons and are integral to the structure and function of such lagoons.
Species composition of selected biotopes at monitoring sites.	Presence and abundance of species, measured during summer, at least once per reporting cycle.	Presence and abundance of species should not deviate significantly from an established baseline, subject to natural change.	Changes in extent and distribution may indicate long term changes in the physical conditions at the site. Baseline surveys required.

SAC Feature: Mudflats and sandflats not covered by sea water at low tide

SUB-FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
Intertidal Sand and Gravel Communities. **Intertidal Fine Sand and Mud Communities.**	Extent of the feature and sub-features.	Area occupied by communities measured at least once per reporting cycle.	Ensure that any loss in extent is only due to natural processes.	Baseline surveys required. This habitat occupies a naturally dynamic position in coastal systems. Changes in extent and distribution may indicate long term changes in the physical conditions at the site. Human induced developments must not impact on the extent and functioning of the natural system.
	Characteristic biotopes at sites chosen so as to provide some indication of the distribution and extent of the communities.	Presence of selected biotopes at chosen sites measured at least once during the reporting cycle.	Results should not deviate significantly from the established baseline, subject to natural change.	
	Species composition of selected biotopes at monitoring sites.	Species composition of selected biotopes measured at least once during the reporting cycle.	Species composition of selected biotopes should not deviate significantly from the established baseline, subject to natural change.	The species composition of some biotopes may provide further information on changes/trends in these communities.
	Substrate mobility.	System dynamics. Substrate characteristics measured.	Ensure that change in system dynamics / substrate characteristics is due only to natural processes.	Provided that no developments result in direct loss of habitat, or change the site dynamics, then the attribute should be deemed to be in favourable condition.
	Substrate availability.	Measure substrate available.	Ensure that change in substrate is due only to natural processes.	Only natural coastal processes should regulate substrate supply and distribution.

SUB-FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
***Zostera* Spp. Beds** *Z. noltii* *Z. angustifolia* *Z. marina**	Distribution of *Zostera* beds.	Distribution of *Zostera* beds, measured during autumn at least once during the reporting cycle.	Distribution should not deviate significantly from the established baseline, subject to natural change.	**Z. marina*, though subtidal, will be assessed under this feature for completeness. The distribution of the beds is of key importance to their conservation condition. Any consideration of *Zostera* within the context of these conservation objectives must fit with the UK Biodiversity Action Plan for Seagrass Beds.
	Extent of the beds.	Area of *Zostera* beds at least once during the reporting cycle.	Extent should not deviate significantly from the established baseline, subject to natural change.	A considerable amount of data has recently been collated regarding this attribute. A target value and consequently limits, will be derived from this data.
	Biomass.	Above and below ground *Zostera* standing crop dry biomass at least once during the reporting cycle.	Average biomass should not deviate significantly from the long term average, subject to natural change.	All three species must be considered. *Z. noltii* is the more common intertidal species, however, as *Z. angustifolia* is spatially unpredictable under natural conditions and are larger plants, the presence of a few plants could make a significant difference to the results.
	Density.	*Zostera* shoot density measured as frequency per unit area at least once during the reporting cycle.	Average shoot density should not deviate significantly from the long term average, subject to natural change.	An early indicator of seagrass under stress is a reduction in the number of plants and loss of plants on the lower shore. This measure will probably concentrate only on *Z. angustifolia* which, being a larger plant, is found at lower densities than *Z. noltii.*

SAC Feature: Reefs

SUB-FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
Subtidal Rock and Boulder Communities. **Subtidal Rocky Reef Communities.** **Intertidal Rock and Boulder Communities.**	Extent of the feature and sub-features.	Area and distribution of the communities measured at least once during the reporting cycle.	Extent should not deviate significantly from the established baseline, subject to natural change.	Baseline surveys required. Changes in extent and distribution may indicate long term changes in the physical conditions at the site.
	Characteristic biotopes at sites chosen so as to provide some indication of the distribution and extent of the communities.	Presence of the selected biotopes at chosen sites measured at least once during the reporting cycle.	Results should not deviate significantly from the established baseline, subject to natural change.	
	Species composition of selected biotopes at monitoring sites.	Species composition of the selected biotopes measured at least once during the reporting cycle.	Species composition of selected biotopes should not deviate significantly from the established baseline, subject to natural change.	The species composition of some biotopes may provide further information on changes/trends in these communities.

SUB-FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
***Modiolus modiolus* Beds.**	Distribution of *Modiolus* beds.	Distribution of *Modiolus modiolus* biotope SCR.ModCVar and biotopes with *Modiolus /Ophiothrix* measured at least once during the reporting cycle.	*Modiolus* beds (SCR.ModCVar) and other biotopes should be present in those areas of the Lough where they currently occur, subject to natural change.	Consideration of *Modiolus* within the context of these conservation objectives should fit with the UK Biodiversity Action Plan for *Modiolus*. Note: Other *Modiolus* biotopes may be identified for Strangford Lough.
	Extent and percentage cover of *Modiolus* beds.	Extent and percentage cover occupied by *Modiolus* beds i.e biotope SCR.Mod.Cvar and biotopes with *Modiolus/ Ophiothrix* measured at least once during the reporting cycle.	This target will reflect the potential to re-establish / allow recovery of *Modiolus* beds in areas where it has been impacted. Lower limit: No decrease in extent or percentage cover from established baseline, subject to natural change.	The beds should not be allowed to become further reduced or fragmented even if the distribution does not change significantly. Data has recently been collated and is being updated regarding this attribute. A target and associated limits will be derived from this data.
	Structure of *Modiolus* beds.	A measure of the height, three - dimensional aspect and age structure of the *Modiolus* beds, measured at least once during the reporting cycle.	Average height of the *Modiolus* beds should not deviate from the established baseline. Age structure should be comparable with undisturbed populations in the Lough. Subject to natural change.	Baseline surveys required. Sample sites should include some which still retain the “clump” formation. Changes will provide some measure of disruption to the bed. Age structure is of interest because of its possible link with recruitment.
	Species index of *Modiolus* beds.	Measure number of species and their abundance.	Species index of the *Modiolus* beds should not deviate from the established baseline, subject to natural change.	*Modiolus* beds are a habitat for many other species. The species index is a key measure of the health of the beds.

SAC Feature: Annual Vegetation of Drift Lines

ATTRIBUTE	MEASURE	TARGET	COMMENT
Extent of the feature.	Area. This is an ephemeral habitat that depends upon the incidence and severity of storm events; survey over a period of years will be required to establish suitable baseline data.	Ensure that any loss in extent is only due to natural processes, with no human induced developments impacting on the natural system.	This community occupies a naturally dynamic position in coastal systems. Provided that no human developments result in direct loss of habitat or of areas with the potential to develop this habitat, or change the site dynamics, then the attribute should be deemed to be in favourable condition.
Substrate mobility.	System dynamics. Substrate characteristics.	Ensure that change in system dynamics and substrate characteristics is only due to natural processes.	Both inorganic and organic substrates are important precursors to the development of annual vegetation of drift lines.
Substrate availability.	Suitable substrate is available.	Ensure that change in substrate is only due to natural processes.	Baselines to be established.
Characteristic species.	Presence of characterising species, e.g. *Honckenya peploides*, *Cakile maritima*, *Beta vulgaris* ssp *maritima, Atriplex* spp., *Matricaria maritima, Galium aparine* during late summer (July/August).	Maintain the presence and broad distribution of stands of characterising species together with other local variants across the feature, subject to natural change.	These communities are found in a narrow strip at the extreme high water mark. Changes in the frequency and abundance of these species should be expected to occur seasonally as a result of storm events, but the communities are also sensitive to disturbance by human activities.
Rare and notable species.	Presence of *Beta vulgaris* ssp. *maritimus.*	To maintain the presence and abundance of *Beta vulgaris* ssp. *maritimus* within the Lough, subject to natural change.	Baseline to be established. Check historical records to determine applicability.

SAC Feature: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)

ATTRIBUTE	MEASURE	TARGET	COMMENT
Extent of the feature.	Area measured at least once per reporting cycle during the summer months of June, July or August.	Subject to natural processes, maintain the overall extent of the vegetation.	Judgements in changes to extent/area will have to take particular care to distinguish changes as a result of natural erosion vs. anthropogenic actions. *Zostera* and *Ruppia* beds and stands of *Salicornia* and *Suaeda* are included within other Annex 1 habitat types. Baseline surveys required.
Substrate mobility.	System dynamics. Record the distribution of vegetated areas, open sediment areas and drainage channel patterns and areas.	Ensure that any changes in the area and distribution patterns of substrate are only due to natural processes. No increase in the area constrained by introduced structures or landforms.	
Vegetation composition.	Low-level marsh: At least three of the species below recorded as frequent and at least a further two as occasional: *Puccinellia maritima, Salicornia agg., Suaeda maritima, Aster tripolium, Plantago maritima, Triglochin maritima, Limonium humile.*	Maintain low-level marsh communities subject to natural change.	
	Creek sides: *Halimione portulacoides* constant along creek sides in marshes to the south.	Maintain creek-side marsh communities subject to natural change.	

SAC Feature: Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) - *continued*

ATTRIBUTE	MEASURE	TARGET	COMMENT
Vegetation composition (cont'd).	Middle marsh: At least four of the species below recorded as frequent and at least a further two as occasional: *Festuca rubra, Juncus gerardii, Glaux maritima, Aster tripolium, Plantago maritima, Triglochin maritima, Limonium humile, Agrostis stolonifera, Trifolium repens, Leontodon autumnalis, Carex flacca.*	Maintain middle marsh communities subject to natural change.	
	Upper marsh: At least four of the species below recorded as frequent and at least a further two as occasional: *Juncus maritimus, Agrostis stolonifera, Festuca rubra, Glaux maritima, Juncus gerardii, Triglochin maritima, Plantago maritima, Armeria maritima, Aster tripolium, Elymus repens, Atriplex prostrata, Potentilla anserina, Phragmites australis, Blysmus rufus, Eleocharis uniglumis* (Killard only).	Maintain upper marsh communities and transitions to freshwater/flush, grassland and heath communities subject to natural change. Negative indicators such as *Spartina*, no more than rare through the sward and scrub encroachment no more than occasional in transitional communities.	
	Record negative indicators of vegetation composition at a series of representastive sample points within the community.		
Vegetation Structure.	Sward height.	Maintain short sward (4 - 12 cm) in existing areas of short sward and species-rich vegetation.	Measure during summer (July/August). Baseline survey required. Maintenance of short-sward is desirable: a. to ensure existing species-rich areas do not become rank due to lack of grazing, and/or b. to maintain sward at an appropriate height for birds, particularly grazing wildfowl.
	Vegetation height and disturbance indicators recorded at a series of representative sample points within the community.	Bare areas should not exceed 10% of the extent of the habitat, subject to natural change.	Salt marsh can be severely affected by persistent heavy trampling, resulting in bare areas.

SAC Feature: *Salicornia* and other annuals colonising mud and sand

ATTRIBUTE	MEASURE	TARGET	COMMENT
Extent of the feature.	Area - measured at least once per reporting cycle during the summer months of July or August.	Subject to natural processes, maintain the overall extent of the vegetation.	Baseline to be established. Subject to periodic and seasonal variation- may need to be assessed over a period of time. These communities are important precursors to more stable vegetation of low to mid marsh. Communities may be dynamic in their distribution and are linked with the physical processes operating on the site - e.g., topography, creek patterns, sea-level rise etc.
Mobility of substrate.	System dynamics. Substrate characteristics.	No increase in the area constrained by introduced structures or landforms.	Colonisation of mud and sand by saltmarsh plants will only occur if adequate sediment is accreting - this is influenced by extent of fronting mudflat which can dissipate wave energy and affect availability of suspended sediment. Introduced structures could interfere with these processes.
Vegetation composition.	Presence of positive indicators: *Salicornia* agg., *Suaeda maritima, Zostera* spp., *Ruppia* spp., *Puccinellia maritima, Aster tripolium, Spergularia media, Limonium humile, Cochlearia officinalis.*	Maintain extent and species composition of low-level marsh communities with *Salicornia* and *Suaeda,* subject to natural change. At least two of the characteristic species frequent and two occasional.	Record positive and negative indicators of vegetation composition (i.e. species and frequencies) at a series of representative sample points within the community.
	Presence of negative indicators eg *Spartina*	*Spartina* recorded as absent or rare in *Salicornia* communities.	*Spartina* often invades these lower marsh communities and its spread needs to be controlled.

SAC Feature: *Salicornia* and other annuals colonising mud and sand - *continued*

ATTRIBUTE	MEASURE	TARGET	COMMENT
Vegetation structure.	Area and thickness of algal mat, measured during summer periodically (frequency to be determined).	Area and thickness of algal mats should not deviate significantly from an established baseline, subject to natural change.	Baseline survey required. Algal mats are often associated with the pioneer saltmarsh communities, and are important primary producers. However, they can be affected by changes to water quality - nutrient enrichment / eutrophication may lead to expansion and smothering of vegetation. On the other hand, pollution can cause a decline, leading to destabilisation of sediment surfaces and can initiate erosion. An increase in algal cover can also indicate a decline in grazing invertebrates.
	Extent of bare areas or erosion as a result of disturbance.	Bare areas resulting from disturbance should account for less than 10% of the extent of the habitat, subject to natural change. No human activities leading to erosion.	*Salicornia* communities on mud and sand can be severely affected by persistent heavy trampling.

SAC Feature: Common Seal (*Phoca vitulina*)

ATTRIBUTE	MEASURE	TARGET	COMMENT
Number of adults.	Number of adult Common Seals using the site, counted in July/August each year.	The number of adults counted to be at least 200 individuals, subject to natural change.	It is not certain that the Lough has a discrete population. Techniques to identify individuals and their site fidelity will be considered. Strangford Lough data will be considered in the context of both long-term trends and existing seal numbers in Co. Down, all Ireland, UK and North East Atlantic. The general decline in numbers since the 1980s has led to a strong body of opinion that counts of less than 200 adults should be a cause for concern.
Number of pups.	Number of Common Seal pups counted in July/August each year.	Number of pups to remain at levels thought to be required to maintain the overall population at appropriate levels, subject to natural change.	
Mother and pup resident time.	Length of time between the birth of a pup and when the mother and pup leave the breeding site.	Resident time to be at least three weeks.	The natural time of weaning is 3-4 weeks of age. Mother and pups leaving the breeding area earlier than this may be related to several factors including food supply i.e. the lack of food near the breeding site may result in the mother taking her pup with her on foraging trips. Conversely, a good food supply may mean that they do not need the full 3-4 weeks to wean the pups.
Habitat availability.	Availability of areas used for moulting, haul-out and breeding.	Maintain the number of suitable sites for moulting, haul-out and breeding.	Categorisation of sites to be determined.

SAC Feature: Perennial Vegetation of Stony Banks

ATTRIBUTE	MEASURE	TARGET	COMMENT
Extent of the feature.	Area of habitat at least once during the reporting cycle.	Subject to natural processes, maintain the overall extent of the vegetation.	Baseline survey required. Although the habitat in Strangford Lough (and at Ballyquintin Point in particular) is comparatively stable, there may be some natural variation as a result of dynamic coastal processes. Area of vegetation is subject to change as a result of trampling, fires, off-road vehicles etc.
Substrate mobility.	System dynamics. Substrate characteristics at least once during the reporting cycle. Area of vegetation and area of bare habitat, annually.	No increase in the area constrained by introduced structures or landforms.	
Vegetation structure.	Sward height (within grassland areas) seasonally.	Sward height should be between 5-15 cm over at least 75% of the sample plots within grassland habitats	Grassland makes up an important component of the system, especially at Ballyquintin Point; much of it is species-rich and requires sufficient (but not excessive) grazing to maintain it.
Vegetation composition.	Area of litter (ie dense thatch-like material) in a more or less continuous layer, distributed either in patches or larger areas within grassland areas, annually.	Average litter cover should not exceed 10%, subject to natural change.	Excessive build-up of litter indicates inadequate grazing levels.
	Presence of full range of vegetation communities at least once during the reporting cycle.	The current range of communities and their approximate distribution should be maintained, subject to natural changes. In particular, there should be no loss in extent of the more species-rich communities.	Ballyquintin Point in particular is a mosaic of different habitats and vegetation types. It is important that this mosaic is maintained. Some scrub control may be required in some areas.

