SCOTTISH NATURAL HERITAGE

Sullom Voe
Special Area of Conservation

Advice under Regulation 33(2)

of The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended)

30 March 2006

About this Package:

Section 1 of this document provides a general introduction and Sections 2 and 3 fulfil Scottish Natural Heritage's duties under Regulation 33(2) of The Conservation (Natural Habitats, &c.) Regulations 1994 (Habitats Regulations) (as amended by The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004). This requires that SNH advises other relevant authorities as to the conservation objectives of the site (see Section 2) and any operations which may cause deterioration of natural habitats or the habitats of species, or disturbance of species, in so far as such disturbance could be significant, for which the site has been designated (see Section 3).

Annexes A and B provide supplementary, non-statutory information. Annex A gives information on the sensitivity and vulnerability of the qualifying interests: 'Coastal lagoons'; 'Large shallow inlets and bays'; 'Reefs'. Annex B gives some indication as to the extent, distribution, structure, function and processes that affect the qualifying interests. It should be noted that this is indicative and not definitive, and as more site information is gathered these sections may be updated.

Sullom Voe was designated by Scottish Ministers as a Special Area of Conservation (SAC) on 17th March 2005. This site is also referred to as a 'European site' (Regulation 10(1)). A 'European marine site' is a 'European site' which is wholly or in part marine (Regulation 2(1)) and is hereafter referred to as a marine SAC.

Although the following statutory information is for the benefit of relevant authorities (see below for explanation of their role), it can also be used by other competent authorities when assessing plans or projects.

1 Introduction

1.1 Background

The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended by The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004), commonly referred to as the Habitats Regulations, transpose the EC Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora (Habitats Directive) into domestic legislation. Regulation 33(2) gives Scottish Natural Heritage a statutory responsibility to advise other relevant authorities as to the conservation objectives for marine SACs in Scotland, and 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.

This document presents the Regulation 33 advice, plus supporting information, for the Sullom Voe SAC to assist relevant and competent authorities, local interest groups and individuals in considering management (including any management scheme) of the site. This advice, plus supporting information, will also help to determine the scope and nature of any "appropriate assessment", which the Habitats Directive requires to be undertaken for proposed plans and projects that are not connected to the conservation management of the site and are considered likely to have a significant effect. Where necessary Scottish Natural Heritage will also provide more detailed advice to relevant, and other competent, authorities to inform assessment of the implications of any such plans or projects.

1.2 Relevant and competent authorities

Within the context of a marine SAC, a relevant authority is a body or authority that has a function in relation to land or waters within or adjacent to the site (Regulation 5) and include: a nature conservation body; a local authority; water undertakers; a navigation authority; a harbour authority; a lighthouse authority; a river purification board (SEPA); a district salmon fishery board; and a local fisheries committee. All *relevant authorities* are *competent authorities*.

A competent authority is defined in Regulation 6 as "any Minister, government department, public or statutory undertaker, public body of any description or person holding a public office". In the context of a plan or project, the *competent authority* is the authority with the power or duty to determine whether or not the proposal can proceed.

1.3 The role of relevant authorities

The Habitats Regulations require relevant authorities to exercise their functions so as to secure compliance with the Habitats Directive. A management scheme may be drawn up for each marine SAC by the relevant authorities as described under Regulation 34. For marine SACs with overlapping interests, a single management scheme may be developed.

Where a management scheme is in place the relevant authorities must ensure that all plans for the area integrate with it. Such plans may include shoreline management plans, Sites of Special Scientific Interest (SSSI) management

plans, local Biodiversity Action Plans (BAPs) and sustainable development strategies for estuaries. This must occur to ensure that only a single management scheme is produced through which all relevant authorities exercise their duties under the Habitats Regulations.

1.4 Responsibilities under other conservation designations

Other designations within or adjacent to the Sullom Voe marine SAC are: Yell Sound Coast SAC; Yell Sound Coast SSSI; Voxter Voe & Valayre SSSI; Burn of Valayre SSSI. The obligations of relevant, and other competent authorities and organisations under such designations and legislation are not affected by the advice contained in this document.

1.5 Conservation objectives

Section 2 of this document contains the conservation objectives for the Sullom Voe marine SAC, a site which consists entirely of marine qualifying interests. The conservation objectives have been developed to ensure that the obligations of the Habitats Directive are met.

