

**Marine Nature Conservation Review**

**Sector 1**

**Shetland**

**Area summaries**

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**1999**

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# Coasts and seas of the United Kingdom

## Marine Nature Conservation Review series

### Area summaries

#### Preface

The *Marine Nature Conservation Review* (MNCR) was initiated by the Nature Conservancy Council in 1987 as the third major resource survey, following the *Nature Conservation Review* and the *Geological Conservation Review*. Since April 1991, the MNCR has been undertaken within the Support Unit of the Joint Nature Conservation Committee. The JNCC is a forum through which the three country agencies, the Countryside Council for Wales, English Nature and Scottish Natural Heritage, deliver their special statutory responsibilities for Great Britain as a whole and internationally. These special responsibilities, known as special functions, contribute to sustaining and enriching biological diversity, enhancing geological features and sustaining natural systems.

The MNCR has drawn together information on marine ecosystems around Great Britain with the objectives of:

- extending our knowledge of benthic marine habitats, communities and species in Great Britain, particularly through description of their characteristics, distribution and extent; and
- identifying sites of nature conservation importance.

The data collected also provide information to support more general measures to minimise adverse effects of development and pollution, particularly on sites and species of nature conservation importance.

The area included in the MNCR is the coastline of England, Scotland and Wales (excluding the Isle of Man and the Channel Isles), extending on the shore from the lower limit of terrestrial flowering plants and within marine inlets from the limit of marine influence out to the limit of British territorial seas. Saline lagoons are also included. The MNCR included a major field survey programme of the shores and near-shore sublittoral zone, undertaken to standard methodology.

MNCR studies have been undertaken within particular coastal sectors around Britain (see map overleaf) or of major physiographic types, such as lagoons and sealochs. These studies are being presented, in the *Coasts and seas of the United Kingdom - MNCR series*, as *area summaries*, each of which provides an account of a discrete stretch of open coast, a marine inlet or a lagoon within the area of study. A list of *area summary* volumes and other major publications from the MNCR is given overleaf.

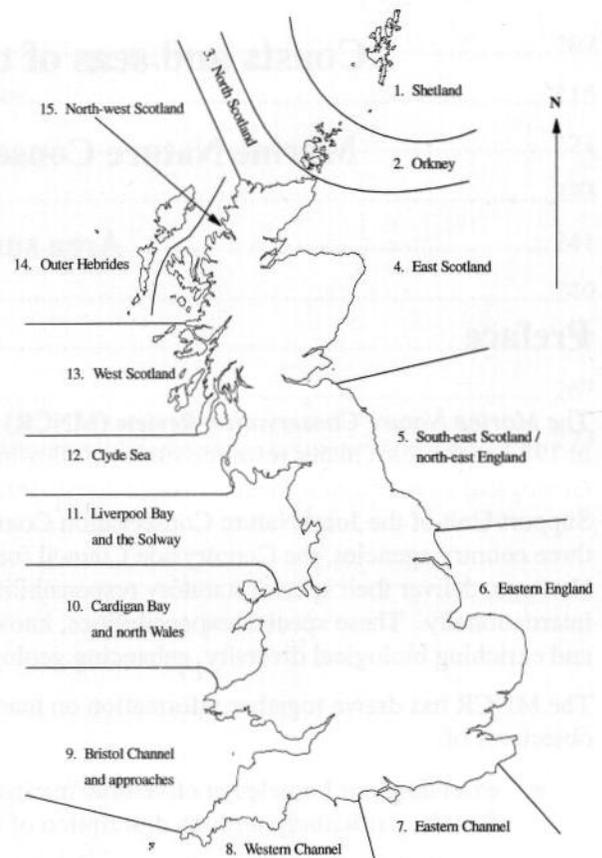
A full list of MNCR and other JNCC marine reports is available from the Marine Information Officer, JNCC, or at JNCC's website [www.jncc.gov.uk/marine](http://www.jncc.gov.uk/marine). JNCC publications can be purchased from NHBS Ltd, 2-3 Wills Road, Totnes, Devon, TQ9 5XN (tel. 01803-865 913; fax. 01803-865 280; e-mail [nhbs@nhbs.co.uk](mailto:nhbs@nhbs.co.uk)). JNCC reports are available directly from JNCC (tel. 01733-562 626; fax. 01733-555 948).

David Connor

Joint Nature Conservation Committee

## Publications in the MNCR series

MNCR coastal sectors, as used in the *Coasts and seas of the United Kingdom - MNCR series*.



### Volumes published or near publication:

Sector	Title	Authors	Date
<b>Foundation volumes</b>			
1-15	Rationale and methods	Hiscock, <i>ed.</i>	1996
1-15	Benthic marine ecosystems of Great Britain and the north-east Atlantic	Hiscock, <i>ed.</i>	1998
<b>Biotope classification</b>			
1-15	Marine biotope classification for Britain and Ireland. Volume 1. Littoral biotopes ( <i>JNCC Report</i> , No. 229)	Connor, Brazier, Hill & Northen	1997
1-15	Marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes ( <i>JNCC Report</i> , No. 230)	Connor, Dalkin, Hill, Holt & Sanderson	1997
<b>Area summaries</b>			
1	Shetland	Howson	1999
1-2	Lagoons in Shetland and Orkney	Thorpe	1998
2	Orkney	Murray, Dalkin, Fortune & Begg	1999
3, 4, 12, 13, 15	Lagoons in mainland Scotland and the Inner Hebrides	Covey, Fortune, Nichols & Thorpe	1998
5	South-east Scotland and north-east England	Brazier, Davies, Holt & Murray	1998
6	Inlets in eastern England	Hill, Emblow & Northen	1996
8	Inlets in the western English Channel	Moore, Smith & Northen	1999
9	Inlets in the Bristol Channel and approaches	Moore, Smith, Northen & Little	1998
10	Cardigan Bay and north Wales	Brazier, Holt, Murray & Nichols	1999
11	Liverpool Bay and the Solway Firth	Covey	1998
12	Sealochs in the Clyde Sea	Dipper & Beaver	1999
13	Sealochs in west Scotland		Due 2000
14	Lagoons in the Outer Hebrides	Thorpe, Dalkin, Fortune & Nichols	1998
14	Sealochs in the Outer Hebrides		Due 2000
15	Sealochs in north-west Scotland		Due 2000

# Marine Nature Conservation Review

## Sector 1

### Shetland

#### Area summaries

## Synopsis

The coastline of Shetland (MNCR Sector 1) has been studied as part of the Marine Nature Conservation Review programme. The studies included field surveys of the shores and nearshore subtidal zone to describe the marine habitats and communities (together referred to as biotopes) present and to assess their marine natural heritage importance. Comparable data from other organisations have been added to provide information on 739 sites within Sector 1, and analysed to classify the biotopes present. These data have enabled 162 marine biotopes to be identified from Sector 1. Information on the designated nature conservation sites and main human activities has also been compiled.

The information is presented as 32 *area summaries*:

- |   |  |
|---|--|
| 1. Unst (north and west)                              | 18. East and West Burra  |
| 2. Unst (east and south)                              | 19. Whiteness, Stromness, Weisdale and Sandsound Voes                  |
| 3. Bluemull Sound                                     | 20. Reawick to Quilva Taing  |
| 4. Fetlar   | 21. Gruting Voe and Vaila Sound  |
| 5. Basta Voe and Mid Yell Voe                         | 22. Papa Stour   |
| 6. Yell (east)  | 23. St Magnus Bay  |
| 7. Lunna Ness (east) and Vidlin Voe                   | 24. Brindister Voe, Swarbacks Minn, Busta Voe, Olna Firth and Aith Voe |
| 8. Out Skerries                                       | 25. North-west Mainland and Ronas Voe                                  |
| 9. Whalsay  | 26. Yell Sound (north)   |
| 10. Dury Voe  | 27. Yell Sound (south)   |
| 11. Nesting, Mainland                                 | 28. Dales Voe, Colla Firth and Swining Voe                             |
| 12. Cat Firth, Wadbister Voe, Lax Firth and Dales Voe | 29. Sullom Voe   |
| 13. Bressay and Isle of Noss                          | 30. Whale Firth and Yell (north-west)                                  |
| 14. Lerwick to Wick of Sandsayre                      | 31. Foula  |
| 15. Mousa   | 32. Fair Isle  |
| 16. No Ness to Sumburgh Head                          |  |
| 17. Sumburgh Head to South Havra                      |  |

Each area is described in a standard format, giving details of its physical and biological character, the biotopes present and their distribution, current nature conservation status, the main human influences and relevant literature. The areas surveyed and the marine biotope information are also presented in a series of maps. These *area summaries* are supported by a summary of the biotopes defined for the Sector (from Connor *et al.* 1997a, b) and by a list of species recorded from the surveys.

## References

Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O. 1997a. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 1. Littoral biotopes. Version 97.06. *JNCC Report*, No. 229.

Connor, D.W., Dalkin, M.J., Hill, T.O., Holt, R.H.F., & Sanderson, W.G. 1997b. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes. Version 97.06. *JNCC Report*, No. 230.