3.2 CONSERVATION OBJECTIVES FOR SPA FEATURES

The conservation objectives for the SPA features focus on maintaining the populations of qualifying species at internationally and nationally important numbers. Achieving these objectives requires that action is taken to avoid significant disturbance and that the condition of habitats used by the qualifying species is maintained.

SPA features 1-3:
The nationally and internationally important populations of regularly occurring species listed on Annex 1 of the Birds Directive, i.e. internationally important populations of breeding Sandwich Tern and breeding Common Tern and nationally important populations of breeding Arctic Tern.

Conservation Objectives 1-3
To maintain in favourable condition the nationally and internationally important populations of breeding Sandwich Tern, breeding Common Tern and breeding Arctic Tern, allowing for natural change.

Favourable condition of each of the populations will be informed by the condition of the following attributes:

- population size
- habitat availability

SPA Features 4-7:
The nationally and internationally important populations of regularly occurring wintering and migratory species i.e Light-bellied Brent Goose, Knot, Redshank and the wintering waterfowl assemblage.

Conservation Objectives 4-7:
To maintain in favourable condition the nationally and internationally important populations of Light-bellied Brent Goose, Knot, Redshank and the wintering waterfowl assemblage, while allowing for natural change.

Favourable condition of each of the populations will be informed by the condition of a selection of the following attributes:

- population size
- number of species in the overwintering population
- age structure (Brent Geese only)
- habitat availability
- habitat quality (usually linked to abundance and quality of food resource)

In addition to the attributes listed on the following pages, the condition of features 1-3 (populations of breeding terns) may also be dependent on the high numbers of small fish prey available in Strangford Lough and the surrounding coastal area. It may not be feasible to monitor these fish on a regular basis, however, it is an issue that may need to be examined if the lower limits of the listed attributes are reached

3.2.1 FAVOURABLE CONDITION TABLES FOR THE SPA FEATURES

SPA Features 1-3: Breeding Terns

FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
Breeding Sandwich Tern. **Breeding Common Tern.** **Breeding Arctic Tern.**	Population size.	The number of birds in the breeding population.	No significant reduction from that at designation, subject to natural change.	Numbers of nests may also be counted as an additional measure.
	Habitat availability.	Number and extent of areas suitable for nesting.	Presence of adequate nesting areas to sustain existing population numbers.	The breeding populations do not always use the same areas/islands within the Lough. Therefore, it is important that an appropriate number of suitable nesting areas/islands are available to allow for the degree of site infidelity shown by the birds.

SPA Feature 4: Wintering Light-bellied Brent Goose

FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
Wintering Light bellied Brent Goose.	Population size.	The number of birds in the population.	No significant reduction from that at designation, subject to natural change.	It is considered that any change from the five year running mean* should be examined in a Strangford Lough, UK, all-Ireland and International population context. It will need to account for normal year to year variation so that a big natural change in one year will not unduly influence our assessment of the population mean.
	Age structure.	Proportion of young and one year old birds.	No significant deviation from established age structure.	Breeding success is primarily dependant on conditions in the Arctic but may be enhanced when birds leave the wintering grounds in good condition.
	Food availability ie seagrass bed communities.	Extent, distribution and quality of seagrass (esp *Zostera* spp.) beds and green algae.	No significant deterioration in the attributes for *Zostera* beds, subject to natural change.	

*Wintering birds are generally counted once each month from September one year through to March the following year. The five year running mean is the mean of the peak counts from each of the previous five winters and is a recognised method of presenting bird count data.

SPA Features 5 & 6: Wintering Knot and Redshank

FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
Wintering Knot. **Wintering Redshank.**	Population size.	The number of birds in the population.	No significant reductions from that at designation, subject to natural change.	It is considered that any change from the five year running mean should be examined in a Strangford Lough, UK, all-Ireland and International population context. It will need to account for normal year to year variation so that a big natural change in one year will not unduly influence our assessment of the population mean.
	Extent of intertidal habitat.	Area of intertidal communities.	No decrease in extent from an established baseline, subject to natural changes.	
	Food availability.	Abundance of prey species.	Presence and abundance of prey species do not deviate from an established baseline, subject to natural change.	Baseline survey required.

SPA Feature 7: Wintering Waterfowl Assemblage

FEATURE	ATTRIBUTE	MEASURE	TARGET	COMMENT
Wintering Waterfowl Assemblage.	Population size.	The number of birds in the population.	No significant reductions from that at designation, subject to natural change.	It is considered that any change from the five year running mean should be examined in a Strangford Lough, UK, all-Ireland and International population context. It will need to account for normal year to year variation so that a big natural change in one year will not unduly influence our assessment of the population mean.
	Species composition of the assemblage.	Composition of over-wintering population.	Maintain existing assemblage.	A key aspect of the wintering bird assemblage on Strangford Lough is that it contains some 25 species representing great biological diversity.
	Population size of individual species which make up the assemblage.	Size of individual bird species populations.	No significant reductions in numbers from an established baseline, subject to natural change.	
	Extent of intertidal habitat.	Area of intertidal sediment communities.	No decrease in extent from an established baseline, subject to natural change.	
	Food availability.	Abundance of prey species.	Presence and abundance of prey species do not deviate from an established baseline, subject to natural change.	Baseline survey required.

3.3 DISTRIBUTION, EXTENT AND CONDITION OF FEATURES AND THE RELATED MONITORING PROGRAMME

The amount of information available on each of the features and sub-features varies. Some habitats and species already have associated monitoring programmes in place, for example bird counts are undertaken routinely as part of the WeBS (Wetland Bird Survey) counts. These counts may need to be adapted to inform the management scheme. Other habitats and species may have been the subject of intermittent research but do not have associated regular monitoring in place, for example *Zostera* beds. Such monitoring will need to be developed under the management scheme. This section outlines the main points in the current monitoring programme (2000 - 2003).

Responsibility for monitoring the conservation features of the SAC and SPA lies primarily with Environment and Heritage Service, though the implementation of the monitoring programme will require co-operation and input from a number of bodies, in particular the Department of Agriculture and Rural Development (DARD) and the National Trust. The more detailed monitoring programme to include monitoring protocols, methodologies, scheduling of survey work, quality assurance etc. is already well advanced. A monitoring group led by JNCC is currently looking at the standardisation of methods and quality control and it will be important for monitoring within Strangford Lough to meet these standards.

The monitoring programme has been developed in the context of our existing knowledge of the conservation features. Some actions will be prioritised to further inform and refine other monitoring activities. It will be structured to ensure that all attributes are measured at least once in a six year cycle in line with the requirements of the Habitats Directive and with JNCC's recommendations for Common Standards Monitoring. The following paragraphs summarise the main points of the monitoring programme.

Specifically, the monitoring programme will:

- Provide information on the condition of the SAC/SPA features through measurement and recording of their key attributes.
- Trigger action, should unacceptable declines in any feature be recorded.
- Provide information which can be used for general management purposes including the assessment of the effects of human activities over time, consideration of the potential for development, and communication with the wider public.

Identification of Biotopes

The measurement of some attributes will require the identification of the main biotopes associated with particular features in the Lough. This work is a pre-requisite of the monitoring programme.

- Many relevant biotopes will be identified from the pilot survey undertaken by Queens University in 1999.
- Biotopes associated with selected subtidal communities will be identified from the DARD surveys undertaken in 2000 and from earlier work.

Broadscale Surveys

"Broadscale" surveys will be undertaken as a matter of priority to:

- Provide an up to date overview of the location, extent and distribution of the biotopes associated with specific communities.
- Reflect overall changes to the system over time.
- Aid the selection of sites for measuring attributes relating mainly to the quality of the communities, such as species composition, as indicated in the favourable condition tables.
- Produce maps indicating the location and approximate boundaries of communities, for a range of management applications.

The fisheries monitoring work undertaken by DARD will contribute significantly to the above. For shallow water subtidal communities up to the edge of the littoral zone, aerial or boat-based survey techniques will be considered. For intertidal communities the pilot study conducted by Queens University will contribute data and improved methodology to the above.

Detailed Assessment of Communities

The measurement of most attributes (other than extent) in the Favourable Condition Tables will require more detailed monitoring than a broadscale survey can deliver. The frequency of this monitoring will vary depending on the kind of community being considered and management requirements. All attributes will be measured at least once in the six year reporting cycle.

Data Analysis

The timely and adequate analysis of data is essential to its value for the purposes of management. This requirement and the need to have standardised formats for presenting summary data will be incorporated into monitoring briefs and related research by EHS.

A pilot integrated GIS system is being developed through the Strangford Lough Office. In addition, the National Trust is developing a computerised system for the analysis of bird data. The results of monitoring will be cross-referenced wherever this would be useful. For example, information on intertidal communities will be related to the monitoring of overwintering bird populations.

3.3.1 MONITORING SAC FEATURES AND SUB-FEATURES

This Section outlines the basis on which a programme for the monitoring of features will be built. It considers existing information on the distribution, extent and condition of the features and recommends action to be taken through the management scheme under the following headings:

- **EXTENT / QUALITY:** What is the extent/quality of the feature and on what is this information based?
- **MONITORING:** What is the monitoring regime for the feature? How has the data been collected? Where is the data held?
- **ACTION REQUIRED**: What action is required
  (a) to update the above information?
  (b) to monitor the feature?

Subtidal Sub-features

Although the following communities contribute to our understanding of more than one feature, they are grouped here because information on their distribution, extent and condition will be collected using broadly similar methods.

- rock and boulder communities (Feature: Reefs)
- rocky reef communities (Feature: Reefs)
- gravel and sand communities (Feature: Large Shallow Inlet and Bay)
- fine sand and mud communities (Feature: Large Shallow Inlet and Bay)

Extent / Quality
Detailed and sufficiently accurate maps of the extent, distribution and quality of the sub-tidal communities within the Lough do not currently exist.

The most detailed information on the seabed of the Lough comes from the Northern Ireland Sub-littoral Survey conducted in the mid-1980s by the Ulster Museum. It includes some 300 dive site records, with data on species abundance and seabed type. From this dive site data and other related information, a broadscale sublittoral habitat map was prepared by the National Trust and digitised on GIS through the Strangford Lough Office.

The habitats identified in the 1980s survey may not necessarily correlate directly with communities and related biotopes identified under the management scheme.

Monitoring
Broadscale seabed mapping undertaken in 1999/2000 includes the use of sidescan sonar, the acoustic ground discrimination system RoxAnn and ground truthing by towed sledge video camera and still photography. This information, along with previous work in 1990 and 1993, will be used to prepare a map of the extent and distribution of the above sub-features. It must be noted, however, that the work in 1990 and 1993 was carried out as research into the possible impacts of mobile gear fishing on the seabed of the Lough and not as a seabed habitat survey.

Action Required
- Assign data from the NI Sub-littoral Survey to the Marine Nature Conservation Review (MNCR) biotope classification.
- Complete the broadscale survey of the sea bed, and plan to repeat this survey at appropriate intervals.
- Consider appropriate survey techniques for shallow water subtidal communities up to the edge of the littoral zone and conduct surveys as appropriate.
- Identify and locate sites for more detailed monitoring that are most likely to reflect any changes taking place in species composition, distribution and extent.

Horse mussel (*Modiolus modiolus*) beds (Feature: Reefs)

Extent / Quality
The 1985 Sub-Littoral Survey identified two main *Modiolus* communities in Strangford Lough:

(a) *Modiolus* in association with *Chlamys*, and
(b) *Modiolus* with *Ophiothrix*.

Surveys conducted in 1990 and 1993 by the then Aquatic Science Division of the Department of Agriculture provide some assessment of the quality of *Modiolus* beds inside the fishing zone.

Monitoring
There is no routine monitoring of the extent of the *Modiolus* communities. However, baseline information can be compiled using previous and current surveys.

One site in Strangford Lough (Green Island) is included in the National Marine Monitoring Programme as a representative SAC sample. Information gathered on water quality, fauna and sediment from this site will be used for long term reference.

Action Required
- Confirm that the work undertaken by DARD will provide sufficient information to measure all the attributes set for this sub-feature and from which targets can be derived. (Grab sample infaunal monitoring started in 1993 and developed in 1997/98 could be used and possibly extended to more sampling sites, to give further indication of the quality of the *Modiolus* communities in defined areas).

Intertidal Sub-features

Although the following communities contribute to our understanding of more than one feature, they are grouped here because information on their distribution, extent and condition will be collected using broadly similar methods.

- rock and boulder communities (Feature: Reefs)
- sand and gravel communities (Feature: Mudflats and sandflats)
- fine sand and mud communities (Feature: Mudflats and sandflats)
- tide-swept communities (Feature: Coastal lagoons)

Extent / Quality
Information on the distribution of the Lough's intertidal communities is available from the 1985 Littoral Survey and the work undertaken by DARD during 1999/2000.

Monitoring
An intertidal biotope mapping project has been commissioned by EHS and undertaken by Queens University (QUB).

Detailed monitoring of the mudflats at the north end of the Lough is being carried out as part of the work on the sea defences between Newtownards and Comber. This may establish baseline data for a range of physical and ecological parameters.

Action Required

- Identify the key biotopes to be selected.
- Commission an appropriate broadscale survey for the intertidal area, and plan to repeat this survey at appropriate intervals.
- Identify and locate sites for more detailed monitoring that are most likely to reflect any changes taking place in species composition, distribution and extent.

Eelgrass (*Zostera* spp.) beds (Feature: Mudflats and sandflats)

Extent / Quality
The most comprehensive and up to date map of the extent of intertidal *Zostera (Z. angustifolia and Z. noltii*) in Strangford Lough is incorporated in *Strangford Lough, overwintering birds, and variation in eelgrass (Zostera spp.) production and distribution,* A. Portig, 1997 (QUB). The 1985 Littoral and Sublittoral surveys also show the location of *Zostera* spp., including the subtidal *Z. marina*. More recently, a detailed survey of the northern mudflats has included a survey of the distribution, density and biomass of the *Zostera* beds in the area.

Eelgrass beds declined drastically during the epidemic of *Zostera* wasting disease in the late 1920s and early 1930s. *Z. marina* was particularly badly affected and has not recovered significantly.

Z. noltii and *Z. angustifolia* grew extremely abundantly over the intertidal flats south of Newtownards during the 1970s. The density here seems to have declined somewhat during the 1980s over the same time period for which fine sediment loss is reported. There has been a commensurate increase in intertidal *Zostera* in the Mount Stewart area and in Ardmillan Bay.

The recent density of *Zostera noltii* is considered low in comparison to other sites. This is most likely due to a reduction in light penetration of the water column. Other factors such as sediment stability, grazing wildfowl, blanketing by algae / vegetation and bioturbation may also be affecting this species.

Monitoring
Although there is no organised monitoring programme for the whole of the Lough, monitoring of the impact of the new sea defences on the northern sandflats includes detailed work on the *Zostera* beds in the area. Information has also been gathered from ad hoc surveys by QUB. In addition, the National Trust note significant changes in *Zostera* communities on land owned by the Trust.

Action Required

- Set distribution targets for *Zostera* species.
- Ensure *Zostera* spp. are included in broadscale intertidal and shallow water surveys.
- Identify monitoring sites for more detailed study of attributes.
- Cross-reference work on *Zostera* against monitoring of the Light-bellied Brent goose, for which *Zostera* is a major food source, and against sediment monitoring.
- Conservation objectives and related actions for *Zostera* will be aligned with the UK Biodiversity Action Plan for Seagrass Beds.

Saltmarsh (Feature: Atlantic salt meadows)

Extent / Quality
The most comprehensive information on the extent and distribution of saltmarsh around Strangford Lough is found in *Strangford Lough Management Plan Map Set II : Marginal Vegetation Survey,* Henry Shaw and John Brooke, 1984/85, QUB.

However, a detailed species analysis and vegetation community mapping of the saltmarshes at the northern end of Strangford Lough as well at the two nature reserves at the mouth of the Lough - Killard and Ballyquintin were completed as part of a Northern Ireland Coastal Survey carried out in the early 1990s. This work used the National Vegetation Classification methodology and concentrated on designated sites i.e. NNRs and ASSIs.

It is believed that some areas of saltmarsh within the Lough are declining due to dumping, erosion and invasion of *Spartina*. Saltmarsh, particularly that south of the Ards Airfield and stretches in the Comber Estuary, is eroding along a low cliff face. The rate of decline is unknown. By contrast there is accretion and development of saltmarsh both in other parts of the Comber Estuary and at Bishops Mill near Ardkeen. These areas include important examples of the habitat and some that are used as high tide roosts by waders. Saltmarsh could be threatened by additional sea defences and by projected sea level rises.