1.6 Advice as to operations

The operations, set out in Section 3, are those which SNH advise may cause deterioration of natural habitats for which the site has been designated. This does not necessarily mean that the operations are *presently* ongoing or, if they are, that they are at levels incompatible with the conservation objectives.

1.7 Plans and projects

The Habitats Regulations require that, where an authority concludes that a development proposal is unconnected with the nature conservation management of a Natura site and is likely to have a significant effect on that site, it must undertake an appropriate assessment of the implications for the qualifying interest for which the area has been designated.

1.8 Review of Consents

Competent authorities are required by the Habitats Regulations to undertake a review of all consents and permissions for activities affecting the site as soon as reasonably practicable after it becomes a European site. This will have implications for discharge and other consents, which will need to be reviewed in the light of the conservation objectives.

2 Statutory advice given by SNH under Regulation 33(2) Conservation Objectives

2.1 Introduction

This section provides conservation objectives, which have been developed by SNH in agreement with the Scottish Executive and are to be provided to the relevant authorities in fulfilment of the requirements under Regulation 33(2) of The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended by The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004).

The conservation objectives ensure that the obligations of the Habitats Directive are met; that is, there should not be deterioration or significant disturbance of the qualifying interest. This will also ensure that the integrity of the site is maintained and that it makes a full contribution to achieving favourable conservation status for its qualifying interests.

The Sullom Voe marine SAC has been designated for the habitats 'Coastal lagoons', 'Large shallow inlets and bays', and 'Reefs', which are listed on Annex I of the Habitats Directive.

The Sullom Voe SAC consists entirely of marine qualifying interests.

The conservation objectives for the Sullom Voe marine SAC are as follows:

To avoid deterioration of the qualifying habitats (**Coastal lagoons, Large shallow inlets and bays, Reefs**) thus ensuring that the integrity of the site is maintained and the site makes an appropriate contribution to achieving favourable conservation status for each of the qualifying interests.
To ensure for the qualifying habitats that the following are maintained in the long term:
• Extent of the habitat on site
• Distribution of the habitat within site
• Structure and function of the habitat
• Processes supporting the habitat
• Distribution of typical species of the habitat
• Viability of typical species as components of the habitat
• No significant disturbance of typical species of the habitat

3 Statutory advice given by SNH under Regulation 33(2) Operations

The following advice as to operations to be considered by relevant authorities is provided by SNH with respect to the Sullom Voe marine SAC in fulfilment of the requirements under Regulation 33(2)(b) of The Conservation (Natural Habitats, &c.) Regulations 1994 (as amended by The Conservation (Natural Habitats, &c.) Amendment (Scotland) Regulations 2004). The advice identifies those operations, either on or affecting the SAC, which may cause deterioration of the marine natural habitats or the habitats of species, or disturbance of species, for which the site has been designated. These include operations that may not be currently affecting the Sullom Voe marine SAC.

Operations (in alphabetical order)

Aquaculture
Finfish farming
Shellfish farming

Coastal Development
Agriculture
Civil engineering

Discharges / Waste Disposal
Discharge of commercial effluent
Discharge of sewage

Fishing
Hydraulic fishing
Mobile gear: Dredging
Static gear: Creel / Pot fishing
Static gear: Line fishing
Static gear: Netting

Gathering / Harvesting
Bait gathering
Diver collection of shellfish
Harvesting of seaweed subtidally
Intertidal collection of shellfish
Intertidal gathering of cast seaweed

Marine Development
Aggregate extraction
Maintenance dredging
Oil exploration, operations and maintenance

Marine Traffic
Boat maintenance and antifoulant use
Commercial vessels

Recreational Activities
Angling
Boat anchorages
Boat moorings
Charter / recreational vessels
Scuba diving

Scientific Research
Scientific research

Annex A

Non-statutory advice given by SNH
Sensitivity and Vulnerability of the Sullom Voe SAC 'Coastal lagoons', 'Large shallow inlets and bays', and 'Reefs' to activities listed in Section 3

The comments below are general and should not be considered to be definitive. They are made without prejudice to any comments SNH may provide or any assessment that may be required for specific proposals to be considered by a relevant authority. The level of any impact will depend on the location and intensity of the relevant activity. This advice is provided to assist and focus the relevant authorities in their consideration of the management of these operations.

NB. References to deterioration in the comments section below should be taken to mean *deterioration of all the qualifying interests*. If specific qualifying interests are particularly at risk they may be referred to individually where relevant.