## Introduction

### Background

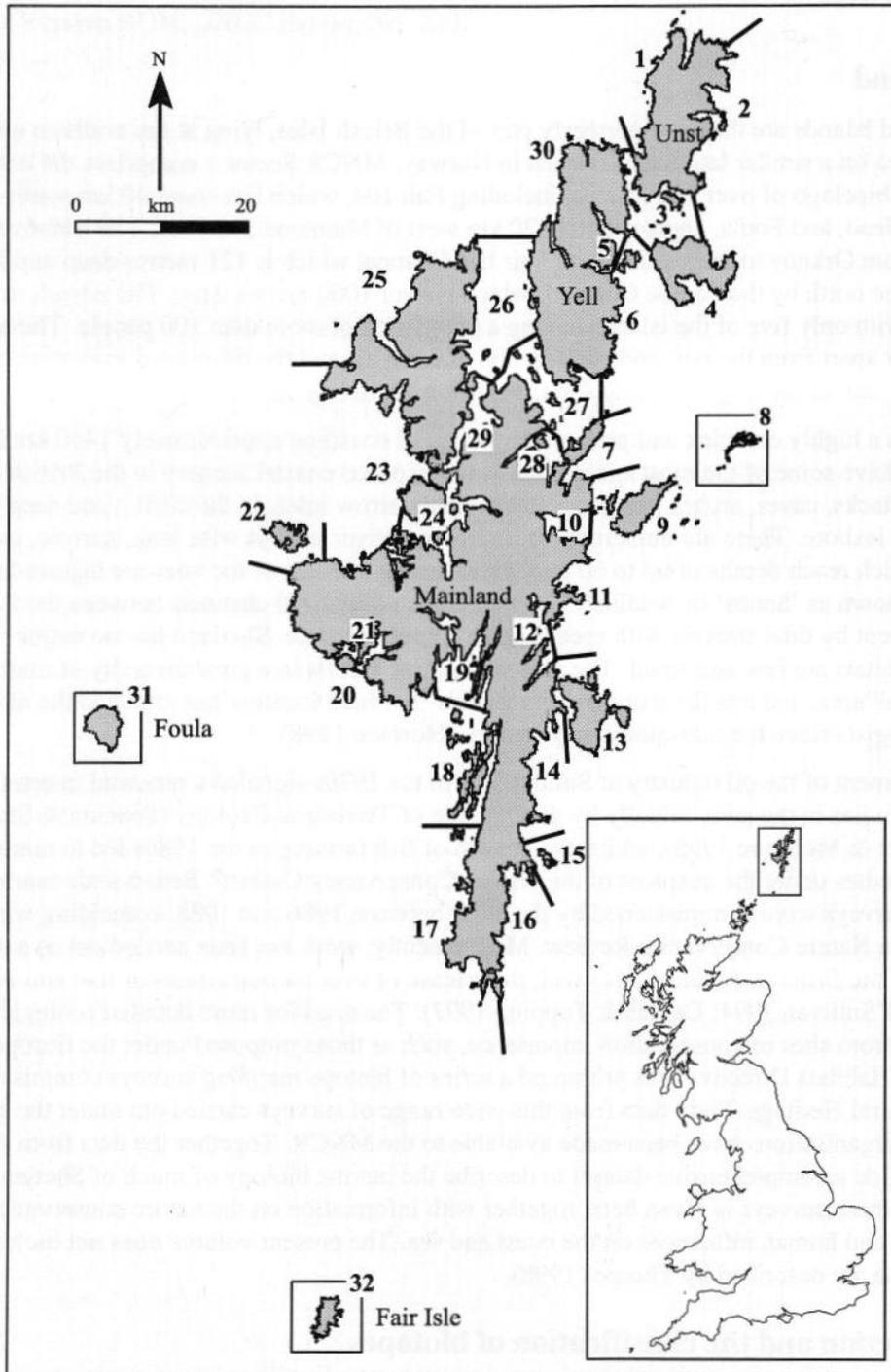
The Shetland Islands are the most northerly part of the British Isles, lying at the northern entrance to the North Sea on a similar latitude to Bergen in Norway. MNCR Sector 1 comprises the entire Shetland archipelago of over 100 islands, including Fair Isle, which lies some 40 km south-west of Sumburgh Head, and Foula, approximately 20 km west of Mainland Shetland. The islands are separated from Orkney to the south by the Fair Isle Channel which is 121 metres deep and from the Faeroes to the north by the Faeroe Channel, which is over 1000 metres deep. The islands are sparsely populated, with only five of the islands having a population of more than 100 people. There is little development apart from the port and conurbation of Lerwick and the oil-related infrastructure at Sullom Voe, one of the major terminals in the UK for North Sea oil.

Shetland has a highly complex and predominantly rocky coastline approximately 1450 km in length. The islands have some of the most spectacular wave-exposed coastal scenery in the British Isles, with high cliffs, stacks, caves, arches and geos (steep-sided narrow inlets in the cliffs), and deep water occurs close inshore. There are numerous voes: drowned river valleys with long, narrow, steep-sided channels which reach depths of up to 60 m. Characteristic features of the voes are lagoon-like structures known as 'houbs' or 'vadills'. The numerous sounds and channels between the islands and rocks are swept by tidal streams with speeds up to 5 knots or more. Shetland has no major rivers, so estuarine habitats are few and small. The varied coastline results in a great diversity of marine habitats within a small area, and this diversity and the islands' northern location has attracted the attentions of marine biologists since the mid-nineteenth century (Howson 1998).

The development of the oil industry at Sullom Voe in the 1970s signaled a renewed interest in ecological studies in the area, initially by the Institute of Terrestrial Ecology (Pearson & Stanley 1981; Dunnet & McIntyre 1995), whilst the growth of fish farming in the 1980s led to marine biological studies under the auspices of the Nature Conservancy Council. Broad-scale marine ecological surveys were commissioned by the NCC between 1986 and 1988, coinciding with the start of the Marine Nature Conservation Review. More recently, work has been carried out as a result of the wreck of the *Braer* in January 1993 with the release of over 84,000 tonnes of fuel and bunker oil (Ritchie & O'Sullivan 1994; Davies & Topping 1997). The need for more detailed ecological information from sites of conservation importance, such as those proposed under the European Community Habitats Directive, has prompted a series of biotope mapping surveys commissioned by Scottish Natural Heritage. Field data from this wide range of surveys carried out under the auspices of a variety of organisations have been made available to the MNCR. Together the data from these surveys provide a comprehensive dataset to describe the marine biology of much of Shetland. A summary of these surveys is given here, together with information on the nature conservation designations and human influences on the coast and sea. The present volume does not include lagoons; these are described by Thorpe (1998).

### Data collection and the classification of biotopes

Field surveys in Sector 1 were undertaken between 1986 and 1989 as part of the Marine Nature Conservation Review programme, to describe the marine biology of the shores and nearshore subtidal zone and to assess their natural heritage importance. These surveys complemented other studies carried out previously or by other organisations, including British Petroleum plc, Department of Agriculture and Fisheries for Scotland (now Fisheries Research Services), Institute of Terrestrial Ecology, Oil Pollution Research Unit (now CORDaH), and Shetland Oil Terminal Environmental Advisory Group, all of whom made data available to the MNCR. A summary of these surveys is given in Table 1. Further references to other studies are given in the individual *area summary* accounts.



**Figure 1** Location of the 32 reporting areas (*area summaries*) in MNCR Sector 1. Based upon Ordnance Survey mapping by permission of Ordnance Survey on behalf of the Controller of Her Majesty's Stationery Office. © Crown copyright. All rights reserved. JNCC GD 27254X/1999.

**Table 1** Sources of MNCR and MNCR-compatible field survey information

MNCR database survey no.	Survey	Source	No. of sites	No. of habitats surveyed
1	1988 MNCR survey of Shetland	Hiscock (1988)	49	73
13	1989 MNCR survey of Whiteness Voe	Hiscock (1989); Rostron (1989)	7	30
227	1987 MCS sublittoral survey of Shetland	Moss & Ackers (1987)	47	134
230	1974 ITE report on sublittoral ecology of Shetland	Earll (1992); ITE (1975a)	36	35
232	1986 OPRU macro-infauna survey from fish farm sites in Shetland	Dixon (1986)	3	33
261	1986 & 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle	Hiscock (1986); Howson (1988)	217	618
376	1982 Leicester Polytechnic littoral survey of the approaches to the Shetland Oil Terminal	Williams, Cohen & Boyce (1983)	30	362
377	1963 DAFS sublittoral survey at Shetland	Pearson, Coates & Duncan (1994)	21	33
378	1978 to 1981 BP sublittoral survey of Sullom Voe Oil Terminal effluent discharge site.	Pearson, Coates & Duncan (1994)	4	4
379	1984 OPRU sublittoral monitoring survey in Sullom Voe	Westwood (1985); Pearson, Coates & Duncan (1994)	19	21
380	1984 SOTEAG littoral survey in Dales Voe and Gluss Voe	Pearson, Coates & Duncan (1994)	2	6
382	1974 to 1978 SOTEAG sublittoral grab sample surveys in Sullom Voe and Swarbacks Minn	Pearson, Coates & Duncan (1994)	40	43
383	1980 Brathay Exploration Group littoral survey of the Isle of Foula	Wilson (1980)	12	169
387	1993 MNCR <i>Braer</i> oil spill marine benthos survey	Covey & Hill (1993); Fuller & Donnan (1993)	19	54
389	1981 Brathay Exploration Group littoral survey of the Isle of Foula	Penny & Brook (1981)	25	409
434	1974 ITE report on rocky shore ecology of Shetland	ITE (1975b)	79	843
443	1993 SNH habitat mapping in Brindister Voe and the Vadills	Bunker, Bunker & Perrins (1994)	25	83
499	1994 Marine Seen sublittoral survey of Whiteness Voe	Bunker, Rostron & Perrins (1995)	21	32
672	1995 Entec/SNH Busta Voe and Olna Firth sublittoral survey	Entec (1996)	19	19
677	1996 Entec sublittoral survey of Papa Stour caves, Shetland	Entec (1997)	7	28
696	1993 NHM sublittoral survey of Sullom Voe, Shetland	Spurrier & Wood (1997)	13	15
723	1993 SOAFD Sublittoral grab survey of Clift Sound, Shetland.	Kingston <i>et al.</i> 1997	5	5
724	1994 SOAFD Sublittoral grab survey of Whiteness Voe, Shetland.	Kingston <i>et al.</i> 1997	3	3
736	1995 OPRU Littoral transect survey of Sullom Voe, Shetland.	Moore & Little (1995)	17	70
<b>Total</b>			<b>720</b>	<b>3122</b>