Monitoring
There is no current monitoring of this feature.

Action required
- Devise a monitoring programme for the attributes listed for this feature.
- Gather information on the nature of the effect of development on saltmarsh areas.

Salicornia and other annuals colonising mud and sand (Feature)

Extent / Quality
In Northern Ireland, stands dominated by annual *Salicornia* spp., bearing few other associates, are extremely rare, being largely confined to parts of Strangford Lough. More commonly, *Salicornia* is found in association with other annuals.

During the Northern Ireland Coastal Survey, this habitat was recorded at the north end of the Lough both near the airport and at the Comber Estuary. It was also recorded at Horse Island, Ballyquintin and the Dorn.

Monitoring
There is no current monitoring of this feature.

Action Required
- Devise a monitoring programme for the attributes listed for this feature.
- Gather information on the nature of the effect of development on this community.

Annual vegetation of drift lines (Feature)

Extent / quality
Strandline vegetation is an open community and a pioneering one, being in a state of perpetual flux. It tends to be characteristic of the relatively sheltered shingle beaches around Northern Ireland.

The Northern Ireland Coastal Survey recorded this community at the northern end of Strangford Lough, at Horse Island, where it was particularly species rich, at Ballyquintin and Killard.

Monitoring
There is no current monitoring of this feature.
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Action Required
- Devise a monitoring programme for the attributes listed for this feature.
- Gather information on the nature of the effect of development on this community.

Common Seal *Phoca vitulina* (Feature)

Extent / quality
There has been much variation in the abundance of common seals in Strangford Lough since the mid-1970s. The number of adults rose in the late 1970s and early 1980s and peaked in 1987. The peak in 1987 was followed by the outbreak of the morbillivirus epidemic. Some 114 common seals were killed by the virus. Since then the decline has continued with numbers now below those recorded in the mid-1970s.

It is considered that the morbillivirus alone cannot be responsible for the continued decline in the Strangford Lough seal population as numbers have generally recovered in other areas, in some cases to numbers higher than pre-virus levels.

Monitoring
An on-going seal survey, co-ordinated by Environment and Heritage Service and the National Trust, undertakes detailed monitoring of the population on a monthly basis throughout the year.

Action Required
- Continue the on-going seal survey of Strangford Lough and the County Down coast.
- Examine other factors which could be affecting the population eg disturbance, food supply.
- Consider further recommendations as set out by SLMC for common seal research and management.

Perennial vegetation of stony banks (Feature)

Extent / quality
This community occurs on Strangford Lough at two discrete and rather different locations. Gransha Point is still an active shingle bank and ensuring that active processes are maintained is one of the fundamental aims here. In contrast, Ballyquintin Point is no longer an active system so coastal processes are not particularly relevant, except for occasional storm events which may cause erosion.

Monitoring
There is no current monitoring of this feature apart from that which is carried out as part of the management of the nature reserve at Ballyquintin Point. Grazing intensity is a particular issue of concern here as scrub encroachment has led to the loss of some species-rich grassland.

Action Required
- devise a monitoring programme for the attributes listed for this feature
- monitor the encroachment by scrub vegetation on this feature

3.3.2 MONITORING SPA FEATURES

The determination of favourable condition targets is particularly difficult for migratory bird species. It may be necessary to compare trends in bird populations in Strangford Lough with those at other sites. It will be important, therefore, to ensure that bird monitoring in Strangford Lough is compatible with the rest of the UK and elsewhere. Monitoring will also need to take account of normal year to year variation in population numbers.

Because the collection and analysis of data for different bird species is closely interrelated, information on the extent, current monitoring and future action for these features is considered together.

Extent

The current numbers and distribution of key species in Strangford Lough are reasonably well known. Trends have been established for a range of wintering birds including internationally important species: Knot, Light-bellied Brent Goose and Redshank. Trends have also been established for the nationally important species which help make up the wintering waterfowl population. The analysis of bird data by the National Trust has helped provide information on these trends. There has been some analysis of spatial distribution of species and temporal usage around the Lough.

Monitoring

Most bird monitoring on Strangford Lough is conducted by the National Trust, in partnership with the Wildfowl and Wetlands Trust and with support from Environment and Heritage Service staff, on behalf of the British Trust for Ornithology, the Royal Society for the Protection of Birds, and the Joint Nature Conservation Committee. EHS indirectly part funds the work through its support of the Strangford Lough Wildlife Scheme.

The following is a list of current bird surveys for Strangford Lough:

- The National Trust Winter Bird Census - Wetland Bird Survey (WeBS Core Count / Mid-High Tide Count)
  This annual count provides the main information on bird numbers.
- National Trust Winter Bird Census - Wetland Bird Survey (WeBS Core Count / Low Tide Count)
  The census provides useful information on distribution during feeding and roosting.
- National Trust Breeding Sea Bird Survey
  This annual survey includes information on Tern species.
- High Water Roost Surveys.
- Light-bellied Brent Goose Survey - An annual survey of population size and proportion of juveniles.
- Shelduck Survey
  This additional work is carried out to clarify numbers of Shelduck as reported in the WeBS Core Count.
- Wildfowling Surveys
  These surveys analyse 'bag data' and record wildfowling activity.

Action Required

- Assess and where appropriate revise current bird surveys in order to meet the need to measure attributes of the SPA selection features.
- Link monitoring of Light-bellied Brent Geese with that of *Zostera*.
- Devise surveys to provide baseline information on quantities of those infaunal species, which are the main food supply for many relevant bird species.

3.3.3 WATER QUALITY AND SEDIMENT MONITORING PROGRAMMES

Monitoring

Good water quality is essential to maintaining the SAC/SPA conservation features in favourable condition. Water quality in the Lough is already monitored under the following programmes, some of which are interlinked:

- National Marine Monitoring Programme (NMMP) - this is a UK wide programme by the Marine Pollution Monitoring Management Group.
- Estuarine and Coastal Waters Monitoring Programme (ECWMP) - waters and sediment sampling and analysis undertaken by the Industrial Research and Technology Unit (IRTU) on behalf of EHS.
- Shellfish Waters Hygiene Monitoring Programmes - surveillance monitoring of shellfish, to meet EC directives, has been undertaken by the Food Science Division (FSD), DARD on behalf of EHS.
- River Quality Monitoring Programme - Condition, trends and classification by monthly or fortnightly monitoring from over 300 stations throughout Northern Ireland.
- Sewage Treatment Works (Discharge) Monitoring.

Action Required:

- Review water quality monitoring in the light of the SAC/SPA monitoring needs.
- Consider issues relating to monitoring plankton biodiversity and abundance.
- Assess the scope for developing the research on sediments carried out by the universities to monitor the movement of sediments in key areas of the Lough and to correlate fauna in sediments with bird feeding patterns.



4 Factors, Operations and Processes that may affect the Conservation Features

The SAC / SPA conservation features will be subject to a range of factors affecting them. Some of these may be natural in origin (termed "processes"), while others will be influenced by human activities ("operations"). The aim of this Section is to alert competent and relevant authorities to the activities which pose the greatest potential threat to the favourable condition of the conservation features. In so doing it meets the requirement of Regulation 28(2)(b) of the Habitats Regulations.

4.1 FACTORS - SUMMARY TABLES

The following tables identify operations that are likely to affect the conservation features of the SAC/SPA. Further work is required in some cases to assess the level of these effects and how human activities might be monitored, and if necessary regulated, in order to meet the requirements of the associated conservation objectives. This is an important aspect of the management scheme as it will assist competent authorities and others in assessing the impact of activities for which they have responsibilities.

The identification of an operation in this document means that it could possibly be the focus of measures under the management scheme. It does not normally mean that it should not take place. Measures might include setting parameters for the operation and/or undertaking monitoring.

Factors are grouped according to their potential effects, as follows:

- Changes to physical regime: tidal flows, waves, temperature, turbidity, sediments.
- Changes to water quality.
- Changes to contaminant levels in sediments.
- Direct physical disturbance or damage
- Collecting or removal of specimens.
- Noise and visual disturbance.
- Spread of alien species.
- Spread of disease and genetic pollution.
- Changes in trophic structure.

Factor Type: Changes to Physical Regime

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Substrate change Sediment distribution patterns are changing at the northern end of the Lough and possibly elsewhere. Where *Modiolus* beds are damaged the shell substrate becomes mud.	**Sea defences and coastal engineering.** **Commercial fishing** on the seabed. **Mechanical shellfish harvesting** or other activities disturbing the sediment may increase instability in the sediment. **Alien species:** *Spartina* spraying could lead to the release of fine sediments in some areas. *Sargassum* may reduce localised water movement and therefore might increase siltation. **Sand, gravel, mineral extraction and dredging** Sand and gravel are customarily extracted from some areas on the shore (eg Benderg Bay). **Accretion / erosion through natural processes.**	Anything that alters the physical structure of the Lough will cause changes in the velocity and nature of water flow, or in wave action. These changes will, in turn, affect the sediment dynamics so influencing the biota. The sea defences at the north end of the Lough may have affected the adjacent mudflats. Trawling over *Modiolus* communities damages the shell substrate on which the community is based. Once this community is lost it may not recover but would be likely to be replaced by a mud-based community. Changes in substrate would affect the balance of sedimentary communities, shifting the boundaries and relative extent of intertidal and sub-tidal sand and mud communities. Energy reflection from man made structures may contribute to erosion. Erosion may lead to loss of habitat (specially sand based habitat) and reduce marginal vegetation such as saltmarsh. Fine sand forms the least stable marine habitat and is the most vulnerable. Localised building, extraction, dredging can cause widespread erosion effects. Erosion may in turn lead to 'coastal squeeze' as habitats are confined by hard development on one side while being eroded by the sea on the other. *Zostera* beds and saltmarsh are among the features most likely to be affected by shoreline substrate changes. An increase in silt load might, through increased sedimentation, cause a decline in many communities.
Changes in depth and shore profile.	**Coastal engineering**: energy dissipated at the point of contact with a hard structure may result in immersion of species at the shore edge elsewhere due to increased wave action. **Dredging** **Erosion** **Global warming / changing weather patterns**	Any major changes to water level would have a serious impact on intertidal communities and may affect sub-tidal communities. Marginal vegetation such as saltmarsh may also be affected either through drying out or full submersion. Depth affects light availability and water flow. Global warming / changing weather patterns may result in sea level rise and more frequent immersion of supralittoral communities.
Salinity.	**Changes in freshwater flowing into the Lough** could be caused by changes in watercourses, overuse of water, drought.	This would mainly affect the northern end of the Lough, the Quoile basin and mouth of the Quoile. Exact effects unknown.

Factor Type: Changes to Physical Regime - *continued*

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Changes in water temperature.	Temperature changes are most likely to be associated with sea level rise through **global warming and changing weather patterns.** (Industry and energy generation stations can result in increases in water temperature but are unlikely to be proposed for Strangford Lough).	Temperature changes may encourage more rapid growth and development of certain species, shifting the balance in communities especially where there is potential for introduced species to thrive. Some species may be temperature sensitive and may not thrive. New species may enter the Lough following warmer water currents.
Turbidity.	**Sewage outfalls.** **Storm water.** **Storms.**	Water clarity is a key factor in maintaining the extent and diversity of plant and algal communities. Clarity is reduced through increases in the suspension of organic or inorganic material in the water column.
Hydrological regime - change to tidal conditions, wave action and currents.	**Coastal engineering** and major constructions such as tidal barrages building of jetties, causeways to islands or coastal protection works. **Natural processes** may also bring about change.	The physical configuration of Strangford Lough interacting with tidal currents, combined with water circulation in the Irish Sea, largely dictates water movement. The planktonic, seabed and shore communities are, to a great extent, determined by the hydrodynamic regime through its influence on the distribution of sediments and the transport of planktonic larvae. Anything which alters the Lough's physical structure will cause changes in the velocity and nature of water flow or in wave action. These changes will, in turn, affect the sediment dynamics so influencing the biota.

Factor Type: Changes to Water Quality

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Nutrient status.	**Sewage outfalls** Occurring at various locations. **Agricultural run-off** (including slurry and fertiliser applications).	Nutrient enrichment (mainly phosphate and nitrate) stimulates the excessive growth of microscopic plants in the water column. Nutrient enrichment can contribute to a reduction in water quality and lead to eutrophication which would affect key biotopes and /or bird features. Increased growth of macroalgae could affect shore communities through the displacement of less robust algal species, reducing favoured food species, displacing faunal species etc. Reduction in light penetration could affect subtidal macroalgae and *Zostera* growth.
Toxic Pollutants.	**Herbicide / Pesticide run-off**. This is most likely to derive from agriculture. Use of chemicals for environmental management eg spraying of *Spartina* is only undertaken with appropriate consent under the Water Act. **Storm water/urban run-off.** **Boating** - Anti-fouling paint from boats (banning the use of TBTs has reduced damage to negligible levels at present) and chemicals used to clean slipways. **Toxic pollutant input from industry.** **Landfill** - leaching of chemicals into the water.	Chemicals may be toxic to marine life and may persist in the food chain.
Organic pollution.	**Sewage.** **Farm slurry / silage.**	These can produce locally anoxic conditions and consequent death of animals in the sediment.
Lead shot.	**Wildfowling.**	Lead in the water may be ingested by waterfowl.
Oil and other chemical spill.	There is potential for any **spillage** in the Irish Sea to enter the Lough system. Spillage might also arise from an incident onshore or from a boating accident within the Lough.	There would be a likely impact on the features as a result of direct physical damage or changes to water chemistry. Impact depends on scale of spill, location, type of oil and subsequent treatment.

Factor Type: Changes to Contaminant Levels in Sediments

Contamination of sediments is not perceived as a significant issue in Strangford Lough at present, though there may be localised problems. However, if levels were to increase such contamination would affect the features and it is therefore included.

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Oil / other chemical pollution.	As for "Water Quality."	Likely impact on the features as a result of changes to contaminant levels in sediments. Scale of impact depends on scale of spill, location, type of oil etc and subsequent treatment.
Industrial waste.	**Tipping.** **Tannery.** **Mining.**	Tipping may result in toxins leaching into sediments. Residual chromium and lead are found in areas formerly used for tanning and mining.
Organic pollution.	**Sewage.** **Fin-fish aquaculture.**	Increased decomposition on the seabed could produce anoxic conditions and consequent habitat loss. There is no fin fish aquaculture in the Lough at present though there could be interest in the future.
Lead Shot.	**Wildfowling.**	Lead could settle in sediments and be ingested by bird species. Slowly dissolving, it can be incorporated into the food chain.
Physical disturbance uncovering anoxic layer.	**Bait collection.** **Shellfish collection - mechanical harvesters.** **Ploughing the shore.** **Dredging harbours.** **Pipe-laying.**	Heavy metals which may have accumulated in the sediments may be released. The infauna can be affected when anoxic sediments are mixed with oxygenated surface layers.

Factor Type: Direct Physical Disturbance or Damage

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Disturbance of the sea-bed.	**Harbour dredging** associated with development and maintenance of harbours and marinas. **Dredging** King Scallops are dredged in the Lough. **Trawling** Queen Scallops and Dublin Bay Prawns are trawled in the Lough. **Moorings and anchoring** - recreational craft, passenger ferries, navy, trawlers. **Aquaculture/ranching**.	Dredging of any kind damages the seabed. Various fishing/harvesting practices may adversely affect key biotopes. Fishing is known to have impacted on the Horse Mussel beds and believed to have affected former King Scallop beds. DARD has introduced regulations restricting dredging to the southern part of the Lough and trawling to the north central part. Moorings / anchorings and some aquaculture structures can cause damage to habitats and seabed though at current levels this is not a significant problem.
Disturbance of / damage to the shore and marginal vegetation.	**Pipe-laying.** **Tipping.** **Grazing and trampling by livestock.** **Shellfish collection.** **Bait collection.** **Education / research fieldwork** Overturning stones, collecting species etc. **Ploughing the shore.** **Construction and maintenance of sea defences.** **Pipe-laying.** **Large numbers of people walking over vegetation.** **Horse Riding.** **Use of vehicles on the shore / foreshore.** **Wildfowling.**	Tipping of rubbish has been considered a problem within the ASSI and may lead to loss of saltmarsh. There are also issues of toxicity and leaching. Grazing and trampling by livestock can destroy shoreline vegetation such as saltmarsh The effects of shellfish and bait collection are dependent on the scale, location and methods used. *Zostera* beds could be damaged. Bait digging creates holes in the sediment which may persist for some time. Overuse and misuse of sites for research and education can cause localised problems. Removal of species especially at sensitive sites can disrupt habitat. May also affect sediment stability. Ploughing the shore can disrupt sediment structure. Any physical disturbance can disrupt sediments. Trampling by people or livestock could affect saltmarsh, sea weed cover and sensitive habitats. Vehicles may damage vegetation and compact sediment.
Damage to individual animals and plants.	**Oil spill - oiled birds, shores.**	Oil spill could lead to loss of birdlife in particular.
Land take and development.	**Housing development.** **Boating infrastructure.**	Land take may replace important marginal habitats, can affect sediment balance and may lead to pressure for coastal defences and may increase effluent discharge.