Operations	Comments
Aquaculture	
Finfish farming	Finfish farming has the potential to cause deterioration of qualifying habitats and communities through changes in water quality, smothering from waste material and physical disturbance from mooring systems. There is potential for accidental introduction of new non-native species and increasing the spread of existing non-native plants and animals (e.g. *Caprella mutica* Japanese skeleton shrimp), which are already widely distributed in the UK. Invasive species have the potential to cause deterioration of the qualifying interests by altering community structure and quality. The associated environmental effects mentioned above are usually localised but the reduced water exchange within sea lochs may exacerbate these effects and cumulative impacts should be considered.
Shellfish farming	This activity has the potential to cause deterioration of the qualifying habitats and communities through physical damage (e.g. installation of mooring blocks and continued scouring by riser chains) and changes in community structure caused by smothering from pseudo-faeces (undigested waste products) and debris (including dead shells) falling from the farm. There is also potential for accidental introduction of new non-native species and increasing the spread within the UK of existing non-native plants and animals (e.g. *Sargassum muticum* Wireweed), through importation or translocation of shellfish stocks. Invasive species have the potential to cause deterioration of the qualifying interests by altering community structure and quality. The associated environmental effects mentioned above are usually localised but the reduced water exchange within voes may exacerbate these effects and cumulative impacts (such as effects on carrying capacity) should be considered.

Coastal Development		
Agriculture		Diffuse run-off from agricultural practices have the potential to cause deterioration of qualifying interests through smothering, altering water quality through discharge of organic and inorganic pollutants, and causing lethal / sublethal effects on marine plants and animals.
Civil engineering		The construction and maintenance of structures, both within and adjacent to the sea have the potential to cause direct loss of qualifying habitat and deterioration of adjacent qualifying habitats and communities as tidal currents and therefore coastal processes are affected. For example coastal structures such as linear coastal defences or erosion control measures (e.g. gabions) can affect local sediment suspension and deposition patterns and therefore have the potential to cause deterioration of qualifying habitats such as reefs through smothering. Installation, replacement and maintenance of undersea cables have the potential to cause direct loss of qualifying habitat as well as local deterioration of these habitats and communities.
Discharges / Waste Disposal		
Discharge of commercial effluent		Commercial effluent has the potential to cause deterioration of qualifying habitats and communities. This would be through the effects of pollution and / or nutrient enrichment, which may cause subsequent changes in community structure.
Discharge of sewage		Sewage effluent (whether treated or untreated) has the potential to cause deterioration of qualifying habitats and communities. This would be through the effects of pollution and / or nutrient enrichment, which may cause subsequent changes in community structure.
Fishing		
Hydraulic fishing		Hydraulic fishing has the potential to cause deterioration of the qualifying habitats and communities through the large volumes of sediment disturbed by this method smothering the qualifying interest, particularly reefs.
Mobile gear: Dredging		Benthic dredging has the potential to cause deterioration of qualifying seabed habitats and communities through direct contact with dredge gear, and sedimentation when dredging occurs close to the reef qualifying interest.
Static gear: Creel / Pot fishing		The use of creels and / or pots in a localised area has the potential to cause deterioration of qualifying habitats and communities through direct contact, particularly during their deployment and / or recovery.
Static gear: Line fishing		Handlines and longlines have the potential to cause deterioration of qualifying interests through removal of target species and loss or imbalance of associated species, communities and ecosystems. Lost gear may cause deterioration to qualifying interests (particularly fragile and erect reef species) through entanglement.
Static gear: Netting		The use of bottom-set gill and tangle nets has the potential to cause deterioration of qualifying habitats and communities, particularly fragile and erect reef species, mainly during deployment and / or recovery, but also through gear loss leading to problems of entanglement.
Gathering / Harvesting		
Bait gathering		Bait gathering on the foreshore has the potential to cause deterioration of qualifying habitats and communities through physical damage and disturbance of intertidal habitats and communities, particularly reefs. This may cause deterioration of the qualifying interests by indirect impact through loss or imbalance of associated species, communities and ecosystems.