Abbreviations: BP - British Petroleum plc; DAFS - Department for Agriculture and Fisheries for Scotland; ITE - Institute for Terrestrial Ecology; MCS - Marine Conservation Society; MNCR - Marine Nature Conservation Review (JNCC); NHM - Natural History Museum, London; OPRU - Oil Pollution Research Unit; SNH - Scottish Natural Heritage; SOAFD - Scottish Office Agriculture & Fisheries Department; SOTEAG - Shetland Oil Terminal Environmental Advisory Group.

During the MNCR field surveys, information on the nature of each site, together with its habitats and their associated communities (together referred to as biotopes) were collected. For MNCR surveys, sites were selected to sample a wide range of substrata and different environmental conditions, such as differing wave exposure and salinity regimes in the littoral and sublittoral zones. Photographs were taken of the sites, and their biotopes and species, to provide a permanent visual record of the areas surveyed.

The sites were surveyed following standard MNCR recording and infaunal sampling techniques (Connor & Hiscock 1996). The location and physiographic characteristics of each site were recorded on a standard MNCR Site form. The physical details of each habitat and the species present were

recorded on standard MNCR Habitat forms (Littoral or Sublittoral as appropriate). The conspicuous species were recorded using the MNCR semi-quantitative abundance scales. Species which could not be identified *in situ* were collected for later identification in the laboratory.

Core samples of littoral sediment habitats were taken for infaunal species identification. Four 0.01 m<sup>2</sup> core samples were taken and sieved over a 0.5 mm mesh sieve. Material retained on the sieve from all four cores was combined and preserved in seawater-formalin for subsequent identification and enumeration of the species present. Abundances of large infaunal species were estimated after digging over areas of sediment with a spade. A separate sediment sample was taken for granulometric analysis. In the sublittoral most MNCR samples were obtained using an anchor dredge and subsequently washed out, sieved and preserved. Samples from external sources were obtained using a variety of grabs, such as the Day or van Veen.

Data were entered into the MNCR database to facilitate subsequent analysis and reporting. Data from other organisations, when collected with compatible techniques, were added to increase the volume of information available and its geographical coverage.

The species data from the surveys were analysed, in conjunction with their associated habitat data, to identify which biotopes, as defined in the MNCR national biotope classification (Connor *et al.* 1997a, b), were present in the dataset. Multivariate analytical techniques, including TWINSPAN and DECORANA, were employed to facilitate the identification of distinct assemblages of species within the dataset, using the procedures given in Mills (1994). Data from a total of 739 sites (3992 different habitat or station records) were used in the analyses, resulting in the identification of 162 biotopes or sub-biotopes from the national classification (Appendix A). Full descriptions of each biotope and the general approach to biotope classification are given in Connor *et al.* (1997a, b). Appendix B shows the distribution of biotopes recorded in each area.

Species recorded from the surveys listed in Table 1 are given in Appendix C.

### Area summaries and their format

The coast of Shetland has been divided into 32 discrete areas (Figure 1) on the basis of their physiographic character, and each has been described in the standard MNCR *area summary* format. The 32 areas described are:

- |   |  |
|---|--|
| 1. Unst (north and west)                              | 18. East and West Burra  |
| 2. Unst (east and south)                              | 19. Whiteness, Stromness, Weisdale and Sandsound Voes                  |
| 3. Bluemull Sound                                     | 20. Reawick to Quilva Taing  |
| 4. Fetlar   | 21. Gruting Voe and Vaila Sound  |
| 5. Basta Voe and Mid Yell Voe                         | 22. Papa Stour   |
| 6. Yell (east)  | 23. St Magnus Bay  |
| 7. Lunna Ness (east) and Vidlin Voe                   | 24. Brindister Voe, Swarbacks Minn, Busta Voe, Olna Firth and Aith Voe |
| 8. Out Skerries                                       | 25. North-west Mainland and Ronas Voe                                  |
| 9. Whalsay  | 26. Yell Sound (north)   |
| 10. Dury Voe  | 27. Yell Sound (south)   |
| 11. Nesting, Mainland                                 | 28. Dales Voe, Colla Firth and Swining Voe                             |
| 12. Cat Firth, Wadbister Voe, Lax Firth and Dales Voe | 29. Sullom Voe   |
| 13. Bressay and Isle of Noss                          | 30. Whale Firth and Yell (north-west)                                  |
| 14. Lerwick to Wick of Sandsayre                      | 31. Foula  |
| 15. Mousa   | 32. Fair Isle  |
| 16. No Ness to Sumburgh Head                          |  |
| 17. Sumburgh Head to South Havra                      |  |

Each *area summary* contains the following sections:

### Location

The geographic location is given as the central latitude/longitude position and Ordnance Survey grid reference, together with the local government administrative area (Shetland Islands Council) and nature conservation agency local area (Scottish Natural Heritage, North Areas: Shetland Isles). A location map shows the main features and bathymetry of the area, key place names and the limit of the area considered by the *area summary*. Place names are taken from the Ordnance Survey 1:50,000 scale second series Landranger maps. The sites surveyed are shown according to four main types of survey:

- ▲ recording on littoral rock/hard substrata
- recording on sublittoral rock/hard substrata
- △ sampling by cores in littoral sediment
- sampling by cores or grab in sublittoral sediment.

### Physical features

A summary of the main physical features includes:

<i>Physiographic type</i>	As defined in Connor & Hiscock (1996)
<i>Maximum length of coast</i>	Measured from the relevant 1:50,000 Ordnance Survey (Landranger series) map. Lengths of inlets are from Dixon (1987), measured from the mouth of the inlet to the limit of tidal influence.
<i>Area of inlet, where applicable</i>	From Dixon (1987)
<i>Bathymetry</i>	The maximum depth below chart datum, as indicated from Admiralty charts.
<i>Wave exposure</i>	Taken from field observations, as defined in Connor & Hiscock (1996) and from Admiralty charts.
<i>Tidal streams</i>	Taken from field observations and tidal streams atlas, as defined in Connor & Hiscock (1996) (1 knot $\equiv$ 0.5 m/s).
<i>Tidal range</i>	Figures for mean spring and mean neap tidal range, quoted for the nearest secondary port, and based on Admiralty tide tables and charts, or as estimated during the survey (the latter applies to semi-enclosed sections of coast such as lagoons which have a restricted tidal range).
<i>Salinity</i>	The salinity range, as categorised in Connor & Hiscock (1996), as estimated at the time of survey (based on the species present and their known salinity tolerances and the presence of freshwater sources) or as given in available literature.

All heights and depths given are corrected to chart datum.

### Introduction

The overall physical characteristics of the area and significant human influences and activities are described.

### Marine biology

A table lists marine biological surveys of the shores and sublittoral which have been used in compiling the *area summary*, including the survey type (littoral/sublittoral), survey method, date(s) of survey and reference source (MNCR database survey number in the case of recent MNCR surveys). The distribution of survey sites is shown on the location map, and sites are listed at the end of each *area summary*.

The marine biological nature of the area is described with reference to the biotopes present and their distribution within the area, based primarily on the findings of the most recent MNCR survey but with reference to previous studies where appropriate. The heights and depths noted in the text are corrected to lowest tide level (chart datum). The biotope codes given in parentheses are from the MNCR national classification, as listed in Appendix A; a summary of biotopes recorded within each area is presented in Appendix B. Marine species nomenclature follows Howson & Picton (1997); that for lichens follows Purvis *et al.* (1992), and that for higher plants follows Stace (1991).

A map illustrates the distribution of the main biotopes and biotope complexes within the area; some mapped areas represent more than one biotope.

**NOTE:** The biotopes maps give an indication of the *likely* distribution and extent of biotopes and biotope complexes, based on the data available, including sketch maps of biotope distribution made at the time of survey, cited literature and information on Admiralty charts. In some areas data are sparse, and additional data or more comprehensive survey would enable more accurate maps to be drawn.