Factor Type: Collecting or Removal of Specimens

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Removal of animals.	**Commercial fishing.** **Bait collection.** **Shore-based shellfish harvesting - mechanical and hand collection.** **Wildfowling.** **Educational / research activities.** **Diving** - Collection of souvenirs, commercial collection of marine life. **Aquaculture** - Predator control.	Collection or removal through any activity may deplete a particular species or affect the balance between species. (There is some interest in the development of sea angling in Strangford Lough. Angling is not thought to have a direct effect on the conservation features in this context - though it may be an issue under disturbance). Aquaculture predator control methods may become an issue for consideration in the future.
Removal of plants / seaweeds.	**Seaweed harvesting for agriculture, horticulture, food or other industry.** **Educational / research activities.** **Maintenance of bathing areas and other areas of shore.**	The removal of seaweed may lead to loss of organic matter input to the Lough and habitat for faunal species. Possible future interest not just in seaweed harvesting but also cultivation. Shoreline maintenance may sometimes involve the removal of seaweed and disturbance of the shore - usually by mechanical diggers.
Physical displacement of communities.	**Aquaculture.**	Laying stock on the seabed could physically displace communities.

Factor Type: Noise and Visual Disturbance

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Shore based disturbance.	**Recreational activities.*** **Development construction work.** **Shoreline development / people living along the shore.** **Shore based shellfish collection.** **Bait collection.** **Education groups.** **Wildfowling.**	Various activities may affect the bird features by disturbing feeding / roosting patterns. Activities may also disturb common seals at haul-out sites. This is of particular concern during moulting and pupping. Shooting wildfowl may cause local problems of disturbance. As currently regulated and practised it is not seen as a significant threat to the bird populations of Strangford Lough.
Water based disturbance.	**Recreational activities.*** **Commercial boating.**	Effects are dependent on activity levels and how craft are handled.
Disturbance from the air.	**Aircraft.**	Low flying aircraft have been observed to disturb birds. Microlites and helicopters are of most concern.

*** Range of recreation activities referred to:** Passive recreation - (walking, sightseeing), maintaining bathing areas, boating, yachting, other water sports, diving, horse riding, angling, wildfowling, aircraft flying , wildlife watching and use of off the road vehicles.

Factor Type: Spread of Alien Species

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Introduction of non-indigenous species	**Deliberate introduction of species.** **Unintentional introduction along with imported farmed species.** **Boating activities.** **The natural process of current flow and prevailing winds may carry alien species into the Lough and may also help to spread species.**	Some introduced species may establish in the wild possibly changing the balance of communities and out-competing native species. There is potential for stock to be introduced through ballast water or on hulls of boats. The spread of *Sargassum*, which is not native, may cause problems for naturally occurring species and habitats. This species is capable of out-competing native flora and can potentially have significant ecological implications. *Spartina* currently covers large areas of the upper shores, eg Ardmillan Bay, and prevents waders, particularly Dunlin, feeding during high tide. There is potential for it to spread.

Factor Type: Spread of Disease and Genetic Pollution

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Introduction of pests or disease.	**Aquaculture.** **Boating.** **Natural processes - not clearly understood.**	DARD fish health legislation maintains Northern Ireland's relative freedom from serious fish diseases and prevents imports of fish or shellfish from countries with a lower fish health status. Interbreeding of introduced stocks with natives could lead to loss of native genetic diversity. There is potential for pests/disease to be introduced via ballast water or hulls of boats. Parasites such as *Mytilicola* could be introduced or spread from other areas into the Lough and affect native shellfish. The cause of the *Zostera* wasting disease is uncertain.

Factor Type: Changes in Trophic Structure

FACTOR	RELATED OPERATIONS / PROCESSES	RATIONALE
Change in abundance and / or distribution of particular species or communities.	Likely to be a complex system of interrelationships.	Changes in abundance of species could produce "knock on" effects affecting food webs eg *Zostera* / Brent geese / Widgeon. Not considered a problem at present.

4.2 REVIEW OF ACTIVITIES AND MANAGEMENT ISSUES

Housing and Industrial Development

Pressure for development around the Lough is evident from the number of planning applications submitted in recent years. Substantial housing developments have proceeded at Portaferry, Greyabbey, Kircubbin and Killyleagh and others are under consideration. The area also attracts applications for individual houses in rural locations that could affect wildlife or landscape.

Development close to the shore may have adverse effects on areas of saltmarsh and other habitats or lead to disturbance to feeding and nesting birds. The cumulative effect of such development is difficult to assess accurately but is unlikely to be insignificant. There are also indirect impacts associated with development, for example the increased load on sewage treatment plants or additional septic tanks and the effects of storm water drainage. Tipping, whether associated with development or not, can damage areas of shore and introduce pollutants to the Lough.

Shoreline housing may also create demand for further sea defences, causeways and boat slips.

Coastal Engineering

Much of the larger scale sea defences are located in the northern end of the Lough. The sea defences at Newtownards have recently been repaired and improved. A monitoring programme has been set up by the Rivers Agency to assess the effects of these major repair works on the ecology of the Lough.

In recent years rock armouring has been a favoured strategy for road protection against erosion. Unlike the traditional sea walls, armouring helps to dissipate wave energy with less drawdown of sediment. However, it is rarely aesthetically pleasing and tends to encroach onto the shore. There have also been attempts by some landowners to prevent erosion by using rocks and boulders from the intertidal area.

Coastal engineering works have affected a number of shallow bays, saltmarshes and areas of tidal flat around the Lough. Causeways, boat slips and other restrictions have modified current and tidal flow patterns and, in turn, affected sediment transport patterns. In some cases this has resulted in the incidental creation of new habitat including saltmarsh, brackish ponds and wetlands.

The effect of rising sea levels and changing weather patterns in the long-term may create a desire for new or additional flood defences at existing settlements.

Sand and Gravel Extraction

Traditional rights to remove sand, gravel and shingle from the shores are attached to the folios of some land-holdings in the area. These materials were formerly extracted by shovel and horse-drawn cart for use on the land. Nowadays tractors, trailers and earth-moving machinery are more likely to be used. The removal of intertidal sediments increases the risk of erosion by removing some of the wave-absorbing materials and altering the beach profile. The exercise of extraction rights is not, however, currently a major issue within the SAC/SPA.

Tourism

Areas of high scenic and amenity value such as Strangford Lough are an important part of Northern Ireland's tourism product. Investment in tourism capital projects and support systems such as environmental and heritage visitor centres has helped bring employment and new prosperity to rural towns and presents diverse business opportunities for local communities. As the trend towards activity and special interest holidays increases, Strangford Lough's environmental designations may provide additional impetus to the promotion of the marine life as a tourist attraction.

Increasing pressure from the public for access to the water and the surrounding countryside for recreation and enjoyment has to be balanced with the need to sustain the environment and the fabric of local communities.

Informal Recreation

Strangford Lough is an attractive and popular venue for a variety of informal recreational pursuits, such as walking (often with dogs), bathing, angling and wildlife watching.

If appropriately managed, walkers need not cause significant problems for conservation. Walkers can, however, disturb bird-life and may trample vegetation. Localised problems have been experienced with dogs disturbing birds, particularly on the upper shore at low tides and at nesting islands. The problem is particularly acute with loose dogs and at certain periods of the year critical to the bird's feeding cycles.

Efforts to keep beaches suitable for recreation often include the removal of drift seaweed along with litter. Seaweed is an important component of the marine ecosystem and in most instances is better left in place unless there are compelling reasons for its removal. There have been proposals to create or extend sandy beaches for bathing. In addition to loss of natural foreshore, such efforts can be counterproductive if they fail to take account of the local sediment regime. There may also be a desire to provide amenities such as promenades and car parking areas. These are likely to increase the numbers of people using the area with the consequent risk of increased disturbance.

The Lough's international reputation for waterfowl is underlined by the number of bird-watchers who are attracted to the area, many from outside Northern Ireland. The National Trust and the Wildfowl and Wetlands Trust have provided hides from which the birds may be observed by the public. Seal watching from the car park at Cloghy Rocks is also popular.

The observation of wildlife for enjoyment is entirely appropriate in a Marine Nature Reserve. However some enthusiasts fail to consider either owners' property rights or the welfare of the wildlife. Disturbance can prevent wildlife feeding and can cause desertion of nests with eggs or young birds.

Litter and discarded angling materials are unsightly and may cause injury to wildlife.

The use of 'off-road vehicles' for recreation on the foreshore is inappropriate and will continue to be discouraged.

Boating and Sailing

About 2000 yachts are located around the Lough and there are approximately 5000 active boaters. Most yachting is organised through the eleven clubs around the Lough. Club races and regattas take place throughout the summer with frequent all-Ireland and international events for particular classes. Yachting instruction takes place at several centres and clubs have their own cadet classes.

Most cruisers are moored on permanent swing moorings close to club premises. There are also a few public moorings and scattered private moorings elsewhere. Some craft are mud-berthed and a few are berthed at marina type jetties. Some areas, particularly Whiterock, are popular for water-skiing. There is limited public access to the shore for boats. Cook Street Pier owned by Ards Borough Council and the pontoons at Portaferry are the two main areas.

Windsurfing (sailboarding) has become increasingly popular over recent years, particularly at Cunningburn, Kircubbin and Whiterock. Little depth of water is required and insulating suits enable enthusiasts to sail throughout the year when weather permits. Water skiing and jet skiing have developed on a small scale on the Lough, notably at Whiterock.

Although generally a benign activity, boating may result in a number of potentially harmful impacts on the Lough and its wildlife. It may cause physical disturbance to the seabed and shore, particularly at moorings and where slipways and jetties are built. It is often difficult to maintain water quality at anchorages and harbours. Boating may also cause noise and general disturbance to wildlife, particularly to breeding or over-wintering birds. Fast powered craft including jet-skis tend to be the worst in this regard. Windsurfing during the winter could potentially conflict with wildlife in refuges.

Diving

Strangford Lough is one of the principal areas in Northern Ireland used by recreational divers for training, exploring wrecks and observing marine life. The Lough's sheltered waters are ideal as training areas for novice divers, while also affording some of the most challenging dives to be found in Northern Ireland for the more experienced.

The study of the seabed by divers is in harmony with conservation interests provided no damage is done. Overcollection of marine life for research or commercial purposes, could, however, prove damaging to the populations of certain species.

Horse Riding

Newtownards, Mount Stewart and Ballyhornan are the most popular areas for horse riding on the foreshore. Firm beaches provide uninterrupted gallops for exercising horses.

The areas most sensitive to horse riding are wildlife refuges over the winter months and areas supporting Eelgrass. Birds may not be unduly disturbed by riders hacking across the shore, but are more likely to move where several horses are using the same stretch of shore as a gallop. There is some conflict with displacement of wildfowl from the shore at Castle Espie where there is a bird watching hide. Otherwise there are few significant problems at present.

Wildfowling

There is a very long tradition of wildfowling on Strangford Lough. The five wildfowling clubs around the Lough, (all affiliated to the British Association for Shooting and Conservation), co-ordinate their activities through the Joint Council of Strangford Lough Wildfowling Associations. Wildfowling on the foreshore and on adjacent lands owned or controlled by the National Trust is subject to controls under the Wildlife Scheme. A system of refuges has been established where wildfowling is either banned or restricted to certain times of year and where efforts are being made to minimise all forms of disturbance. Bag returns provide information on the numbers and species of birds shot and their location. Mallard is the main quarry species, followed by teal.

The current level of wildfowling in Strangford Lough is generally considered to be sustainable. However, in addition to taking birds, wildfowling causes disturbance to birds affected by the sound of gunshot.

The revised system of refuges, including time-share zones and shooting regulated zones, has been designed to increase the birds' opportunity to feed and roost undisturbed, so maintaining the Lough's attraction for them. Work to determine the effectiveness and sustainability of the current refuge system is on-going.

Aircraft

Newtownards Airfield lies adjacent to the designated area. Light aircraft, gliders and small helicopters use the airfield, mostly for recreation. An annual fund-raising air-show attracts large crowds.

The evidence to date suggests that birds generally become accustomed to the normal movements of light aircraft. Microlites and helicopters cause greater disturbance.

Operations Affecting Water Quality

Anthropogenic inputs entering Strangford Lough include those from sewage out-falls, watercourses, recreational and commercial craft and associated facilities, and the open sea. They include nutrients from effluent discharges, organic wastes and fertiliser run-off; some particulate material including bacteria; small amounts of petroleum and oils; some metal ions and other more complex chemicals derived from industrial processes; fuel additives, pesticides, anti-fouling paints, slip-way treatments etc.; and plastic and other floating waste. Some fly-tipping of refuse onto the shore also takes place, which may result in chemicals leaching into the Lough.

Sewage effluent is discharged directly into Strangford Lough from eight main outfalls. In addition, treated sewage effluent from a number of neighbouring settlements is discharged into the Quoile system. Slurry, silage effluent, effluent from septic tanks and leachate from landfill sites may enter the rivers and some of the smaller streams, particularly the Quoile. A certain amount of agricultural run-off enters the Lough directly from adjacent fields, or indirectly via watercourses.

Effluent discharged from in-board toilets on boats may cause localised pollution.

Water quality in the Lough is generally good, although there be locally significant effects from discharges of storm water and sewage from peripheral housing areas. High nutrient levels from sewage outfalls can adversely modify the local biota though such inputs may increase productivity and carrying capacity. Some forms of wildlife thrive in nutrient enriched areas but nutrient overload can also lead to some species having a blanketing effect on the habitat. Enrichment tends to result in an increase in the abundance of a few tolerant species such as ragworms and in the growth of green algae.

Nutrification may be having a detrimental effect particularly at the northern end of the Lough. Increases in the suspension of organic or inorganic material in the water column increases turbidity and reduces light levels, which along with changes in sedimentation may be affecting the growth of eelgrass.

The potential exists for any spillage from shipping in the Irish Sea to enter the Lough system. The scale of impact would depend on the amount of spill, its location and type of oil etc.

Farming

Farmers and landowners have helped to shape the Strangford Lough landscape and its habitats and contributed to the conservation interests around the Lough. For example, many of the islands which are important for wildfowl or nesting terns are grazed by sheep or cattle. By and large farmers have tolerated the habit of Brent Geese to graze agricultural land when eelgrass is in short supply. Some farming practices, however, can cause localised damage.

Livestock which are free to wander onto the shore may result in damage to strandline vegetation and saltmarsh. Their trampling can seriously poach the ground and exacerbate erosion. The practice of sand-ploughing on the shore to clean the plough can have damaging effects both on eel-grass beds and on invertebrates in the sand. Recovery from this seemingly harmless activity can take years in some situations.

Commercial Fishing

Commercial fishing is now a relatively minor source of employment for the population around the Lough - about 15-18 boats are now 'resident' in the Lough, with occasional vessels from Portavogie and other County Down Ports. However, it still contributes significantly to the annual income of fishermen based in the Strangford Lough area. The main active fishing operations undertaken in Strangford Lough today are trawling for Queen Scallops ('Queenies') and Dublin Bay Prawns as well as dredging for King Scallops.

Fishing on a commercial scale can affect the seabed in a variety of ways. Several studies of the impact of fishing operations on the seabed were undertaken during the 1990s. These studies concluded that only those areas where fishing boats could not easily gain access remained unmodified. Of particular concern has been the impact on Horse Mussel beds and their associated fauna.

Potting takes place mainly in the Narrows and the periphery of the Lough. There is pot fishing of Dublin Bay Prawns and more recently of Shore Crabs, Velvet Swimming Crabs, Common Whelks and Lobsters. Fishing effort can disturb sediment and over-fishing of some species might affect the conservation interests.