Gathering / Harvesting contd.		
Diver collection of shellfish		Collection of shellfish by diving has the potential to cause deterioration of the qualifying habitats and communities where the target species is a key component of a particular community, or where the collection method involves the use of invasive techniques (e.g. hydraulic equipment). Diving amongst qualifying habitats could cause deterioration and physical damage, in particular to erect and fragile reef species.
Harvesting of seaweed subtidally		Harvesting of seaweed subtidally has the potential to cause deterioration of habitats and communities by physical damage or through the loss of target species, which can cause imbalances in community and ecosystem structures.
Intertidal collection of shellfish		Collection of shellfish from intertidal areas has the potential to cause deterioration of qualifying habitat and communities through physical damage and disturbance to these habitats (trampling and turning stones), and removal of the target species, which can cause an imbalance of communities and ecosystems.
Intertidal gathering of cast seaweed		The gathering of cast seaweed has the potential to cause deterioration of qualifying intertidal habitats and communities through physical damage and disturbance (trampling). Removal of the target species can cause an imbalance of communities and ecosystems within the intertidal area, which may affect qualifying interests.
Marine Development		
Aggregate extraction		Extraction of subtidal aggregate has the potential to cause deterioration of the qualifying seabed habitats and communities through direct loss and impact within the extraction site. Such operations could result in the redistribution and deposition of significant quantities of fine particulate sediment, which could alter the sediment characteristics of adjacent areas and their associated plant and animal communities.
Maintenance dredging		Maintenance of shipping channels has the potential to cause deterioration of qualifying habitats and communities through direct contact with extraction gear, and sedimentation when this activity occurs close to reef qualifying interest.
Oil exploration, operations and maintenance		The laying and maintenance of oil pipelines or other associated infrastructure have the potential to cause deterioration of seabed qualifying habitats and communities through direct loss and localised impact. This activity may also affect hydrographic patterns of erosion and deposition. Oil spills and clean-up techniques (e.g. the use of dispersants, mechanical clean-up) have the potential to cause deterioration of qualifying interests through direct impact, or toxic chemicals causing lethal or sublethal effects on marine biota, which would cause subsequent changes in community structure. The introduction of non-native species through, for example, the discharge of ballast and attachment to ships' hulls could occur within or close to the SAC. Such introductions are already known to have occurred (e.g. Australian barnacle *Eliminus modestus* – now widespread and common throughout the UK, and the South American or Magellan mussel *Aulacomya ater*). Non-natives have the potential to cause deterioration of qualifying habitats and communities through alteration of community and substrate characteristics (e.g. through stabilising former mobile areas / destabilising former stable areas) or through competing with native species. Local authority emergency plans and oil spill contingency plans, including testing of emergency response fire-fighting equipment, should take into account specific qualifying interests and recognise the importance of marine SACs should such incidents occur.

Marine Traffic		
Boat maintenance and antifoulant use		Most antifoulant products are designed to kill or discourage naturally occurring organisms and, as such, cause damage to the water environment if used carelessly. Under such circumstances use of antifoulant has the potential to cause deterioration of qualifying habitats and communities within this site.
Commercial vessels		The pumping of bilges, discharge of ballast, accidental grounding, or accidental oil (or other chemical) spillage from commercial vessels could occur within or close to this SAC. Such incidents have the potential to cause deterioration of qualifying habitats and communities through direct and / or indirect impacts. Local authority emergency plans and oil spill contingency plans should take into account specific qualifying interests and recognise the importance of marine SACs should such incidents occur.
Recreational Activities		
Angling		Sea angling has the potential to cause deterioration of qualifying interests by removing target species, which could subsequently cause changes in community structure.
Boat anchorages		Anchors and continual scouring by riser chains have the potential to cause deterioration of qualifying interests, particularly reef habitats and communities through direct contact with such qualifying interests.
Boat moorings		Moorings and continual scouring by riser chains have the potential to cause deterioration of qualifying interests, particularly reef habitats and communities through direct contact with such qualifying interests.
Charter / recreational vessels		Boats have the potential to cause deterioration of qualifying habitats and communities (particularly reefs) through repeated launching and recovery in specific areas, accidental grounding, and accidental fuel spillages.
Scuba diving		Recreational diving in specific areas has the potential to cause deterioration of qualifying habitats and communities, in particular to qualifying reef erect and fragile species.
Scientific Research		
Scientific Research		Research activities have the potential to cause deterioration of qualifying habitats and communities through direct alteration, removal or manipulation of such qualifying interests and their associated species.