### Nature conservation

A summary of statutory and non-statutory wildlife and landscape conservation designations for the marine and coastal parts of the area is given (from Barne *et al.* 1997, where further information on the types of designation can be found).

Key to abbreviations used: (c = candidate; p = proposed):

ESA	Environmentally Sensitive Area (whole of Shetland)
GCR	Geological Conservation Review sites
MCA	Marine Consultation Area
MoD	Ministry of Defence
NNR	National Nature Reserve
NSA	National Scenic Area
NTS	National Trust for Scotland
RSPB	Royal Society for the Protection of Birds nature reserve
SAC	Special Area of Conservation
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest

### Human influences

This section describes the main uses of and activities in the area, including urbanisation, industrial or commercial activities that have (or potentially have) an impact on the area. These can include sewage discharges, industrial effluent, development, dredging, spoil-dumping, fishing, aquaculture, recreation and shipping. Although as accurate as possible at the time of writing, readers should be aware that further developments, particularly improvements to sewage treatment and disposal, and changes in the number and location of mariculture installations, are likely to have occurred since then. Further details of human influences are given in Barne *et al.* (1997) and, for aquaculture, La Tene Maps (1999).

## References and further reading

A list of cited references and other relevant literature and information sources.

## Sites surveyed

This lists the sites surveyed within the area from the surveys shown in Table 1, with additional information on the location of each site (OS grid reference and latitude/longitude), and an inventory of biotopes known to be present at the time of survey.

## Acknowledgements

Particular thanks are due to Eleanor Murray and Tim Hill of the MNCR for their considerable input and encouragement during the preparation of this volume.

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1

## Unst (north and west)

## Location

<i>Position (centre)</i>	HP 580 150	60°48.8'N 00°56.0'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)

## Physical features

<i>Physiographic type</i>	Open coast and voe
<i>Length of coast</i>	59.2 km
<i>Area of inlet</i>	Area of Burra Firth: 2.7 km <sup>2</sup>
<i>Bathymetry</i>	50 metre contour very close inshore along west coast; Burra Firth reaches maximum depth of 30 m in entrance and shallows gradually into voe with no deep basins.
<i>Wave exposure</i>	Extremely exposed on open coast to very sheltered in Burra Firth
<i>Tidal streams</i>	Negligible along linear coast; 6-7 knots north of Muckle Flugga; slightly less around Herma Ness
<i>Tidal range</i>	2 m (mean springs); 1 m (mean neaps)
<i>Salinity</i>	Fully marine

## Introduction

Area 1, which consists of the northern and western coastlines of the island of Unst, is extremely exposed along most of its length, and much of it comprises high cliffs. Herma Ness, at the northern tip of Unst, is particularly scenic with cliffs of over 150 m in height and numerous geos, arches, caves and stacks. The Muckle Flugga group of small islands and rocks, the most northerly point of the British Isles, lies a short distance off Herma Ness. The area includes one voe, Burra Firth, which is open to the north and is exposed to wave action even at its head. There are several caves along the sides of this voe.

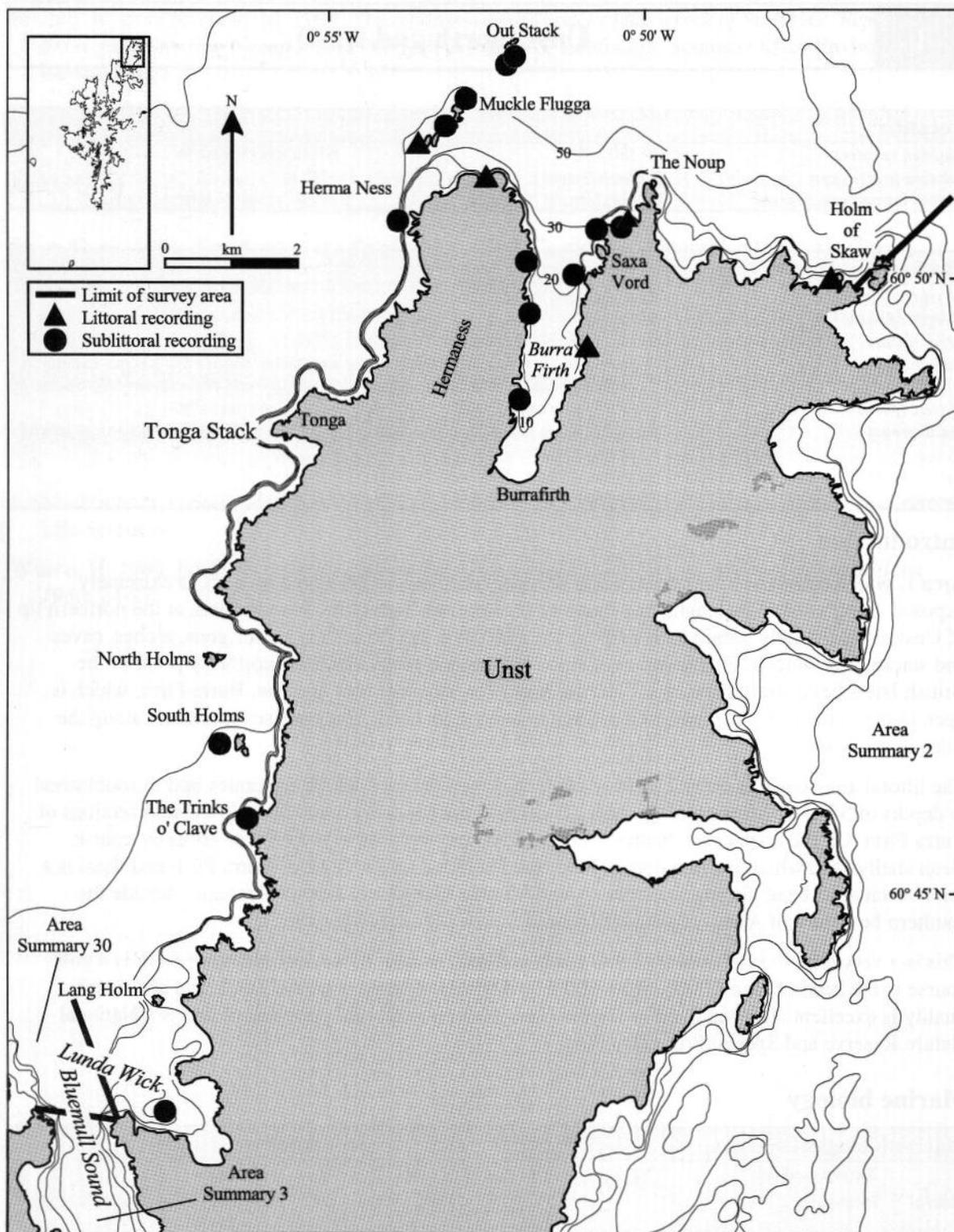
The littoral zone consists almost entirely of steep or vertical rock which continues into the sublittoral to depths of 35 m in the north of the area, 25-30 m in the south-west and 20 m in the mid sections of Burra Firth. On the open coast, bedrock and boulders are replaced at their lower limits by coarse, clean shelly sand which is often duned. Finer sand is found on the floor of Burra Firth and there is a sand beach at its head. Strong tides run around Muckle Flugga and Herma Ness and, outside the southern boundary of Area 1, through Bluemull Sound (*Area summary 3*).

This is a very remote rural area with few roads and only scattered housing, although there is a golf course at the head of Burra Firth. Most of the land within the area is grazed heathland and water quality is excellent. The headland of Herma Ness has important bird populations and is a National Nature Reserve and Special Protection Area.

## Marine biology

## Marine biological surveys

	<i>Survey methods</i>	<i>No. of sites</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	5	July - August 1974	Institute of Terrestrial Ecology (1975)
<i>Sublittoral</i>	Recording	6	July - August 1987	Moss & Ackers (1987)
	Recording	7	August 1987	Howson (1988)
	Recording	1	June 1988	Hiscock (1988)



**Figure 1.1** Main features of the area, showing sites surveyed.

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## Littoral

The littoral zone consists for the most part of steep to vertical rock which is extremely exposed or very exposed to wave action. There are no extensive sheltered shores although it is likely that biotopes characteristic of sheltered conditions are present in areas of localised shelter, such as on the lee side of islands and headlands or behind rocky ridges in otherwise exposed locations. There is no marine biological information for the head of Burra Firth, but as this faces due north with no obstructions to wave action, biotopes are likely to be predominantly exposed in nature.

Zonation on these shores reflects their exposed nature. Yellow and grey lichens dominate the supralittoral (YG) whilst the littoral fringe has a wide band of the black lichen *Verrucaria maura* (Ver.Ver). Below this, the mid-eulittoral is animal dominated with a zone of small mussels *Mytilus edulis* mixed with the barnacle *Chthamalus stellatus* (MytB) followed by a zone with the barnacle *Semibalanus balanoides* and the limpet *Patella vulgata* (BPat.Sem). Algae such as *Corallina officinalis* and *Mastocarpus stellatus* are found in the lower eulittoral and the kelp *Alaria esculenta* dominates the sublittoral fringe with *M. edulis* (Ala.Myt). The kelp *Laminaria digitata* is found in the sublittoral fringe at one site on the north coast, mixed with *A. esculenta* (Ala.Ldig). Overhanging rock on the lower shore at cave entrances in Burra Firth has sponges and shade-tolerant red algae such as *Palmaria palmata* and *Osmundea pinnatifida* (SR).