Shore-based Harvesting of Shellfish

Though economically viable beds of the Native Oyster were worked out in the 19th century, other shellfish are still gathered. Cockles are gathered by hand raking the sediment. Common Mussels and Winkles are collected on a small scale.

Small-scale collection of shellfish for home consumption causes little overall disruption to the Lough's ecological balance. Some commercial harvesting may be sustainable but large-scale harvesting could be detrimental. Mechanical harvesting of cockles for example would be very likely to severely damage other fauna and flora that live in the mudflats. Eelgrass may be physically damaged and harvesting may interfere with birdlife such as oystercatchers, for which cockles are a major food source.

People on the shore engaged in such activities may reduce bird feeding times and increase their energy requirements as they fly to other areas.

Seaweed Harvesting

Historically in Strangford Lough seaweeds have been both harvested and cultured. Drift wrack and kelps were used on the land as fertiliser. At certain sites, for example around Greyabbey, large boulders were placed on sandy areas of shore for seaweeds to attach and create a crop of material.

The red algae known as Dulse is also a traditional crop, being cut from the stipes of kelp, on which it grows, particularly in the Narrows, then dried for human consumption.

Were extensive commercial exploitation of seaweed to take place in Strangford Lough, the loss in ecological terms would be likely to be on a significant scale. Research has indicated that large scale commercial harvesting would probably alter populations over a wider area with consequent decline in larval supply, increase in sediment mobility and loss of organic material from the inshore system.

Bait Collection

Bait digging has traditionally taken place on a small scale in many places around the Lough. Today, digging for Lugworm and Ragworm is commonplace at Island Hill. Small-scale bait digging by anglers for individual use may be insignificant in its effect in many situations but if undertaken in sensitive habitats, at certain times of the year or on a commercial scale, it may be incompatible with the aims of nature conservation. It may damage eelgrass beds and large numbers of bait diggers are likely to cause disturbance to waterfowl. Raking or digging for burrowing invertebrates buries oxygen-rich surface sediments often killing the animals they contain.

Aquaculture

There has been a steady growth in interest in shellfish cultivation in Strangford Lough in recent years. A number of different techniques are used for growing oysters, mussels, clams and scallops. Oyster farming is the most economically important fishery in the Lough with an annual turnover in excess of that from commercial fishing. The principle species cultivated is the Pacific Oyster grown in mesh sacks on trestles at low water and finished on ground mats.

Shellfish culture is generally regarded as an activity that has a relatively low negative impact on the environment. A high standard of water quality is required and no chemicals or antibiotics are used in shellfish production. It can, however, cause loss or modification of habitat, disruption of sediment movement, and disturbance to wildlife. Care has to be taken to avoid the accidental introductions of other species with commercial shellfish. Imports of juvenile shellfish for cultivation are therefore routinely inspected by DARD.

Predator control methods may need to be assessed in the future.

The impact of shellfish cultivation on bird feeding is considered to be limited. Sown areas cover only a small proportion of the foreshore and are usually well spaced. Harvesting and net cleaning occurs only during periods of spring tides. However, harvesting does occur during the winter months when bird feeding may be at its most intense.

Caged fin-fish farming is presently considered to be an inappropriate practice in Strangford Lough for various environmental reasons including risks to native marine life from waste products and parasite treatments, incompatibility with predator species and its impact on maintaining visual amenity.

There is interest in the cultivation of seaweed in Strangford Lough which may have implications for the features.

Education and Research

One of the criteria for the establishment of the Strangford Lough Marine Nature Reserve was its potential for use in education. The Lough provides a natural laboratory for carrying out marine biological and oceanographic research and this is evident from the number and diversity of research projects that it supports. Strangford Lough is much used for field studies at all levels of education, with many school groups visiting the interpretive centres which have been established around the Lough. In addition, residential centres bring Primary and Secondary school parties to the Lough for study and training.

Generally speaking these activities have little lasting impact on the Lough's ecology. There is, however, a risk of disturbance from large parties repeatedly using sensitive areas. Repeated collecting at favoured sites may also lead to local depletion of species in that area.



5 Assessment of Site Management

Management schemes provide the statutory basis for the conservation of European marine sites. The key requirements are:

- European marine sites should be managed in order to contribute to the maintenance or restoration of their natural habitats and species at favourable conservation status.
- Steps will be taken to avoid the deterioration of the habitats, the habitats of the species or the disturbance of species for which the site has been designated.
- Activities, plans or projects, whether inside or outside the European marine site, that are likely to have a significant effect on the conservation status of the site's features shall be subject to assessment.
- A programme of monitoring will be undertaken to monitor the condition of conservation features of the site and to assess the effectiveness of management measures undertaken.
- Any management of the site should take account of the economic, cultural, social and recreational needs of the local people.

In its widest sense, the management of the Strangford Lough SAC/SPA thus includes the regulation of activities, improvement of environmental quality, species recording and management, management of designated areas and enforcement of planning controls. A number of public bodies are involved to some degree in protecting and sustaining the conservation features.

It is envisaged that existing powers and management arrangements will be used wherever possible and developed to meet the needs of the management scheme. This Section reviews the principal mechanisms available.

5.1 TENURE

The majority of both the foreshore and the seabed of the Strangford Lough is owned by the Crown Estate Commissioners on behalf of the Crown. At present most of the Crown Estate seabed is not leased, though it is likely that the Commissioners may be willing to lease the bed, or parts of it, to appropriate bodies, for example for aquaculture.

Extensive areas of foreshore and some of seabed are, however, owned or leased by the National Trust and other conservation organisations including EHS. District Councils also lease foreshore as do some commercial shellfish growers. The National Trust holds the sporting rights to most of the intertidal area. Many of the islands, and most of the land that surrounds the Lough is in private ownership.

Many people with land holdings around or close to Strangford Louth claim rights to take seaweed, and/or gravel. These are generally written into title deeds. The Crown Estate Commissioners own most mineral rights in the SAC/SPA. Other mineral rights are, in some areas, associated with foreshore which was formerly part of large estates. Common law rights have been established for the collection of wild shellfish and for digging bait for fishing.

The Crown, as "Government", holds inalienable rights in trust for the public in relation to foreshore, seabed and inshore water. These include rights of free navigation (to sail, anchor and move goods and passengers) and rights to take commercial fish species including shellfish and bait but excepting farmed stock, oysters and mussels in beds, and to spread nets out to dry on the shore. There is, surprisingly, no actual right of the public to be on Crown foreshore except for the purposes of exercising rights of navigating and fishing. However, the Crown Estate Commissioners normally place no restriction on access for amenity and recreational purposes over their tidal lands and there

is a perceived right of access over the foreshore owned by the Crown. This does not extend to right of access over private foreshore or over private land to reach Crown foreshore.

5.2 DESIGNATIONS AND EXISTING MEASURES

The Habitats Regulations

These Regulations make relevant and competent authorities responsible for the conservation and management of European marine sites. In so doing they require that authorities with functions which have the potential to affect the marine environment exercise their duties so as to meet the requirements of the Habitats Directive.

Relevant and competent authorities have certain specific statutory functions to decide on applications for consents, licences and permissions. These are plans or projects within the meaning of Article 6 of the Habitats Directive. The Regulations establish the procedures that must be followed for the consideration of plans or projects. These procedures include a provision for an assessment if the effect of the plan or project is likely to be significant. The advice of EHS must be taken into account during this process. In many cases this assessment will be aided by a formal Environmental Assessment.

The Regulations make provision for certain plans or projects to be carried out despite a negative assessment for the implications of the site. In the absence of alternative solutions a plan or project may nonetheless be carried out for imperative reasons of overriding public interest.

The Regulations also place a duty on competent authorities to review, subject to certain limitations, any extant consents, licences or permissions which are likely to have a significant effect on a European site.

Both the consideration of new development proposals and the review of existing consents will be informed by the conservation objectives.

Areas of Special Scientific Interest

Areas of Special Scientific Interest (ASSIs) represent the main form of domestic statutory protection for sites of high nature conservation value. The relevant statute is the Nature Conservation and Amenity Lands (NI) Order I985 and its subsequent 1989 amendment. The designation is aimed at protecting areas that EHS considers to be of special scientific interest by regulating changes in management.

Most of Strangford Lough was declared an ASSI in 1988-89 in three separate designations - Strangford Lough Part 1 (north), Strangford Lough Part 2 (south) and Strangford Lough Part 3 (the middle section). More recently Killard, Ballyquintin Point and Quoile Pondage have also been declared ASSIs. These 6 ASSIs include all the foreshore of Strangford Lough and, to a limited and variable extent, adjacent land above high water. ASSIs do not extend below mean low water mark.

It is intended that management of ASSI lands is achieved through co-operation; landowners retain ownership and occupancy of their land, and are usually encouraged to manage it as they have done in the past. EHS recognises that there is a need to promote a more positive approach to ASSI management through increased contact with owners and occupiers and greater targeting of incentives to encourage enhancement as well as protection of sites. To date very few of the 400 owners and occupiers within the ASSIs covering Strangford Lough have entered into formal management agreements with EHS.

Current ASSI legislation only allows EHS to take action against an owner or occupier if damaging operations are carried out without seeking prior consent. This is unsatisfactory in cases where damaging activities are carried out by a 'third party' and the owner or occupier is powerless to prevent them. A consultation paper on the protection and management of ASSIs in Northern Ireland has been issued by the Department of the Environment.

Marine Nature Reserve

The Strangford Lough Marine Nature Reserve (MNR) was established under the Nature Conservation and Amenity Lands (NI) Order 1985. The whole of Strangford Lough up to high water mark mean tide is included in the MNR which was designated in 1995. It extends seawards of the Narrows into the Irish Sea to include areas north and south of the mouth of the Lough which are outside the SAC/SPA.

The MNR provides for management for nature conservation purposes and for study and research. In certain circumstances byelaws may be made to protect aspects of the MNR not otherwise regulated by public bodies. (See Appendix 3)

The MNR is described in detail in *Strangford Lough Proposed Marine Nature Reserve - Guide to Designation*, published by Environment Service in 1994. This document presented eleven objectives covering both conservation and human use of the MNR. These were agreed between Government and SLMC and were intended to serve as a guide to the management of the Reserve area. They encompass

- the conservation of:
  - the physical system
  - biological diversity
  - the man-made heritage
- the provision of:
  - a healthy, safe and clean environment
  - continued commercial use
  - beneficial new development
  - public enjoyment
  - study, scientific research and monitoring

where these do not conflict with the conservation objectives

- the co-ordination of uses.

National Nature Reserves

National Nature Reserves (NNRs) are also established under the Nature Conservation and Amenity Lands (NI) Order, 1985, at sites of high importance for nature conservation, and which may also be valuable for education or research. Management of NNRs is undertaken primarily to benefit the nature conservation interests and public access may be controlled. There are seven NNRs on or adjoining Strangford Lough: North Strangford Lough, the Dorn, Granagh Bay, Ballyquintin Point, Killard, Cloghy Rocks and Quoile Pondage. EHS manages all but North Strangford Lough which the National Trust owns and manages.

National Trust Strangford Lough Wildlife Scheme

In the early 1960s, the National Trust developed its Strangford Lough Wildlife Scheme in conjunction with the Wildfowlers' Association of Great Britain and Ireland (now the British Association for Shooting and Conservation, BASC). A covenant was drawn up between the two organisations to ensure that an appropriate balance was maintained between shooting and nature conservation. The scheme's principal focus has been the regulation of wildfowling and habitat management for nesting birds. The Trust acquired or leased from the Crown Estate Commissioners and others sporting rights to most of the Lough foreshore. This enabled a refuge/shooting permit scheme to be operated to regulate wildfowling and benefit other wildlife.

The scheme was jointly policed by Trust wardens and voluntary wardens, many drawn from wildfowling clubs. The regulation of wildfowling was combined with practical habitat management for wintering and nesting birds, in which wildfowling club members were required to participate. By degrees a number of changes took place which required the Wildlife Scheme to be reassessed. The National Trust acquired a considerable area of foreshore, many islands and some coastal land around the Lough, adding to the areas under its control. Variations were made to refuges, with the creation of some new ones.

In 1990 a major review of the effectiveness of the refuge system was carried out through the International Waterfowl and Wetlands Research Bureau. The present refuge system is based on the recommendations for the future operation of the scheme made under this review. The review stressed that refuges should be free from all forms of disturbance, not just shooting. A further review of the refuge system began in 1997.

Overall the refuge system has succeeded in maintaining the populations of most key species and the quality of wildfowling has been maintained. The National Trust intends to make a few minor adjustments to several refuges, or to the timing of their use, but otherwise the current refuge system will remain unchanged.

A sustainable wildfowling regime including a satisfactory refuge system is an essential component of the management scheme for Strangford Lough to meet the SPA conservation objectives of maintaining waterfowl populations. The National Trust Wildlife Scheme has, over the years, delivered well on this in terms of the control of shooting. However, to be fully effective the refuges must have the support of the community at large across a range of human activities and be integrated with the overall management objectives for the Lough.

Fisheries Legislation

Under the Fisheries Act (NI) 1966, the Department of Agriculture and Rural Development is responsible for the management and regulation of fisheries and for fostering the development of fisheries.

Commercial fishing in Strangford Lough has made a significant contribution to the local economy. The main fishing activities today target scallops, queen scallops, lobster, crab, Buckie whelks and Dublin Bay prawns. Hand collection of periwinkles and cockles also takes place. In 1991 the fishing industry, responding to concern, volunteered to forego a number of the potentially damaging fishing practices and agreed to zoning in the use of mobile gear. In response to this initiative and following consultation with the industry and the wider interests, the Department of Agriculture introduced new regulations in 1993 which included measures specific to Strangford Lough.

This legislation, The Inshore Fishing (Prohibiting of Fishing and Fishing Methods) Regulations (NI) 1993, is primarily aimed at protecting the fisheries of the Lough while maximising the scope of the existing fisheries legislative base to reconcile fishing and conservation. The measures in the Regulations specific to Strangford Lough (in which "scallops" refer to King Scallops (*Pecten maximus*) only) are:

- the banning of suction dredging, beam trawling, the use of tickler chains on trawl nets, the use of a dredge to capture sea fish other than scallops and fishing for horse mussels
- a closed season for taking scallops between May 1 and October 31
- the zoning of fishing/diving for scallops to the southern part of the open Lough and of trawling to the northern part, and
- a size restriction on fishing vessels to 15.24 metres maximum.

The 1966 Act was amended in 2001 to give DARD powers to regulate commercial fishing in Northern Ireland inshore waters (which includes the intertidal zone) for environmental purposes.

Marine aquaculture is licensed by the Fisheries Division of the Department of Agriculture and Rural Development (DARD). It is the Department's aim to stimulate the development of aquaculture in Northern Ireland in ways which are not harmful to the environment. Regulation is achieved through fish culture licences and shellfish fishery licences. Various interested parties (including SLMC) are routinely consulted on shellfish licence applications and permits for scientific research within Strangford Lough.

Northern Ireland Biodiversity Strategy

Biodiversity is the total variety of all living things. The threats to world biodiversity resulted in 178 countries, including the UK, signing the Biodiversity Convention in 1992 committing them to develop national strategies for its conservation. To begin fulfilling this commitment to address national and global issues, the UK Biodiversity Action Plan was first published in 1994.

The Northern Ireland Biodiversity Group (NIBG) was consequently established in late 1996. From the outset, the NIBG recognised that a regional strategy for Northern Ireland should facilitate the implementation of the UK action plan in Northern Ireland, whilst paying considerable attention to local needs and the all-Ireland context. A draft Northern Ireland Biodiversity Strategy has been produced on behalf of the NIBG and final recommendations were placed before Government in October 2000.

The principle of targets and action plans is firmly enshrined in the UK approach to biodiversity. A series of Action Plans for a range of habitats and species have been prepared at a UK level. The Northern Ireland Biodiversity Strategy will facilitate the production of Action Plans at a Northern Ireland level for those habitats and species for which Northern Ireland has a key role to play. Forty Northern Ireland priority habitats have been identified including coastal saltmarsh, mudflats, seagrass beds and Horse Mussel beds. The final recommendations also identify a series of UK priority species or species groups which occur in Northern Ireland. These include Native Oyster and the seaweed *Ascophyllum nodosum ecad mackii*.

General Planning Measures

Planning Policy for the Strangford Lough area is set out in the North Down and Ards (1984-95) and the Down (1982-97) Area Plans. A new Area Plan for Ards and Down districts is currently under preparation.