Annex B

Non-statutory Advice given by SNH
Site account

Site description

Sullom Voe SAC lies on the southern shore of Yell Sound in Mainland Shetland. The site encompasses Gluss Voe, Sullom Voe, Orka Voe and several small subsidiary arms and embayments including Voxter, Scatsta and Garths Voes and the Bight of Haggrister. A sill rising to 12 m between Ness of Haggrister and Voxter Ness separates the deep inner basin from the main channel of Sullom Voe. Gluss Voe is separated from Sullom Voe by a shingle spit, which may be breached during severe weather and extreme high tides. The shores at the entrances to Gluss, Sullom and Orka Voes are moderately exposed to wave action whereas extremely sheltered conditions prevail towards the head of Sullom Voe and within the houbs.

Qualifying marine interests

This complex site contains a number of important biological features recognised as subfeatures of the 'Large shallow inlets and bays' habitat. It encompasses a wide variety of marine habitats that enhance the quality of the SAC including the qualifying Annex I habitat 'Reefs' and the priority habitat 'Coastal lagoons.' However, it should be noted that these sub-features of Sullom Voe also qualify as Annex I features in their own right. For this reason the description of the 'Large shallow inlets and bays' habitat focuses on the sediment communities found within the main body of the site. Sediment communities found within the houbs are described under the heading 'Coastal lagoons', and intertidal and subtidal reef communities are described under the heading 'Reefs'.

Annex I Habitats
Coastal lagoons

The Houb of Fugla Ness and the Houb of Haggrister both qualify as the Annex I habitat 'Coastal lagoons'.

The Houb of Fugla Ness is a silled lagoon located on the western shore of Sullom Voe. Water-exchange occurs via a constricted channel in the shingle barrier at the mouth of the lagoon. The lagoon is extremely sheltered from wave-action and tidal streams are weak, except for tidal rapids within the channel. Boulder shores around the periphery of the lagoon are characterised by egg wrack (*Ascophyllum nodosum*), spiral wrack (*Fucus spiralis*) and channelled wrack (*Pelvetia canaliculata)*. Lugworms and the brackish-water wrack *Fucus ceranoides* dominate the community around the freshwater inflow. The shingle barrier at the mouth of the lagoon is colonised by juvenile mussels and a species-rich flora and fauna attached to, or living amongst, the mussels. Surface-dwelling populations of the common cockle *Cerastoderma edule* are an unusual component of the lagoon community. The sublittoral zone is characterised by pebbles and gravel on coarse sand, which is colonised by lugworms *Arenicola marina*, bootlace weed *Chorda filum*, bladder wrack and serrated wrack. The fucoid wracks are typically

unattached and the larger plants are extensively covered in epiphytes (i.e. they have other plants and animals growing on them). The brown shrimp *Crangon crangon*, the shore crab *Carcinus maenas*, the sand goby *Pomataschistus minutus* and the burrowing anemone *Edwardsia claparedii* are also present amongst the lagoon community.

The Houb of Haggrister is a percolation lagoon situated behind a shingle barrier, also on the western shore of Sullom Voe. Seawater percolates through the shingle barrier from Sullom Voe and over-tops the barrier on high tides and during storms. There is limited freshwater input from a small stream. The lagoon is extremely sheltered from wave action and there is negligible disturbance from tidal currents. Firm sand, pebbles and boulders occur in shallows on the northern shore of the lagoon. The habitat is characterised by dense beds of Beaked tasselweed *Ruppia maritima*, floating mats of filamentous green algae and occasional patches of egg wrack. The faunal community appears to be sparse, except for gammarid amphipods and a few small fish such as the fifteen-spined stickleback *Spinachia spinachia*.

Large shallow inlets and bays

The 'Large shallow inlets and bays' habitat encompasses the main channel of Sullom Voe, plus Gluss and Orka Voes at the mouth of the bay. Several small subsidiary arms and embayments, including Voxter, Scatsta and Garths Voes and the Bight of Haggrister, are also included within the habitat.