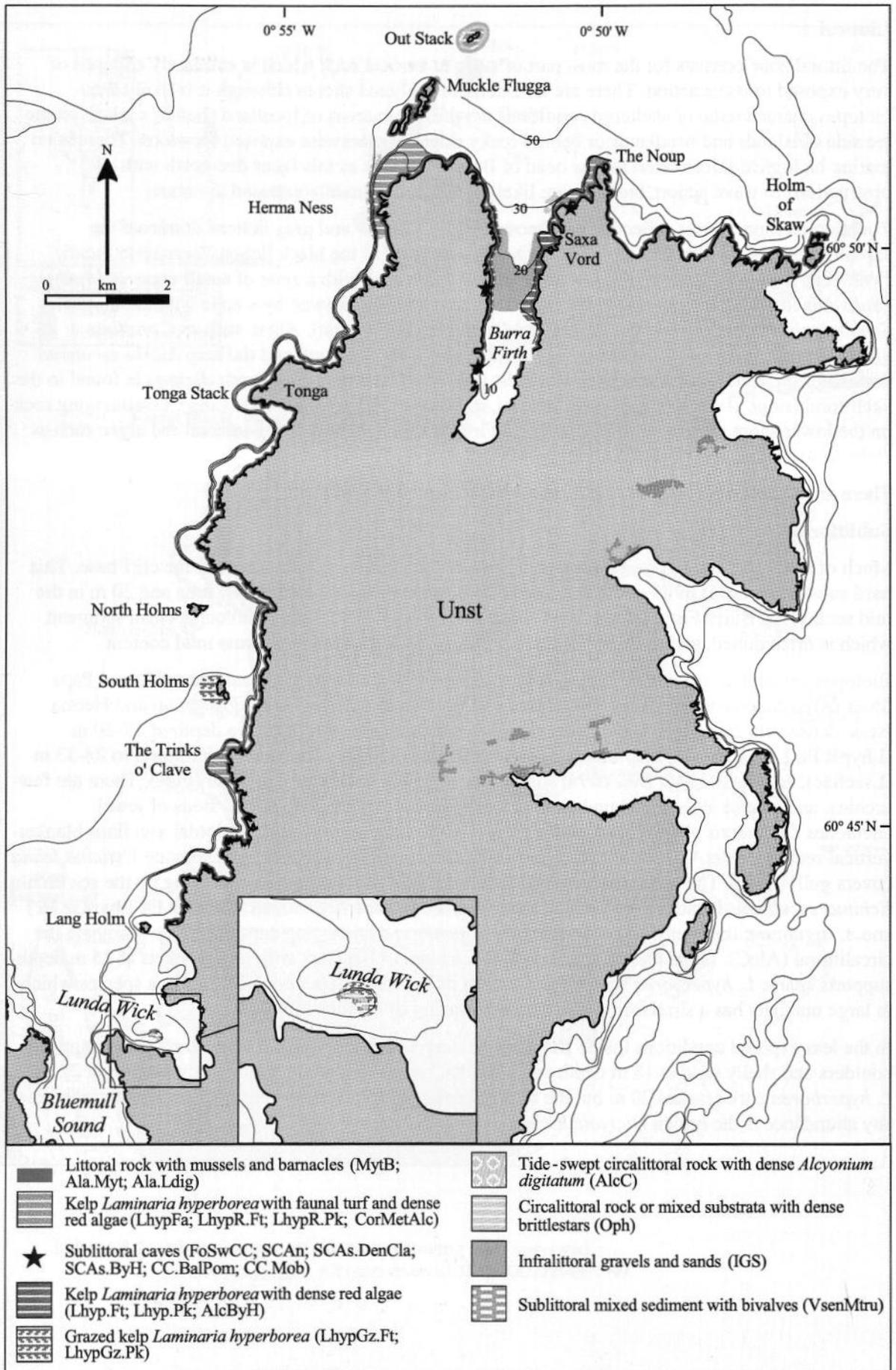
There are no descriptions of the sandy shore at the head of Burra Firth.

## Sublittoral

Much of the sublittoral has steep or vertical bedrock, sometimes with boulders at the cliff base. This hard substratum drops to 35 m off Out Stack, 25-30 m in the south-west of the area and 20 m in the mid sections of Burra Firth. On the open coast, rock gives way to a slope of coarse clean sediment which is often duned, and in Burra Firth it is replaced by finer sand with some mud content.

Biotopes are similar to those on Foula (*Area summary* 31), Fair Isle (*Area summary* 32) and Papa Stour (*Area summary* 22). At the most exposed sites around the Muckle Flugga group and Herma Ness, dense kelp *Laminaria hyperborea* dominates the upper infralittoral to a depth of 17-20 m (LhypR.Ft; LhypFa), with kelp *Laminaria saccharina* dominating the lower infralittoral to 28-33 m (LsacSac), and the red alga *Delesseria sanguinea* the lower infralittoral to 35 m (FoR). There are few urchins, and foliose algae are abundant in the sub-flora and on the kelp stipes. Beds of jewel anemones *Corynactis viridis*, dead-man's fingers *Alcyonium digitatum* and colonial ascidians blanket vertical rock (CorMetAlc) and the open parts of kelp forests whilst the dahlia anemone *Urticina felina* covers gully floors. The open west coast of Unst is broadly similar, although grazing by the sea urchin *Echinus esculentus* is more apparent and thus there are fewer foliose algae (LhypGz.Ft; LhypGz.Pk) and *A. digitatum*; the keel worm *Pomatoceros triqueter* and encrusting coralline algae dominate the circlittoral (AlcC). In the mouth of Lunda Wick, a plain of boulders with sand pockets at 25 m depth supports sparse *L. hyperborea* with large numbers of brittlestars *Ophiocomina nigra*, a species which in large numbers has a similar impact to intense grazing by urchins (Oph).

In the less exposed conditions inside Burra Firth, steep bedrock towards the voe entrance changes to boulders and shelly sand at 18 m depth and a rippled barren sand plain with muddy patches at 22 m. *L. hyperborea* park reaches 20 m but the rock is heavily grazed and the only foliose alga recorded in any abundance is the brown *Dictyota dichotoma* (Lhyp.Ft; Lhyp.Pk).



< **Figure 1.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 1.1, cited literature and additional field observations).

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A long narrow cave at the entrance to Burra Firth and two in the voe itself have rich biotopes characteristic of both surge and shaded conditions. The outer walls have biotopes similar to the open coast with *A. esculenta*, the barnacle *Balanus crenatus* and the dwarf form of the plumose anemone *Metridium senile* (Ala.Myt) whilst there are dense beds of foliose algae such as *Haraldiophyllum bonnemaisonii* and *Delesseria sanguinea* on the sea bed (FoSwCC). The calcareous sponges *Clathrina coriacea*, *Grantia compressa* and *Leucosolenia* sp., didemnid ascidians, encrusting bryozoans, dwarf *M. senile* and aggregations of the tubeworm *Salmacina dysteri* dominate the middle reaches (SCAs.ByH). Further in there are extensive areas of the hydroid *Tubularia indivisa* and the ascidian *Dendrodoa grossularia* (SCAs.DenCla), whilst boulders on the cave floors and crevices hold *U. felina* and crustaceans (CC.Mob).

Records from Area 1 show little variety in sediment type and include no descriptions of infaunal biotopes. Coarse shell-gravel and stones amongst boulders on the open coast in depths of about 30 m support *L. saccharina* and some foliose red and brown algae, such as *D. dichotoma* and *Desmarestia ligulata* (LsacSac). The northern spider crab *Lithodes maia* and the necklace shell *Polinices pulchellus* are both found in this biotope. At the entrance to Lunda Wick, coarse sand between boulders at 24 m depth supports, in addition to scattered algae, the horse mussel *Modiolus modiolus*, brittlestars and the bivalve *Venerupis* sp. (VsenMtru). Similar shell-gravel in deeper water, beyond the lower depth limits of the foliose algae, is superficially barren. Finer sand in Burra Firth supports mobile species such as the swimming crab *Liocarcinus depurator* and juvenile flatfish, diatom films and, at one site on the east coast of the voe, a mat of unattached filamentous algae (IGS).

## Nature conservation

Conservation sites		
Site name	Status	Main features
Hermaness	NNR; SSSI	Geological; biological; ornithological
Hermaness & Saxa Vord	SPA	Ornithological
Tonga-Greff coast	SSSI; GCR	Geological
Lunda Wick	SSSI; GCR	Geological
Saxa Vord	SSSI	Ornithological
Shetland: Hermaness	NSA	Landscape
Shetland Islands	ESA	Agri-environmental scheme
Unst (Woodwick; Collaster; Lund)	NTS	Cliffed coastline
Saxa Vord	MoD	Cliff; moorland

## Human influences

### Coastal development and uses

This is a very remote, rural area with cliffs and moorland along the western coastline. There is little or no development, with scattered housing concentrated around Burrafirth and the lower ground in the south-west of the area. There is a visitor centre for Hermaness National Nature Reserve at the head of Burra Firth, where there is also a golf course.