Planning policy relating to sites of conservation value is spelt out in *Planning and Nature Conservation (PPS2)* published by the Planning Service. Where Planning Service receives a planning application relating to any site which has a statutory nature, landscape or heritage conservation designation the advice of EHS is sought. Planning Service gives special consideration to the conservation aspects of such applications. Developments likely to have a significant adverse effect on such statutorily designated sites will not be permitted unless the reasons for the development clearly outweigh the value of the site itself.

Water Quality Measures

Since its enactment, the Water Act, (NI) 1972 has resulted in routine monitoring for water quality in the Strangford Lough catchment and the improvement of industrial and sewage discharges. More recently EC Directives and other legislative measures have further contributed to this improvement and will continue to do so.

The Urban Waste Water Treatment Directive sets minimum standards for sewerage and sewage treatment and some industrial dischargers across Member States. A timetable has been set, targeting larger dischargers in the first instance, for improved discharge standards.

Deposits in the sea are controlled under Part II of the Food and Environment Protection Act (1985). This refers to the disposal of dredged material at sea and construction below mean high water spring tide. There are no licenced disposal sites within Strangford Lough. Any construction works are subject to a full consultation process under the Act. The licensing authority is the Water Quality Unit, Environment and Heritage Service.

Areas of Outstanding Natural Beauty

The Strangford Lough Area of Outstanding Natural Beauty (AONB) was designated in 1972 under the Amenity Lands Act (Northern Ireland) 1965. It covers the foreshore, the islands and landward margins around the Lough for a varying distance inland. At its southern end it joins the Lecale Coast AONB, which dates from 1967. The AONB designation is essentially concerned with conserving and enhancing the natural beauty and amenity of the area. The current development plan includes a presumption against new isolated dwellings in the AONB, with certain exceptions.

Strangford Lough has not yet been formally reviewed for re-designation under the Nature Conservation and Amenity Lands (NI) Order 1985 although preparatory landscape assessment has been carried out. This legislation gives greater opportunities for positive action towards the conservation and enjoyment of landscapes, heritage and wildlife and the promotion of public access.

Countryside Access

The Access to the Countryside (NI) Order 1983 places responsibility for the provision and maintenance of access to the countryside with district councils. This legislation enables councils to assert public rights of way and to create new access opportunities through public path and access agreements. The Department of the Environment supports and facilitates this role through grant aiding practical works, through advice and training, and with respect to aspects of the legislation such as the holding of public enquiries.

Shellfish Water Directive

The EC Directive on the quality of shellfish waters requires Member States to designate coastal and brackish waters which need protection or improvement so as to support shellfish life and growth. In 1983, a 5.41 km^2 area in Ardmillan Bay and Ringneill was designated as a shellfish water. In addition, two further designations at Skate Rock and Marlfield Bay were made in 1999. A water quality monitoring programme has been initiated for the new sites. Shellfish flesh is monitored at all sites under a combined shellfish monitoring programme between the Food Standards Agency, EHS and DARD.

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The EC Directive on the quality of shellfish waters requires Member States to designate coastal and brackish waters which need protection or improvement so as to support shellfish life and growth. In 1983, a 5.41 km^2 area in Ardmillan Bay and Ringneill was designated as a shellfish water. In addition, two further designations at Skate Rock and Marlfield Bay were made in 1999. A water quality monitoring programme has been initiated for the new sites. Shellfish flesh is monitored at all sites under a combined shellfish monitoring programme between the Food Standards Agency, EHS and DARD.

Bivalve Mollusc Production Areas

New food safety regulations were introduced in 1993 to provide for the EC Directive laying down the health conditions for the production and the placing on the market of live bivalve molluscs. All farmed shellfish beds must now be classified according to water quality. Six areas in Strangford Lough have been so classified, three as Class A enabling direct sale of shellfish and three as Class B under which shellfish must be depurated or relaid in a Class A area for a period prior to offering for sale.

Voluntary Reserves

The Northern Ireland Federation of Sub-aqua Clubs (NIFSAC) has, since Underwater Conservation Year in 1977, subscribed to a system of three underwater reserves - in the Strangford Narrows, an area around Bird Island (off Kircubbin) and another north-east of Killyleagh. Inside these three areas divers belonging to clubs in NIFSAC voluntarily agreed not to remove live specimens. The success of this system may need to be reviewed.

The Royal Society for the Protection of Birds (RSPB) purchased the east side of Castleward Bay in 1989 as a Reserve for birds, so increasing the area of shore in public ownership dedicated to nature conservation.

Voluntary Management Initiatives

Leaders of organised activities have been encouraged to introduce voluntary codes for participants and club members. In many cases the Strangford Lough Management Committee has been involved in the establishment of these codes working closely with clubs such as the Association of Strangford Lough Yacht Clubs and the Northern Ireland Federation of Sub-Aqua Clubs.

5.3 DEVELOPMENT AND INTRODUCTION OF NEW MANAGEMENT MEASURES

A series of four workshops were run by the Strangford Lough Office as part of its work to assist in the preparation of the management scheme. The first two workshops were on the factors affecting the Lough and involved a range of participants including Lough users and local interests. Two further workshops were held with officers from the relevant and competent authorities; Ards Borough Council, Down District Council, DARD - Fisheries Division, Planning Service, Environment and Heritage Service, with input also from SLMC and the National Trust.

Several key conclusions were derived from these workshops:

- There is a broad measure of consensus on how the site should be managed and regulated.
- Representatives from competent and relevant authorities supported the 'participatory' approach to the production of the management scheme.
- There is an acknowledgement of collective responsibility in terms of protecting the site.
- There must be effective management arrangements and co-operation between authorities to achieve the conservation objectives.

The following paragraphs outline how new or additional management measures will be introduced. Figure 2 (see page 55) illustrates the proposed management arrangements which are being put in place to secure effective and co-ordinated management.

Strangford Lough Liaison Group

A management group, referred to as the Strangford Lough Liaison Group, involving officers from EHS, the two councils, DARD, the National Trust and the Strangford Lough Office, has been established to progress the management scheme. It is intended that this group will ensure that the requirements of the management scheme are fully implemented. In doing this it will continue to work alongside SLMC. Other relevant and competent authorities will be invited to contribute from time to time.

While this group will be concerned primarily with the management scheme, there will be cross reference to the wider issues raised under the Sustainable Development Strategy and the work of SLMC.

Strangford Lough Office

SLMC advises on issues relating to management and provides a public forum for debate and communication. It is assisted in this work by the staff of the Strangford Lough Office. The Strangford Lough Office has also been used to develop additional projects such as the Human Use Survey, the Strangford Lough Information Network and an integrated geographic information system (GIS). Subject to the Office being adequately resourced, there are clear advantages to it continuing with strategic management activities under the management scheme.

Wardening

Wardening is an important aspect of conservation management. The activities of wardens operating on Strangford Lough are wide-ranging and include day to day site management and monitoring, communication with the public and landowners, and collection of evidence where enforcement of regulations is deemed necessary.

The main players in wardening the Lough are EHS and the National Trust. The activities of the EHS wardens centre around the management of its nature reserves with a limited amount of direct involvement in the wider Lough (for example ASSI

monitoring and control of *Spartina*). The National Trust operates its Strangford Lough Wildlife Scheme which requires its wardens to be heavily focussed on the areas of foreshore and islands under its management. Neither body has any prescribed wardening role in relation to the MNR. Local Councils are also involved in aspects of wardening across a range of functions - access, leisure, tourism, and environmental health.

DARD has powers to regulate fishing. This work is specific to fisheries management and it would be inappropriate to share this work with other bodies. However there is informal liaison and co-operation with other wardens.

There is strong support for both strengthening the system of wardening on Strangford Lough and for collaboration between authorities to the extent that there should be a common identity, perhaps under the auspices of the MNR. The need to develop a wardening partnership with shared objectives is therefore a priority under the management scheme. The establishment of this partnership will include the following principles:-

(i) the need to define roles and areas of responsibility for EHS, the National Trust and others;

(ii) the need to clarify lines of accountability between wardens and those authorities which have legal responsibilities for the conservation of Strangford Lough's international wildlife interests; and

(iii) the need to ensure that warden services are adequately resourced.

Monitoring Programme

A considerable amount of monitoring already takes place within and around Strangford Lough and although not always specifically designed for the purpose of the SAC/SPA management scheme, it is nevertheless relevant to it.

The monitoring requirements in relation to the management scheme can be considered to fall into two main areas:

(a) relating to the condition of the conservation features and sub-features. The main requirements of this monitoring are outlined in 3.3.

(b) relating to the factors affecting the features. In the short term emphasis will be given to gathering and collating information on the human use of the Lough from studies undertaken by the District Councils, SLMC, NITB and others.

Perceived Deficiencies in Current Legislation

The workshops run by the Strangford Lough Office identified several areas where existing legislation could be strengthened to provide additional, but warranted, protection to the SAC/SPA:

- Current ASSI legislation does not allow EHS to control the activities of individuals who are neither landowners or formal occupiers. This means in effect that EHS may not take action where the landowner is unable to control the activities of a 'third party' on their land. The Department of Environment has issued a consultation paper addressing this and other issues concerning the protection and management of ASSIs.

- The Habitats Regulations have been amended in England to apply the definition of European site (and European marine site) to include candidate SACs. This amendment provides additional legal protection to candidate SACs.

- The powers of DARD have recently been extended into the intertidal area so that fishing can be regulated. It is proposed that mechanical harvesting in the intertidal area be banned - subject to public consultation. The practice of individuals collecting by hand for their own use will be protected.

- Legislation on the use of lead shot in environmentally sensitive wetlands is being considered in GB and this may be addressed in Northern Ireland.

Byelaws and Other Regulatory Powers

The National Trust, Ards Borough Council, Down District Council and EHS each have byelaw making powers in relation to Strangford Lough.

Byelaws are acknowledged to have associated problems and their enforcement can have a negative effect and may endanger co-operation from the public in environmental management. Although voluntary management is favoured, the introduction of byelaws may be required in relation to some recreational activities and use of the shore (including bait-digging). Ards Borough Council and Down District Council are currently working to amend their byelaws which will include areas of foreshore within their control.

DARD is empowered to regulate fisheries and aquaculture through issuing of licences and permits under the 1966 Fisheries Act. They can also put conditions on these licences to introduce restrictions on gear used, areas used, times of year etc.

Zoning

There is considerable interest in the introduction of a positive system of zoning that would encourage activities and developments to progress without conflicting with each other or with the environment. Such a system requires further consideration but needs to be based on the following principles:

- It should be supported by a co-ordinated system of wardening with each authority taking action as appropriate under their own statutory responsibilities and legislation

- It should involve Lough users, local people and public representatives.

- It should be supported by a system of regulation combining legislation and voluntary mechanisms.

- It should be supported by the best available scientific information and, where possible, by management tools such as GIS mapping to overlay environmental features and human activities.

An essential step towards zoning is to know or be able to predict the effect of a range of activities on the environment in different parts of the Lough. It is recognised that further work needs to be done in this area before some activities can be zoned with any confidence that the result would be beneficial to either those engaged in the activity or to the environment.

Voluntary Management Tools

Like byelaws, voluntary codes of conduct have a role to play as part of a strategic system of regulation. SLMC has been heavily involved with the development and consultation concerning such codes. To be effective, codes of conduct need to be supported by visible and easily accessible on-site information. There is a perceived need to bring different codes together into the one system. The importance of local people in this cannot be overestimated and it will be important to work with them to develop shared values and goals for Strangford Lough.

Communication

A communication plan is required to support the aims of the management scheme. Where possible this plan should also incorporate the aims of the Sustainable Development Strategy. The communication will need to address the following points:

- The need to promote understanding of management issues to staff involved in managing the Lough as well as the public

- The importance of developing a range of material appropriate for different sectors and for particular purposes

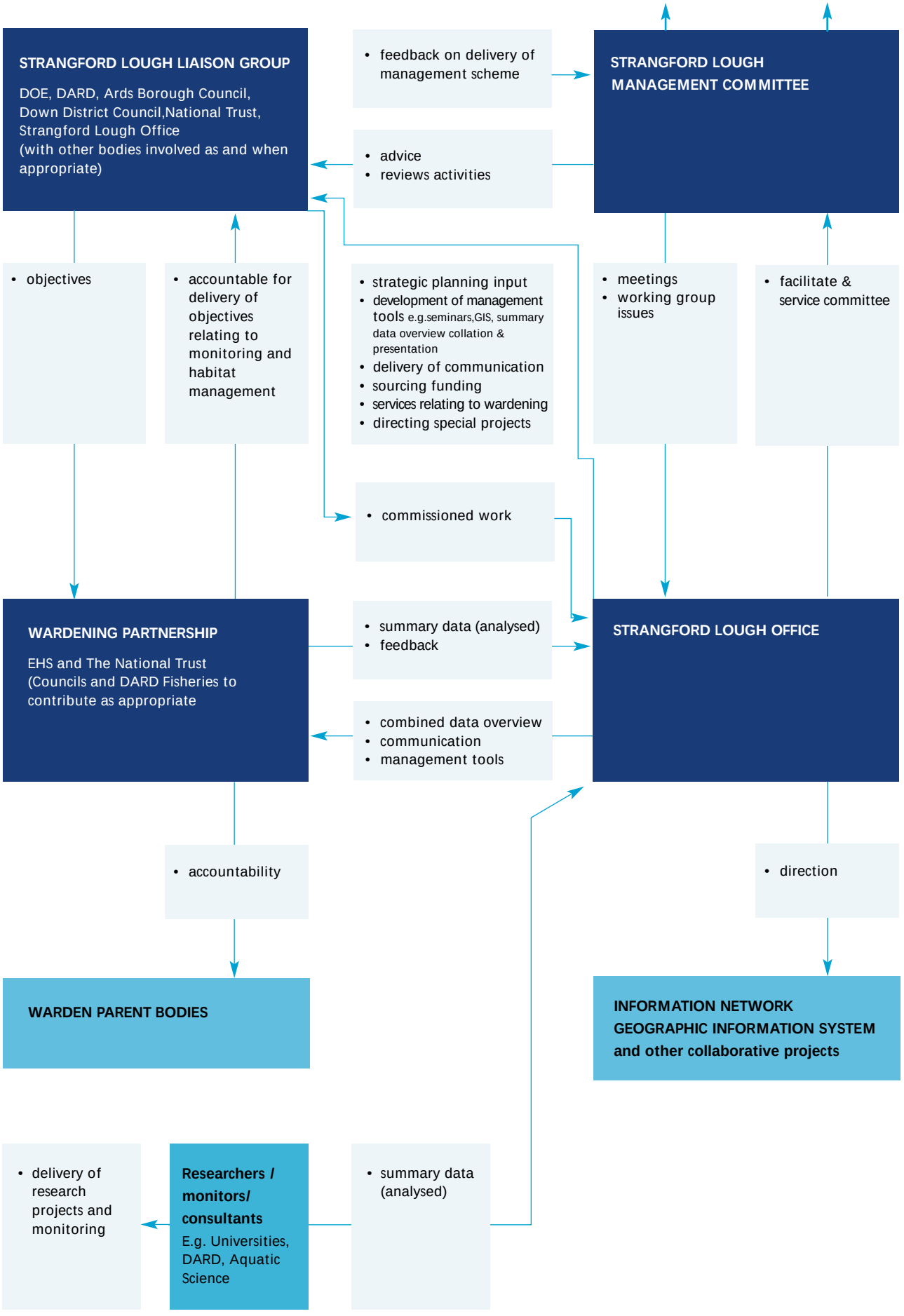
- The importance of communicating with local people and Lough users

- The need to communicate with key opinion formers and decision makers.

- The need to support management initiatives by providing on-site information at key access points

The Strangford Lough Information Network provides a good basis for shared communication. The Network is currently under the direction of the Strangford Lough Office working with EHS, the two Councils, and the National Trust. It was established to meet specific objectives over a three year period. The Strangford Lough Office is well placed to continue to develop proposals for a shared communications strategy for the SAC/SPA and to focus related activities.

Figure 2: MANAGEMENT ARRANGEMENTS FOR STRANGFORD LOUGH SAC / SPA





6 Management Objectives & Action Plan 2000-2003

The following objectives and action points form the basis of an action plan which will be kept under review and prioritised as necessary by the Strangford Lough Liaison Group. In doing this it will seek advice from SLMC.