Intertidal sediments are confined to the houbs and the heads of Gluss, Garths, Scatsta and Voxter Voes. These sediments are variable and poorly sorted, consisting mainly of coarse sand, gravel, shell debris and peat fragments. Fine sands at the head of Scatsta Voe are colonised by bivalves, polychaete worms and the sea cucumber *Leptosynapta inhaerens*. Poorly-mixed, muddy sediments which characterise the sublittoral environment within the main body of Sullom Voe SAC, are colonised by horse mussels *Modiolus modiolus*, sea-pens *Virgularia* sp. and diverse communities of burrowing animals. Where horse mussels grow in dense aggregations, they are considered to form biogenic reefs (see description in Annex I habitat 'Reefs'). North of Calback Ness, organically-enriched shell-sand and gravel is colonised by polychaete worms and the amphipods *Corophium crassicorne* and *Ampelisca typica*. Throughout Sullom Voe, from Little Roe to Voxter Ness, muddy sands at depths of 10-30 m support a community dominated by polychaetes, bivalves and amphipods. Muds occurring at different depths are characterised by slightly different communities, consisting predominantly of polychaetes, bivalves and amphipods. The deep inner basin of Sullom Voe has a high organic content and is subject to intermittent periods of anoxic conditions (when oxygen is absent). This is reflected by low faunal diversity and the dominance of polychaete worms such as *Glycera alba* and *Capitella capitata*, both species that are characteristic of organic enrichment.

Reefs

Within Sullom Voe two main types of reef have been recognised; those where animal and plant communities grow on raised or protruding rock (rocky reefs) and those where structure is created by the animals themselves (biogenic reefs).

A. Rocky reefs

Intertidal rocky reefs within the Sullom Voe SAC range from steep, moderately-exposed bedrock at the seaward limit of the site to gradually sloping, extremely-sheltered bedrock in the inner reaches of the voes. Very steep bedrock and boulder shores also occur in sheltered conditions at Mavis Grind and Voxter Ness.

Moderately exposed shores at the seaward limit of the site are dominated by barnacles *Semibalanus balanoides* and limpets *Patella vulgata*. Yellow and grey lichens occur at the top of the shore and the black lichen *Verrucaria maura* is common in the littoral fringe. The lower shore is colonised by a rich turf of foliose red algae. Fucoid algae (wracks) are largely absent from these shores although there may be occasional scattered plants of bladder wrack *Fucus vesiculosus*. The thong-weed *Himanthalia elongata* may be present on some moderately exposed shores. The kelps *Alaria esculenta* and *Laminaria digitata* that thrive in more wave exposed conditions characterise the sublittoral fringe.

With increasing shelter wracks become increasingly common. Bands of channelled wrack *Pelvetia canaliculata* and spiral wrack *Fucus spiralis* occur on boulders or bedrock on the upper shore. Where the substratum is sufficiently stable the egg wrack blankets the mid-shore, sometimes mixed with bladder wrack. The lower shore at these sheltered sites is characterised by a band of the serrated wrack *Fucus serratus*. In sheltered conditions at Voxter Ness, very steep or vertical bedrock is colonised by large common mussels *Mytilus edulis*, barnacles and limpets, whereas more gradually sloping rock at Mavis Grind is covered by a dense blanket of egg wrack.

Around Calback Ness, and in the outer parts of Sullom Voe, sublittoral bedrock is dominated by forests of the kelp *Laminaria hyperborea*, which is replaced by *Saccorhiza polyschides* at the rock-sand boundary. The bryozoan *Scrupocellaria scruposa* and the sea squirt *Ascidia mentula* often colonise the kelp stipes in these areas. Bedrock and boulders below the kelp forest are heavily grazed but coralline algae, the keel worms *Pomatoceros triqueter* and the soft coral, dead man's fingers *Alcyonium digitatum*, may be present. With increasing shelter, *L. hyperborea* is replaced by the sugar kelp *L. saccharina*, which is the dominant macroalga in inner Sullom Voe. At the head of the voe amongst the sugar kelp forest at Mavis Grind, boulders and coarse sediment are colonised by sea urchins, sea mats (bryozoans) and sea squirts *(*ascidians*)*.

B. Biogenic reefs

The horse mussel, *Modiolus modiolus*, (known in Shetland as the Yoag) is a widespread and abundant member of the macrofauna throughout Sullom Voe, with individuals growing between the lower *Laminaria* kelp zone to a depth of

at least 21 m. There is a well-established horse mussel reef throughout the channel between Little Roe and Mio Ness on the Mainland, as well as in sand and shell-gravel to the south of Little Roe. The mussel shells provide stable, hard substrata, which are colonised by a species-rich community including the brittle stars: *Ophiothrix fragilis*; *Ophiocomina nigra*; *Ophiopholis aculeata*, the boring sponge *Cliona celata*, sea squirts, the queen scallop *Aequipecten opercularis* and numerous sea firs (hydroids) and sea mats. The burrowing sea cucumber *Thyone fusus* is often associated with these horse mussel beds.