### Marine developments and uses

A small amount of sailing takes place but the only piers and slipways are at Burrafirth, for the old shore station for Muckle Flugga Lighthouse. Potting for crustaceans takes place around the rocky inshore areas.

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## Sites surveyed

- Survey 1: 1988 MNCR survey of Shetland (Hiscock 1988).
- Survey 227: 1987 MCS sublittoral survey of Shetland (Moss & Ackers 1987).
- Survey 261: 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Howson 1988).
- Survey 434: 1974 ITE report on rocky shore ecology of Shetland (Institute of Terrestrial Ecology 1975).

Littoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
434	42	Muckle Flugga.	HP 600 190	60°50.9'N 00°53.7'W	Ala.Myt
434	46	Lamba Geo, Burra Firth, Unst.	HP 630 179	60°50.3'N 00°50.4'W	MytB; Ala.Myt
434	51	Wilna Geo, Unst.	HP 610 185	60°50.7'N 00°52.6'W	Ala.Ldig
434	71	Lee of Saxavord, Burra Firth, Unst.	HP 625 160	60°49.3'N 00°51.0'W	YG; Ver.Ver; MytB; Lhyp.Ft
434	76	Nez Geo, Unst.	HP 661 170	60°49.8'N 00°47.0'W	YG; Ver.Ver; MytB; BPat; BPat.Sem; Ala.Myt

Sublittoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
1	223	Herma Ness, N Unst.	HP 597 179	60°50.4'N 00°54.0'W	LhypFa; LsacSac; CorMetAlc; AlcC
27	12	E Muckle Flugga, Unst.	HP 607 197	60°51.3'N 00°52.9'W	LhypR.Ft; IGS
27	13	Rumblings, Muckle Flugga, Unst.	HP 604 193	60°51.1'N 00°53.2'W	LhypGz.Ft
27	14	Hols Hellier, Unst.	HP 627 178	60°50.3'N 00°50.7'W	LhypR.Ft; AlcC
227	15	Norwick Hevda, Burra Firth, Unst.	HP 623 171	60°49.9'N 00°51.2'W	Lhyp.Pk
227	16	SW South Holms, Unst.	HP 571 102	60°46.2'N 00°57.1'W	LhypGz.Ft; LhypGz.Pk; AlcByH
227	17	Hagdale Ness, Unst.	HP 575 091	60°45.6'N 00°56.6'W	LhypR.Ft; LhypR.Pk
261	90	S Out Stack, Muckle Flugga, Unst, Burra Firth.	HP 613 202	60°51.6'N 00°52.2'W	LhypR.Ft; LsacSac; FoR; IGS
261	91	E Out Stack, Muckle Flugga, Burra Firth.	HP 614 203	60°51.6'N 00°52.1'W	Ala.Myt; LhypR.Ft; LhypR.Pk; LhypFa
261	92	Cave S of the Fidd, Burra Firth.	HP 616 165	60°49.6'N 00°52.0'W	SR; Ala; Ala.Myt; SCAn; CC.Mob
261	93	Cave S of Fiska Geo Burra Firth.	HP 614 153	60°48.9'N 00°52.2'W	Ala.Myt; SCAs.DenCla; CC.BalPom
261	94	Cave SW of the Noup, Unst, Burra Firth.	HP 630 178	60°50.3'N 00°50.4'W	Ala.Myt; FoSwCC; SCAs.ByH
261	95	Brimness, Unst, Burra Firth.	HP 616 173	60°50.0'N 00°52.0'W	Lhyp.Ft; Lhyp.Pk; IGS
261	101	Lunda Wick, Unst, Bluemull Sound.	HP 563 048	60°43.3'N 00°58.0'W	LhypGz.Pk; Oph; VsenMtru

Compiled by: Christine Howson

2

## Unst (east and south)

Location		
<i>Position (centre)</i>	HP 650 080	60°45.0'N 00°48.4'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)
Physical features		
<i>Physiographic type</i>	Open coast, voe and sounds	
<i>Length of coast</i>	Unst: 49.6 km; Balta: 8.1 km; Huney: 2.5 km; Haaf Gruney: 2.4 km	
<i>Area of inlets</i>	Nor Wick: 2.4 km <sup>2</sup> Harold's Wick: 4.4 km <sup>2</sup> Balta Harbour & Sound: 4.1 km <sup>2</sup>	
<i>Bathymetry</i>	Open coast: 50 m contour is close inshore in north-east. South of Balta it is approx. 2 km offshore. Maximum depth of inlets: Nor Wick 41 m; Harold's Wick 52 m; Balta Harbour 14 m; Balta Sound 31 m	
<i>Wave exposure</i>	Very exposed on open coast to very sheltered behind islands and at heads of inlets	
<i>Tidal streams</i>	Very strong (6-7 knots) around Holm of Skaw & Lamba Ness; weak elsewhere	
<i>Tidal range</i>	1.9 m (mean springs); 1 m (mean neaps)	
<i>Salinity</i>	Fully marine	

## Introduction

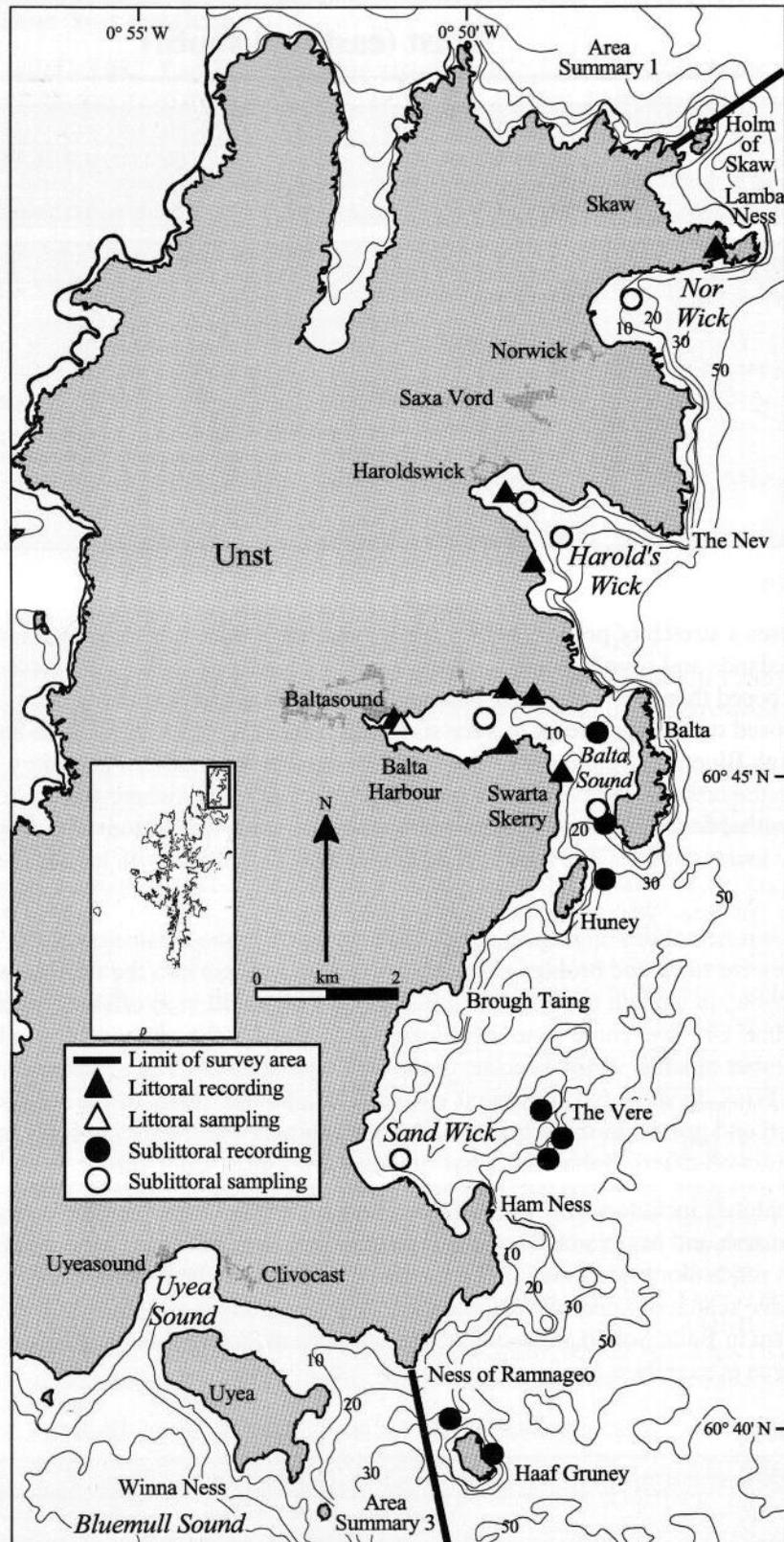
Area 2 comprises a stretch of predominantly rocky coastline which is broken by a number of voes, embayments, islands and sounds which provide varying degrees of shelter. Whilst the east coast of Unst is less exposed than the west (*Area summary 1*), there is a gradient of exposure to wave action from very exposed on the open coast to very sheltered conditions at the head of Balta Sound. Strong tides run through Bluemull Sound (*Area summary 3*), outside the southern boundary of Area 2, and these influence the area around Ness of Ramnageo and Haaf Gruney where there are tidal streams of moderate strength. Moderate tides also run around the headlands and islands of the open coast but elsewhere they are negligible. The area is predominantly fully marine with localised areas of reduced salinity.