Objective 1: Develop a management structure

Actions:

- The Liaison Group will continue to meet regularly to ensure co-ordination of management effort, including the monitoring programme and practical management projects.
- SLMC will be encouraged and facilitated to play a key role in the development and review of the management scheme.
- The Strangford Lough Office will continue to drive and develop the Information Network and plans for data sharing and communication.
- EHS will work with the National Trust and others towards the establishment of a collaborative wardening partnership for the Marine Nature Reserve, SAC and SPA.

Objective 2: Review the conservation objectives and favourable condition tables

Actions:

- EHS will review the conservation objectives and favourable condition at appropriate intervals.

Objective 3: Review the factors and related human activities with the potential to affect the conservation features

Actions:

The following actions relate to Recreational Activities and Tourism:

- The Liaison Group will develop and take forward proposals for further research into the interactions between recreational use of the Lough and the conservation features.
- The Councils and the National Trust will lead work to develop a strategy for managing access to the shore and the water for land and water-based recreation. This strategy will include measures to protect sensitive sites and limit disturbance. It will also aim to maximise opportunities to communicate environmental values and increase enjoyment of the countryside through planned access provision.
- The National Trust will continue to work with local wildfowling clubs and BASC to manage and regulate wildfowling through the Strangford Lough Wildlife Scheme.

The following actions relate to Development:

- The Down and Ards Area Plan will take account of the SAC/SPA management scheme in the framing of proposals which may have an effect upon Strangford Lough. Key relevant environmental issues to be addressed in the Plan include:
  - the need for sustainable development;
  - the protection of rural character through Countryside Assessment, and
  - the need for strategic assessment of environmental impact which refers to, among other things, the SAC/SPA conservation objectives.
- Planning Service and EHS will consider, in the context of the Area Plan, the extent of protection afforded by planning policy to the shoreline of Strangford Lough.

The following actions relate to operations affecting Water Quality:

- EHS will review its water quality monitoring programmes to ensure compliance with the conservation objectives.
- EHS will continue to liaise with SLMC and others to strengthen measures in the response to pollution incident plans for Strangford Lough.
- EHS will meet its obligations under the Shellfish Waters Directive and ensure that plans are in place to maintain water quality in designated areas.
- The Liaison Group and SLMC will encourage beach clean-ups and support national campaigns regarding marine litter.

The following actions relates to Agriculture:

- EHS will liaise with DARD and the farming community and seek to develop opportunities to benefit nature conservation on farmland adjacent to Strangford Lough.

The following actions relate to Fishing, Aquaculture and Related Activities:

- DARD will continue to monitor the effects of commercial trawling and dredging on the seabed and on biodiversity within the Lough.
- DARD will collate information on levels of commercial fishing activity in Strangford Lough.
- DARD will continue to assess the need to introduce appropriate fisheries conservation measures.
- DARD will progress consultations on legislation to prohibit the mechanical harvesting of shellfish in the intertidal area as required.
- DARD will progress the implementation of the strategic recommendations in its Shellfish Management Plan for Northern Ireland.
- DARD and EHS will ensure that arrangements are in place for the monitoring and management of impacts from aquaculture on the conservation objectives and issue a report on initial findings by June 2002.
- DARD will consider the need to amend legislation so that seaweed cultivation may be licensed and regulated.

The following actions relate to Education and Research:

- The Information Network will explore the possibility of setting up a register or database of research and monitoring within Strangford Lough.
- The Liaison Group will work with other bodies to improve and promote codes of practice for educational parties using the Lough.

Objective 4: Agree and implement a joint monitoring and research programme

Actions:

- EHS, with support from the Strangford Lough Office, has agreed a plan for monitoring the condition of the conservation features. EHS will work with other bodies as required to ensure that this programme is implemented.
- The Liaison Group will review the monitoring programme annually.
- Proposals for research and monitoring in relation to human activities will be considered by the Liaison Group.

Objective 5: Develop positive management initiatives

- EHS and the National Trust will continue to control the spread of *Spartina* through the use of herbicide and other suitable methods.
- The Liaison Group will develop a strategy for establishing and resourcing positive environmental management work, such as the enhancement of island vegetation for breeding birds and the management of wetlands.

Objective 6: Develop a shared data and information handling system

Actions:

- The Liaison Group will continue to support work by the Strangford Lough Office to establish a system for sharing and presenting data, including the use of GIS.

Objective 7: Address regulation issues

Actions:

- Relevant Departments will seek to address the deficiencies in regulation identified in the management scheme (see page 53) at the earliest opportunity.
- The Liaison Group will review the need for additional or modified byelaws covering Strangford Lough. Should the introduction of new byelaws be necessary this will only follow public consultation.
- The Liaison Group will review existing codes of practice and the need for additional measures based on voluntary agreements, such as zoning.

Objective 8: Develop a shared communication system

Actions:

- EHS, the District Councils, the National Trust and SLMC will continue to support the Strangford Lough Information Network under the direction of the Strangford Lough Office. This includes the development of a Strangford Lough website and various interpretive products.

Objective 9: Review the Management Scheme and Action Plan

Actions:

- The Liaison Group will annually review and update this three year Action Plan. This will include a review of the conservation feature monitoring programme.
- The management scheme will be formally reviewed by the Liaison Group as required or as requested by one or more of the competent or relevant authorities.

Appendix 1

EXTRACTS FROM *The Conservation (Natural Habitats, etc.) Regulations (Northern Ireland) 1995*

Relevant authorities in relation to marine areas and European marine sites (Regulation 4)

For the purposes of these Regulations the relevant authorities, in relation to a marine area or European marine site, are such of the following as have functions in relation to land or waters within or adjacent to that area or site –

(a) a district council;

(b) the Commissioners of Irish Lights;

(c) a harbour authority as defined by the Harbours Act (Northern Ireland) 1970 (section 38);

(d) the Fisheries Conservancy Board for Northern Ireland;

(e) The Foyle Fisheries Commission; and

(f) A pilotage authority within the meaning of the Pilotage Act 1983

Competent authorities generally (Regulation 5)

For the purposes of these Regulations the expression "competent authority" includes government departments, district councils and statutory undertakers and any trustees, commissioners, board or other persons who, as a public body and not for their own profit, act under any statutory provision for the improvement of any place or the production or supply of any commodity or service.

Marking of site and advice by the Secretary of State (Regulation 28)

(1) The Secretary of State may install markers indicating the existence and extent of a European marine site.

(2) As soon as possible after a site becomes a European marine site, the Secretary of State shall advise the relevant authorities as to –

(a) the conservation objectives for that site; and

(b) 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.

Management scheme for European marine site (Regulation 29)

The Department, the Department of Agriculture and the relevant authorities, or any of them, may establish for a European marine site a management scheme under which their functions (including any power to make byelaws) shall be exercised so as to secure in relation to that site compliance with the requirements of the Habitats Directive.

(2) Only one management scheme may be made for each European marine site.

(3) A management scheme may be amended from time to time.

(4) As soon as a management scheme has been established by the relevant authority or authorities, or is amended, a copy of it shall be sent by the relevant authority or authorities concerned to the Secretary of State.

Direction to establish or amend management scheme (Regulation 30)

(1) The Secretary of State, or persons authorised on his behalf, may give directions to the relevant authorities, or any of them, as to the establishments of a management scheme for a European marine site.

(2) Directions may in particular-

(a) require conservation measures specified in the direction to be included in the scheme;

(b) appoint one of the relevant authorities to co-ordinate the establishment of the scheme;

(c) set time limits within which any steps are to be taken;

(d) provide that the approval of the Secretary of State is required before the scheme is established; and

(e) require any relevant authority to supply to the Secretary of State such information concerning the establishment of the scheme as may be specified in the direction.

(3) The Secretary of State, or persons authorised on his behalf, may give directions to the relevant authorities, or any of them, as to the amendment of a management scheme for a European marine site, either generally or in any particular respect.

(4) Any direction under this regulation shall be in writing and may be varied or revoked by a further direction.

Appendix 2

DESCRIPTION OF KEY COMMUNITIES

Subtidal Rock and Boulder Communities

In the strong tidal currents of the Strangford Narrows, bedrock and associated surfaces can be entirely clothed in suspension-feeding species; most notably the soft coral known as Dead Man's Fingers *(Alcyonium digitatum)*; sponges, especially Elephant's Ear Sponge *(Pachymatisma johnstonia)* and Rock-boring Sponge *(Cliona celata)* can reach massive proportions; tunicates, particularly Gooseberry Seasquirt *(Dendrodoa glossularia)* and *Corella parallelogramma* and sea-anemones including Plumose Anemone (*Metridium senile*).

Very large boulders are also found over much of the bed of the Narrows, and are subject to strong but probably turbulent tidal currents. These boulders are clothed with encrusting sponges such as *Myxilla incrustans* and *M. fimbriata* with abundant hydroids, especially *Tubularia indivisa*, and sea-anemones including *Sagartia elegans, Corynactis viridis* and *Actinothoe sphyrodeta.* Algae include *Laminaria hyperborea, Palamaria palmata* and *Alaria esculenta.*

In other areas where current speeds are slightly reduced, the mobility of the smaller cobbles which comprise the seabed prevents a rich biota establishing. Algae include *Schmitzia hiscockiana* and fauna include the hydroid *Rhizocaulus verticillatus* and the mollusc *Leptochiton asellus.*

In even more sheltered areas where the seabed is dominated by boulders, Sugar Kelp *Laminaria saccharina* predominates with some Bootlace Weed *Chorda filum*, Sea Lettuce *Ulva lactuca* and Sea Oak *Halidrys siliquosa*. Fauna includes the hydroid *Obelia geniculata*, bryozoans *Alcyonidium gelatinosum* and *Electra pilosa*, the starfish *Henricia oculata* and tunicates *Clavelina lepadiformis* and *Ascidia mentula.*

Subtidal Gravel and Sand Communities

Very coarse sands at each end of the Narrows are thrown into waves or dunes running at right angles to the current and the largest area extends well south of the Bar, with a much smaller patch in the main channel at the South of the Lough where there is still considerable laminar flow. The current throws the substrate into "mega-ripples" up to 1 metre high and 2-10 metres apart. The fauna includes holothurian *Neopentadactyla mixta*, the Dog Cockle *Glycymeris glycymeris* and crab *Atelecyclus rotundatus.* Off Ballyquintin Point, the Purple Heart-urchin *Spatangus purpureus* replaces *N. mixta.*

Level bottom coarse sands mixed with gravel and cobble occur in areas with currents of around two knots. Brittle-stars are the dominant fauna, especially *Ophiothrix fragilis* and *Ophiocomina nigra*, but with sponges such as *Suberites carnosus*, tunicates including *Ciona intestinalis*, the King Scallop *Pecten maximus* and Swimming Crab *Liocarcinus depurator*.

Clean sand is found in small pockets at the outer fringes of open bays such as Granagh, just out of the strongest tidal currents. Typified by the Razor-shell *Ensis arcuatus*, Blunt Gaper *Mya truncata*, Sand-eel *Ammondytes tobianus* and Hermit Crab *Pagurus bernhardus*, with juvenile flatfish often present.

A distinct community called maerl is formed by a growth of loosely bound nodules and branches of calcareous red algae, particularly *Phymatolithon calcareum*, on the surface of gravel beds. It occurs sparsely at Audleys Road and Ballydorn and is associated with sea-cucumber *Neopentadactyla mixta* and Parchment Worm *Chaetopterus variopedatus.*

Subtidal Rocky Reef Communities

These rock communities are found in areas of reduced but still relatively fast current flow, where subtidal pladdies of cobbles and boulders rise from coarse sand bottoms to near the surface. Typical species include the Devonshire cup coral *Caryophyllia smithii,* the anemone *Sagartia elegans* and, on the shallow, turbulent tops of the reefs, a wide range of algae.

Coarse sand scours rock-surfaces at the sides and either end of the Narrows. Here the characteristic species is the Lemon Sea-mat *Flustra foliacea*, more delicate forms being abraded off the rock surface. Encrusting species of red algae are also found.

Where there are reefs and pladdies with some wave exposure and moderately strong currents, particularly in the shallow waters on the sides of the Narrows, in the southern part of the Lough the kelps *Laminaria digitata* and *L. hyperborea* predominate, with coralline and foliose red algae. Fauna includes Edible Sea Urchin *Echinus esculentus*, Devonshire Cup Coral *Caryophyllia smithii,* squat Lobster *Galathea squamata* and Velvet Swimming Crab *Liocarcinus puber.*

Subtidal Fine Sand and Mud Communities

Clean, rippled, fine sand occurs where currents are still noticeable and some wave-action is present, such as at Ballywhite. The characteristic species are the Sea-potato *Echinocardium cordatum*, a burrowing brittle-star *Amphiura brachiata* and sea-cucumber *Labidoplax digitata,* sometimes with the Masked Crab *Corystes cassivelaunus*. In slightly muddier situations such as in the northern shallows, Lugworms *Arenicola marina* dominate.

Muddy fine sand with gravel and shell among cobbles is a rather mixed habitat and is generally found in shallow, sheltered areas such as Ballywhite Bay. Cobbles support growths of *Sacchorhiza polyschides*, *Laminaria saccharina* and *Chorda filum*, typically with green algae *Asperococcus* spp., burrowing anemones *Cerianthus lloydii* and *Halcampa chrysanthellum.* Tunicates such as *Ascidiella aspera* live in the sediments and the Gobies *Pomatoschistus pictus*

and *Gobiusculus flavescens* among the algae.

In more sheltered waters, usually at somewhat greater depth, muddy fine sand occurs. The Slender Sea-pen *Virgularia mirabilis*, is conspicuous, though not abundant. Other species include burrowing brittle-stars *Amphiura chiajei* and *A. filiformis,* sea-anemones *Cerianthus lloydii, Sagartiogeton laceratus* and *S.undatus,* the Pelican's Foot Shell *Aporrhais pespelecani,* Tower Shell *Turitella communis,* and off Killyleagh the Hardshell Clam *Arctica islandica.*

Fine mud occurs in very sheltered locations where either limited fetch or greater depth prevent wave-generated disturbance and where currents are slight. The most significant species is the Dublin Bay Prawn *Nephrops norvegicus* which lives in burrows and often reaches unusually large size. Also present are the crab *Goneplax rhomboides*, Sea Mouse *Aphrodite aculeata* - a large scale-worm, and Fries' Goby *Lesuerigobius friesli* - a scarce fish which shares Prawn burrows.

Muddy sand with cobble is most frequently encountered on the eastern side of the South part of the Lough in areas of weaker current, the King Scallop is characteristic of this habitat, with Common Starfish *Asterias rubens*, Spiny Starfish *Marthasterias glacialis* and Common Sunstar *Crossaster papposus.*

Fine mud with shell extends through much of the central part of the Lough. It is described under Sub-Feature "*Modiolus* Communities".

Since its accidental introduction, Japanese seaweed *Sargassum muticum* has established in sheltered areas of the shallow sub-littoral, attaching to any solid surface including jetties, cobbles and shells. It was first observed in 1994 and is now present throughout the Lough.

Intertidal Rock and Boulder Communities

Though most of the intertidal zone is clothed in sediments, glaciated or sea-worn bedrock outcrops are found at many locations. Also massive boulders - glacial erratics or the cores of eroded drumlins - occur on the shore and form pladdies. Whilst Silurian rocks predominate, there is sandstone at Mountstewart and limestone at Limestone Rock. The fauna and flora are dependent on the rock type, the angle of its bedding plane and degree of weathering, on position on the shore and on exposure to currents and waves.

The soft surface of sandstone is too impermanent to permit algal growth of other than ephemeral species such as *Enteromorpha* and *Dumontia incrassata* with a few grazing littorinid molluscs. The limestone, however, is heavily bored by bivalves such as the Common Piddock *(Pholas dactylus)* and *Hiatella arctica*, and by worms such as *Polydora ciliata.* The Piddock also bores into overconsolidated clay in Ardmillan Bay and Granagh Bay - an unusual phenomenon.

Species of Kelp *(Laminaria)* dominate low water rocky sites in the southern half of Strangford Lough. *Laminaria digitata* occurs below the *F. serratus* belt with *L. hyperborea* below it in the sublittoral and down to 10-15 metres. Sugar Kelp *(L.saccharina)* is found in more sheltered areas, often attached to quite small stones. An understorey of red, particularly coralline algae is present in clean areas, but is much impoverished in silty areas. Epiphytic species include *Palmaria palmata* var *sarniensis, Plocamium cartilaginium, Ceramium* and *Polysiphonia* spp.