This coastline is relatively low-lying although there are cliffs in the north-east of the area. Many of the rocky shores are steep and broken and rocky substrata continue into the sublittoral, often as boulder and cobble, to a depth of about 20 m inshore and about 30 m in offshore locations such as off the Vere and Haaf Gruney. There is no information available for the rocky sublittoral north of Balta. There are a number of small sandy beaches in the area and larger ones in exposed conditions in Sand Wick and Nor Wick. In sheltered conditions such as Balta Sound, many of the shores are of boulders and muddy sand and gravel. In the sublittoral, the predominant sediment type is clean shell-gravel and sand, sometimes with maerl. Balta Sound has muddier sublittoral sediments.

Other coastal habitats include a sand tombolo joining the island of Huney to the mainland, small patches of saltmarsh and heathland. The area is predominantly rural and surrounded by grazed moorland, with roads alongside much of the coastline. Villages at the heads of several of the voes or embayments have scattered linear developments of housing along these roads. There is a salmon *Salmo salar* farm in Balta Sound and a hatchery/smolt unit at Skaw, in the north-east of Area 2. Water quality in the area is excellent.

## Marine biology

Marine biological surveys				
	<i>Survey methods</i>	<i>No. of sites</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	6	July - August 1974	Institute of Terrestrial Ecology (1975)
	Recording	2	August 1987	Howson (1988)
	Infaunal sampling (cores)	1	August 1987	Howson (1988)
<i>Sublittoral</i>	Recording	8	August 1988	Hiscock (1988)
	Infaunal sampling (dredge)	6	August 1987	Howson (1988)



**Figure 2.1** Main features of the area, showing sites surveyed.  
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## Littoral

The littoral zone consists of steep slopes of bedrock and boulders on the open coast, with gullies, cracks and crevices in the rock. In the more sheltered sites, the shores are generally less steeply-sloping and consist of rounded boulders with the addition of muddy gravel and stones in the most sheltered locations. Much of the shoreline of Balta Sound is a mixture of boulders and muddy gravel overlain by shingle. There are cleaner sand beaches in more exposed locations and, at Swarta Skerry, to the west of Balta, the shore comprises sand with bedrock outcrops.

On shores exposed to wave action, there are few, if any, furoid algae in the mid-eulittoral. The littoral fringe is dominated by the black lichen *Verrucaria maura* with the addition of scattered barnacles in the lower part of the zone (Ver.B). The mid-eulittoral has a narrow band of small mussels *Mytilus edulis* and barnacles *Chthamalus stellatus* (MytB) and *Semibalanus balanoides* in the upper part of the zone and a broad band of limpets *Patella vulgata* and barnacles across the remainder of the zone (BPat.Sem). In areas of localised shelter, such as behind rocky ridges, a mosaic of *M. edulis* and the furoid *Fucus vesiculosus* develops (MytFves). The lower eulittoral is dominated by the furoid *Fucus serratus*, often mixed with thongweed *Himanthalia elongata* and foliose red algae (Fser.R). This biotope gives way to a sublittoral fringe with kelps *Alaria esculenta* and *Laminaria digitata* on the exposed shores (Ala.Ldig) or *L. digitata* alone in moderately exposed conditions (Ldig.Ldig).

More sheltered shores are dominated by furoids, and boulder shores, such as those along the north coast of Balta Sound, have similar supralittoral and littoral fringe biotopes to those of more exposed conditions with zones of yellow and grey lichens (YG) and *V. maura* (Ver.Ver). In the upper eulittoral, the furoids *Pelvetia canaliculata* (Pel) and *Fucus spiralis* (Fspi) are common and the mid-eulittoral is dominated by *F. vesiculosus* with some *Ascophyllum nodosum* (Fves). The lower eulittoral has *F. serratus*, often with foliose red algae such as *Mastocarpus stellatus* (Fser.Fser). The substratum is often a mixture of boulders, cobbles and sand on the lower shore and in this situation, the furoid canopy is more open and there are other associated algal species such as the green *Ulva* sp. and *Enteromorpha* sp.

Sheltered, wide, mixed substratum shores are found at the heads of Harold's Wick and Balta Sound and along the south shore of Balta Sound. These shores are also characterised by furoids *F. vesiculosus* and *A. nodosum* although these algae may be more scattered than on adjacent boulder shores (FvesX; AscX). Lugworm *Arenicola marina* casts and *M. edulis* are often found amongst the algae. Cobbles on the upper shore support *V. maura* with scattered barnacles and large numbers of littorinids *Littorina saxatilis* var. *rudis* in the littoral fringe and barnacles, *L. saxatilis* and *Littorina littorea* in the upper eulittoral (BLlit). Ephemeral algae such as the green *Enteromorpha* spp. are found with the brackish-tolerant furoid *Fucus ceranoides* where freshwater streams cross the shore (EphX). In Balta Harbour, the lower eulittoral consists of muddy gravel and pebbles and has a rich infauna of large bivalves, polychaetes, nemertean, sipunculans and the anemone *Edwardsia claparedii* (VsenMtru).

## Sublittoral

In the sublittoral, slopes of bedrock, boulder and cobble extend to a depth of about 20 m inshore and about 30 m in offshore locations such as off the Vere and Haaf Gruney. The upper infralittoral is dominated by forests of the kelp *Laminaria hyperborea* (LhypR.Ft) and the lower infralittoral by kelp park of either *L. hyperborea* or *Laminaria saccharina*, reaching a maximum depth of about 30 m where the substratum permits (LsacSac). Intense grazing by the urchin *Echinus esculentus* results in foliose algae being largely confined to the kelp stipes; rock surfaces are dominated by encrusting algal species and grazing-resistant animals such as the keel worm *Pomatoceros triqueter*, the featherstar *Antedon bifida* and the cup-coral *Caryophyllia smithii* (LhypGz.Ft). Boulders provide shelter and grazing refuges for a number of species such as the brachiopod *Neocrania anomala*, the holothurian *Pawsonia saxicola*, the bivalve *Chlamys* sp. and various species of brittlestar. Intense grazing is also apparent in the circalittoral. Large numbers of the brittlestars *Ophiothrix fragilis* and *Ophiocomina nigra* are present on boulders and cobbles in depths of 20-35 m at several sites in the south-east of Area 2 (Oph). The presence of these species has a similar effect on the surrounding fauna and flora to

the grazing activities of *E. esculentus*. There are few foliose algae in the upper circalittoral and dead-man's fingers *Alcyonium digitatum*, encrusting coralline algae and animals such as *P. triqueter* and the encrusting bryozoan *Parasmittina trispinosa* are common.

Coarse, clean sediments with shell-gravel and pebbles are widely distributed in the area in depths from 10 to below 30 m. In Sand Wick, Harold's Wick and Nor Wick, these support the bivalves *Ensis arcuatus*, *Dosinia exoleta* and *Chamelea gallina*, the northern brittlestar *Ophiura affinis*, sand-eels *Ammodytes* sp. and scattered maerl (EcorEns; Sell). Maerl is most abundant in depths of 12-20 m on fine sand in south Balta Sound. Balta Sound, which is more sheltered, has mixed muddy sediments similar to those which are abundant in sheltered voes elsewhere in Shetland with *M. modiolus*, the polychaete *Nephtys ciliata* and amphipods (TubeAP).

## Nature conservation

Conservation sites		
Site name	Status	Main features
Norwick	SSSI; GCR	Geological
Norwick Meadows	SSSI	Biological
Keen of Hamar	NNR; SSSI	Botanical; geological
Balta Island	SSSI; GCR	Geological
Ham Ness	SSSI; GCR	Geological
Punds - Wick of Hagdale	SSSI; GCR	Geological
Skeo Taing - Clugan	SSSI; GCR	Geological
Qui Ness - Pund Stacks	SSSI; GCR	Geological
Unst (Swinna Ness)	NTS	
Unst (Framgord)	NTS	
Shetland Islands	ESA	Agri-environmental scheme

## Human influences

### Coastal developments and uses

Area 2 is predominantly rural and surrounded by grazed moorland, with roads and villages concentrated in the region between the northern boundary and Balta Sound. Villages at the heads of several of the voes or embayments have scattered linear developments of housing along these roads. The houses in the area have septic tanks with no centralised sewerage, but water quality is excellent.