Much of the Lough shore is covered by boulders. The nature of the flora and fauna varies considerably with exposure and position on the shore. Upper-shore and more exposed areas tend to support less algal growth and Barnacles (largely *Elminius modestus*) and Limpets *(Patella vulgata)* dominate.

On the middle shores in the central part of the Lough there are very extensive beds dominated by Knotted Wrack *(Ascophyllum nodosum)* which grows to prodigious lengths of up to five metres in sheltered boulder areas. An algal understorey of *Audouinella, Cladophora, Ulva, Lomentaria, Plumaria, Membranoptera* and *Phyllophora* spp., *Chondrus crispus* and *Mastocarpus stellatus* occurs. Many small molluscs, especially littorinids, also Shore Crabs, amphipods, isopods and polychaetes are typical of the fauna. More unusual is the epifauna which includes sponges such as the Breadcrumb Sponge *Halichondria panicea*, Purse Sponge *Grantia compressa* and *Scypha ciliata*, and colonial ascidians.

Lower on the shore, Saw Wrack (*Fucus serratus*) dominates, often supporting the epiphyte *Elachista fucicola*. The richer algal understorey includes Dulse (*Palmaria palmata var sarniensis* - a sheltered water form), *Leathesia difformis, Polysiphonia, Callithamnion* and *Ceramium* spp. and coralline red algae such as *Corallina officinalis.*

Most animal species present in the Saw Wrack zone also occur among the *Laminaria*, but the tangled rhizoids of the kelp hold-fasts provide an additional niche occupied by a diverse community including: amphipods *Caprella acanthifera*, *Amphithoe rubricata* and *Ericthonium punctatus*; small polychaetes *Nicolea* spp, *Fabricia sabella* and *Syllidae*; bryozoans *Callopora lineata, Cellepora pumicosa* and *Escharoides coccinea*; colonial ascidians; and molluscs such as the Blue-rayed Limpet *Patina pellucida* and Painted Top-shell *Calliostoma zizyphinum* (especially the white variety *lyonsii* within the Lough).

Intertidal Sand and Gravel Communities

The sheltered nature of the Lough makes clean sand a relatively rare habitat. Algae are generally absent from these shores. The invertebrate fauna includes the bivalves Thin Tellin, Common Cockle and Golden Carpet Shell, (*Paphia aurea*).

Areas with moderate wave or current action often consist of gravel, either clean or mixed with sands, broken shell or mud. Gravel areas occur as shingle spits to islands and at bays in the Narrows. The area on the north side of Ballyhenry Point is particularly rich. Any algae tend to be ephemeral, green or brown, filamentous types of genera such as *Enteromorpha*, *Chaetomorpha* and *Ectocarpus* with some Sea Lettuce. However, on the sheltered, landward side of Ballyhenry Island, the unattached brown alga *Ascophyllum nodosum* var. *mackaii* is

abundant. Gravel fauna includes: Common Mussels which can form dense surface beds, and in the sediment the Peppery Furrow Shell (*Scrobicularia plana*); sea-anemones *Halcampa chrysanthellum, Edwardsia timida* and the Dahlia Anemone *(Urticina felina)*; holothurian *Leptosynapta inhaerens*; and Sipuculid *Golfingia vulgaris*. This exceptional assemblage of species is found on the lower shore, with little besides amphipods and isopods among the free-draining shingle of the upper shore.

Much of the muddy shoreline in sheltered areas is fringed by small, loose stones overlying gravel or finer sediments. These also occur where freshwater flows down the shore. More extensive areas are found at Paddy's Point, Ballyreagh and the south side of Castleward Bay. Smaller brown algae such as Spiral Wrack (*Fucus spiralis*) and Bladder Wrack (*F. vesiculosus*) form partial cover over stony areas, with *F. ceranoides* and *Enteromorpha* where fresh water seepage occurs. Typical fauna includes the Rough Winkle *(Littorina saxatilis)* and *Lepidochitona cinereus.*

In much more exposed situations, stones are abraded by the pounding of waves to become rounded. These cobbles can be piled to an appreciable depth. This free-draining habitat is inhospitable to macroalgae and epifauna alike. However, the closely adpressed mollusc *Lepidochitona cinereus* and well armoured Rough Winkle survive as do the highly mobile Sea Slater (*Ligia oceanica*), amphipod *Marinogammarus marinus* and Shore Crab *(Carcinus maenas*). Butterfish (*Centronotus gunnellus*) survive during low tides in damp crevices among the stones and wrack.

Horse Mussel (*Modiolus modiolus*) beds

These communities are found in three main forms

1. Full development of the climax community depends on the very sheltered, plankton-rich waters of extremely low turbidity found in the central-to-northern area. It is based on beds of the Horse Mussel *Modiolus modiolus* which is often virtually buried in mud. The mussel-clumps provide a hard surface in an otherwise soft-sediment environment on which numerous other species - up to 100 -depend. The Horse Mussels, which rarely occur in such still waters, and their dead shells are clothed in a dense epifauna of: hydroids including *Sertularia, Sertularella, Hydrallmania, Kirchenpaueria* and *Abietinaria*; sea-anemones *Sagartia* and *Cerianthus* ; sponges including *Tethya, Suberites, Mycale, Spanioplon* and *Amphilectus*; bryozoans including *Bugula, Alcyonidium* and *Cellepora*; and tunicates including *Dendrodoa, Ascidiella, Corella* and *Pyura*. These are very susceptible to smothering in silt if the bottom is disturbed. Many mobile suspension feeders also occur, particularly the Variable Scallop *Chlamys varia* which is co-dominant with Horse Mussel and also the Queen Scallop *Aequipecten opercularis*, the Banded Carpet Shell *Paphia rhombiodes*, the Peacock Worm *Sabella pavonina*, the tube worm *Myxicola infundibulum*, the Feather Star *Antedon bifida*, various brittle stars, and the sea-cucumbers *Thyonidium commune, Thyone fusus* and *T. roscovita.* Grazers, detritus feeders and predators include the Common Whelk *Buccinim undatum*, the Bonnet Limpet *Capulus ungaricus*, the Painted Top-shell *Calliostoma zizyphinum*, the sea-slug *Eubranchus tricolor*, the scale-worm *Harmothoe extenuata*, the sea- urchins *Echinus esculentus* and *Psammechinus miliaris*, the starfish *Henricia oculata* and *Crossaster papposus*, the spider crabs *Inachus dorsettensis* and *Hyas* spp. the squat lobsters *Galathea intermedia* and *Munida rugosa*, the crabs *Liocarcinus depurator* and *Cancer pagurus* and small Lemon Sole *Microstomus kitt.*

2. A similar species list, still dominated by the Horse Mussel, but with brittle-stars *Ophiothrix fragilis* and *Ophiocomina nigra* replacing the Variable Scallop *Chlamys varia* as co- dominant, occurs in the central to south-western area where water movement is slightly greater.

3. Fringing, shallower areas, and deep areas where sediment has been disturbed, smothering the fine epifauna, may have some live Horse Mussels, but dead shells tend to be colonized by sea- squirts, particularly *Ascidiella aspera* and *Corella parallelogramma*. Sediment dwelling suspension feeders *Thyone commune, T. roscovita* and *Amphiura filiformus* are typical, along with whelks, starfish and crabs. Queen Scallops can be plentiful in this habitat.

Eelgrass (*Zostera*) Beds

The following descriptions are based largely on the MNCR biotope classification for seagrass beds. It should be noted that *Z. noltii* and *Z. angustifolia* occur together in the intertidal beds in Strangford Lough. They appear to be more common than *Z. marina*, which was formerly the dominant species in the Lough.

Zostera angustifolia

Expanses of clean or muddy fine sand in shallow water and on the lower shore (typically to about 5 m depth) can have dense stands of *Zostera marina/angustifolia* [Note: the taxonomic status of *Z. angustifolia* is currently under consideration].

The community composition may be dominated by these *Zostera* species and therefore characterised by the associated biota. Other biota present can be closely related to that of areas of sediment not containing *Zostera marina*, for example, *Laminaria saccharina, Chorda filum* and infaunal species such as *Ensis* spp. and *Echinocardium cordatum*. It should be noted that sparse beds of *Zostera marina* may be more readily characterised by their infaunal community.

Zostera noltii

Zostera noltii usually occurs on mid and upper shore on wave-sheltered muddy fine sand or sandy mud. Exactly what determines the distribution of the *Zostera noltii* is, however, not entirely clear. *Zostera noltii* can often be found in small lagoons and pools, remaining permanently submerged, and on sediment shores where the muddiness of the sediment retains water and stops the roots from drying out. The infaunal community is characterised by polychaetes *Pygospio elegans* and *Arenicola marina*, mud amphipods *Corophium volutator* and bivalves *Cerastoderma edule, Macoma balthica* and *Scrobicularia plana.* Typically an epifaunal community is found that includes the mud

snail *Hydrobia ulvae*, shore crabs *Carcinus maenas* and the green alga *Enteromorpha* spp.

Zostera marina

Zostera marina, the largest species of eel-grass, grows in shallow, sheltered muds. Beds of this plant were formerly much more extensive but were decimated by the *Zostera* wasting disease in the early 1930s. It has re-established patchily and is found off Pig Island, Taggart Island, in the Dorn inlet and at Castleward Bay. Sugar Kelp and Bootlace Weed may be co-dominant with Lugworm *Arenicola marina* and the sea-cucumber *Thyone fusus* generally present in the sediment.

The *Zostera* spp. cover in Strangford Lough tends to be patchy but extensive on the northern mudflats, extending from Island Reagh, past Castle Espie and Comber to Newtownards and then southwards to Greyabbey. Other eelgrass beds occur on the muddy-sand bays e.g. at Mahee Bay and Ardmillan to the west and at Gransha Point on the eastern shore. The eelgrass leaves appear around June and the meadows grow over the mudflats until October.

The introduced seaweed *Sargassum muticum* has begun to colonise areas of *Zostera* habitat where suitable shells or pebbles are available for attachment and also "stone-walks" into such areas.

Saltmarsh Communities

Much of the muddy shoreline of Strangford Lough is fringed by a narrow strip of saltmarsh, largely Scurvy Grass *Cochlearia officinalis*, Saltmarsh Grass *Puccinellia maritima*, Sea Aster *Aster tripolium* and Saltmarsh Rush *Juncus gerardii*. However the habitat is more extensive at the Comber Estuary (where mature, level saltmarshes, some with salt pans, occur), at Ballyrickard, Doctors Bay to the Dorn (especially near Gransha Point), at Ballyquintin, Killard, and Rathgorman. Outside the Lough the Templecowey area is important. The marshes at the Comber Estuary are of national importance. Here, a pioneer zone of Glasswort *Salicornia* spp. gives way to vegetation dominated by Saltmarsh Grass which may be mixed with Lax-flowered Sea Lavender (*Liminium humile* is the characteristic species in Northern Ireland), Sea Aster, Sea Arrow-grass *Triglochin maritima*, Sea Pink *Armeria maritima* and Sea Plantain *Plantago maritima*. At higher levels this community is replaced by one containing Red Fescue *Festuca rubra* and Saltmarsh Rush as co-dominants. It is backed, in places, by Common Reed *Phragmites australis* which even fringes the shore without a saltmarsh zone near Island Hill. The introduced Cord-grass *Spartina anglica* has established in pans and creeks at Comber Estuary, Ballyrickard, Doctors Bay, Horse Island and Gransha Point. It also occurs as slumps and extensive meadows further down the shore, particularly at Ardmillan Bay where it was first introduced. In many areas, saltmarsh provides important high-tide roosts for wading birds. Some more unusual plants occur in small patches of flushed saltmarsh on rocky shores at the mouth of the Lough. These include Chestnut Sedge (*Blysmus rufus*) and the Spike-rushes *Eleocharis uniglumis and E. quinquefolia.*

Annual Vegetation of Drift Lines

In the United Kingdom this Annex 1 habitat corresponds to strandline communities identified in the National Vegetation Classification (NVC) as types SD2 *Cakile maritima-Honckenya peploides* and SD3 *Matricaria maritima-Galium aparine.* The NVC is a system for classifying vegetation on the basis of plant species composition. Since its development in the 1980s, the NVC has become the standard classification for describing vegetation in Britain. Although the coverage did not extend to Northern Ireland, it is possible to ascribe most, if not all, of NI plant communities to an appropriate NVC community. This is particularly true for coastal communities, many of which were surveyed by Lancaster University (under contract to EHS) at a range of coastal sites around NI in the early 1990s.

"Annual vegetation of drift lines" tends to occur as narrow, linear stands that are widely scattered along the coastline. The majority of species associated with the habitat are characteristic of coastal sites that receive large amounts of organic material - generally seaweed and other debris that have been deposited above the high water mark by storm events. As a result, the habitat has an ephemeral quality to it, and can vary in extent and vigour from year to year.

In selecting NI examples of strandline vegetation for the Natura 2000 network, EHS has favoured areas with extensive stands of the community. In addition, as the community tends to be dominated by nitrogen-loving species (e.g. Cleavers *Galium aparine,* Orache *Atriplex prostrata,* etc.) that are generally fairly common around the coastline of Northern Ireland, extra weight has been given to examples with more notable species. Sea-beet *Beta vulgaris* ssp. *maritimus* is such a species; it tends to be characteristic of the SD1 community, which is typical of strandline communities from more southerly parts of the UK. However, the species is found abundantly in some NI SD3 communities, particularly around Strangford Lough.

Given the extensive nature of the habitat around Strangford Lough, the presence of both of the relevant NVC communities (SD2 and SD3), and the abundance of Sea-beet *Beta vulgaris* ssp. *maritimus* (which gives the community its regional distinctiveness), it was felt that the Lough represents an important example of the habitat in Northern Ireland, and contributes to the overall geographical coverage of the habitat within the UK.

Appendix 3

LEGAL BACKGROUND TO MNR DESIGNATION AND MANAGEMENT

The Marine Nature Reserve was established under Article 20 of *The Nature Conservation and Amenity Lands (NI) Order 1985* (NCALO). It imposes an obligation on the Secretary of State for Northern Ireland to manage a designated Marine Nature Reserve for the purpose of:

a) conserving marine flora, fauna or features of geological, physiographical or other scientific or special interest in the area; or

b) providing, under suitable conditions and control, special opportunities for the study of, and research into, matters relating to marine flora and fauna and the physical conditions in which they live, or for the study of features of geological, physiographical or other scientific or special interest in the area.

The Secretary of State is empowered, but not required, to install markers indicating the existence and extent of a reserve and to make byelaws. The scope of such byelaws is presented in Article 21 of the 1985 Order.

Byelaws for Protection of Marine Nature Reserves

Article 21

(1) Subject to this Article, the Secretary of State may make byelaws for the protection of any area designated as a marine nature reserve under Article 20.

(2) Without prejudice to the generality of paragraph (1), byelaws made under this Article as respects a marine nature reserve—

(a) may provide for prohibiting or restricting, either absolutely or subject to any exceptions—

(i) the entry into, or movement within, the reserve of persons and vessels;

(ii) the killing, taking, destruction, molestation or disturbance of animals or plants of any description in the reserve, or the doing of anything therein which will interfere with the seabed or damage or disturb any object in the reserve: or

(iii) the depositing of rubbish in the reserve;

(b) may provide for the issue, on such terms and subject to such conditions as may be specified in the byelaws, of permits authorising entry into the reserve or the doing of anything which would otherwise be unlawful under the byelaws;

(c) may be so made as to apply either generally or with respect to particular parts of the reserve or particular times of the year.

(3) Before making byelaws under this Article the Secretary of State shall consult the Council for Nature Conservation and the Countryside.

(4) Nothing in byelaws made under this Article shall -

a) prohibit or restrict the exercise of any right of passage by a vessel other than a pleasure boat; or

(b) prohibit, except with respect to particular parts of the reserve at particular times of the year, the exercise of any such right by a pleasure boat.

(5) Nothing in byelaws so made shall make unlawful—

(a) anything done for the purpose of securing the safety of any vessel, or of preventing damage to any vessel or cargo, or of saving life;

(b) the discharge of any substance from a vessel; or

(c) anything done more than 30 metres below the sea bed.

(6) In this Article "vessel" includes a hovercraft and any aircraft capable of landing on water and "pleasure boat" shall be construed accordingly.

(7) References in this Article to animals or plants of any description include references to eggs, seeds, spores, larvae or other immature stages of animals or plants of that description.