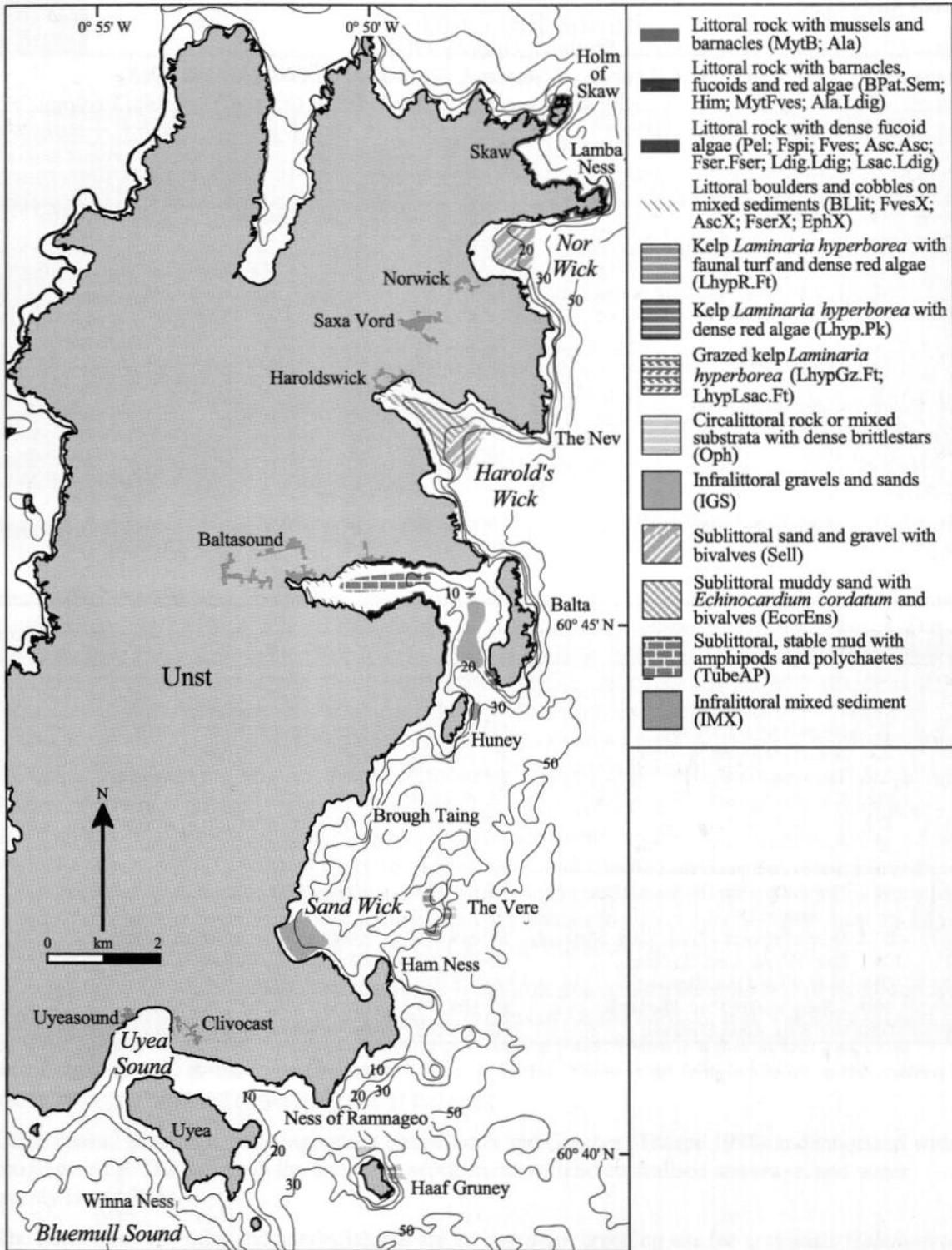
### Marine developments and uses

There is a salmon *Salmo salar* farm in Balta Sound and a hatchery/smolt unit at Skaw, in the north-east of Area 2. Potting for crustaceans takes place around the inshore rocky coastline and there is a sand-eel *Ammodytes* spp. fishing-ground east of Balta.

Baltasound has a harbour and a marina for local boats with one visitor's berth. The voe is also used as an anchorage.

## References and further reading

- Hiscock, K. 1988. *Marine Nature Conservation Review: Marine biological surveys in Shetland, 28<sup>th</sup> May-5<sup>th</sup> June 1988. Field Report*. Unpublished, Nature Conservancy Council, Peterborough.
- Howson, C.M. 1988. *Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987*. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 816.
- Institute of Terrestrial Ecology. 1975. Report to the Nature Conservancy Council on some aspects of the ecology of Shetland. Part 6.2. Littoral biota of rocky shores. *Nature Conservancy Council, CSD Report*, No. 27.



**Figure 2.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 2.1, cited literature and additional field observations).

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## Sites surveyed

Survey 1: 1988 MNCR survey of Shetland (Hiscock 1988).

Survey 261: 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Howson 1988).

Survey 434: 1974 ITE report on rocky shore ecology of Shetland (Institute of Terrestrial Ecology 1975).

<b>Littoral sites</b>					
<i>Survey</i>	<i>Site</i>	<i>Site name</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes recorded</i>
261	96	Head of Balta Harbour, Unst, Balta Sound.	HP 623 087	60°45.4'N 00°51.4'W	BPat.Sem; AscX; FserX; VsenMtru
261	97	E of Swinna Ness, Balta Sound, Unst.	HP 644 091	60°45.6'N 00°49.0'W	Ldig.Ldig.Bo
434	6	Hamar Geo, Balta Sound, Unst.	HP 640 092	60°45.6'N 00°49.5'W	Pel; BLlit; FvesX; FserX; Ldig.Ldig
434	11	Ordale, Balta Sound, Unst.	HP 640 084	60°45.2'N 00°49.5'W	BLlit; Fspi; Fves; Fser.Fser; FserX
434	16	Clibberswick, Unst.	HP 642 123	60°47.3'N 00°49.2'W	BLlit; Fves; EphX; FvesX; FserX; Lsac.Ft
434	41	Russa Geo, Unst.	HP 670 155	60°49.0'N 00°46.0'W	Ver; Ver.Ver; MytB; BPat; Him; MytFves; Ala; Ala.Ldig
434	56	Swarta Skerry, Unst.	HP 648 080	60°45.0'N 00°48.6'W	Fves; Fser.R; Fser.Fser; Lsac.Ldig
434	61	The Veils, Harold's Wick, Unst.	HP 644 110	60°46.6'N 00°49.0'W	Ver.B; BPat; BPat.Sem; Him; Ala.Ldig

<b>Sublittoral sites</b>					
<i>Survey</i>	<i>Site</i>	<i>Site name</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes recorded</i>
1	201	SW Balta Island, Unst.	HP 654 073	60°44.6'N 00°48.0'W	Lhyp.Pk
1	225	NE of Ham Ness, Unst.	HP 646 025	60°42.0'N 00°48.9'W	LhypR.Ft
1	226	NW of Haaf Gruney, Unst.	HU 632 988	60°40.0'N 00°50.6'W	Oph
1	227	The Vere, Unst.	HP 645 032	60°42.4'N 00°49.0'W	LhypR.Ft
1	228	E of Haaf Gruney.	HU 638 983	60°39.8'N 00°49.9'W	LsacSac; Oph
1	230	S of the Vere, Unst.	HP 648 028	60°42.2'N 00°48.7'W	LsacSac; Oph
1	232	E of Huney, Unst.	HP 654 065	60°44.2'N 00°48.0'W	IMX
1	233	S of Swinna Ness, Unst.	HP 653 086	60°45.3'N 00°48.1'W	LhypGz.Ft
261	D11	The Punds, Harold's Wick, Unst, Shetland.	HP 648 114	60°46.8'N 00°48.5'W	Sell
261	D12	Head of Harold's Wick, Unst, Shetland.	HP 643 119	60°47.1'N 00°49.1'W	EcorEns
261	D13	Balta Sound, Unst, Shetland.	HP 637 088	60°45.4'N 00°49.8'W	TubeAP
261	D19	Sand Wick, Unst, Shetland.	HP 625 025	60°42.0'N 00°51.3'W	IGS
261	D20	S Balta Sound, Unst, Shetland.	HP 653 075	60°44.7'N 00°48.1'W	IGS
261	D21	Nor Wick, Unst, Shetland.	HP 658 148	60°48.6'N 00°47.4'W	Sell

## 3

## Bluemull Sound

Location		
<i>Position (centre)</i>	HU 570 970	60°39.1'N 00°57.4'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)

Physical features	
<i>Physiographic type</i>	Sound
<i>Length of coast</i>	44.0 km; Uyea: 9.3 km; Daaey: 1.5 km; Urie Lingay: 1.9 km; Sound Gruney: 1.3 km
<i>Area of inlet</i>	11.4 km <sup>2</sup> ; Uyea and Skuda Sounds: 2.8 km <sup>2</sup>
<i>Bathymetry</i>	Max. depth 55 m north of Fetlar; channel floor mostly between 20 and 35 m depth; maximum depth in Uyea & Skuda Sounds: 20 m
<i>Wave exposure</i>	Very exposed in eastern entrance to very sheltered around islands
<i>Tidal streams</i>	Very strong – negligible; strong (4-5 knots) through most of sound
<i>Tidal range</i>	2.1 m (mean springs); 0.9 m (mean neaps)
<i>Salinity</i>	Fully marine

### Introduction

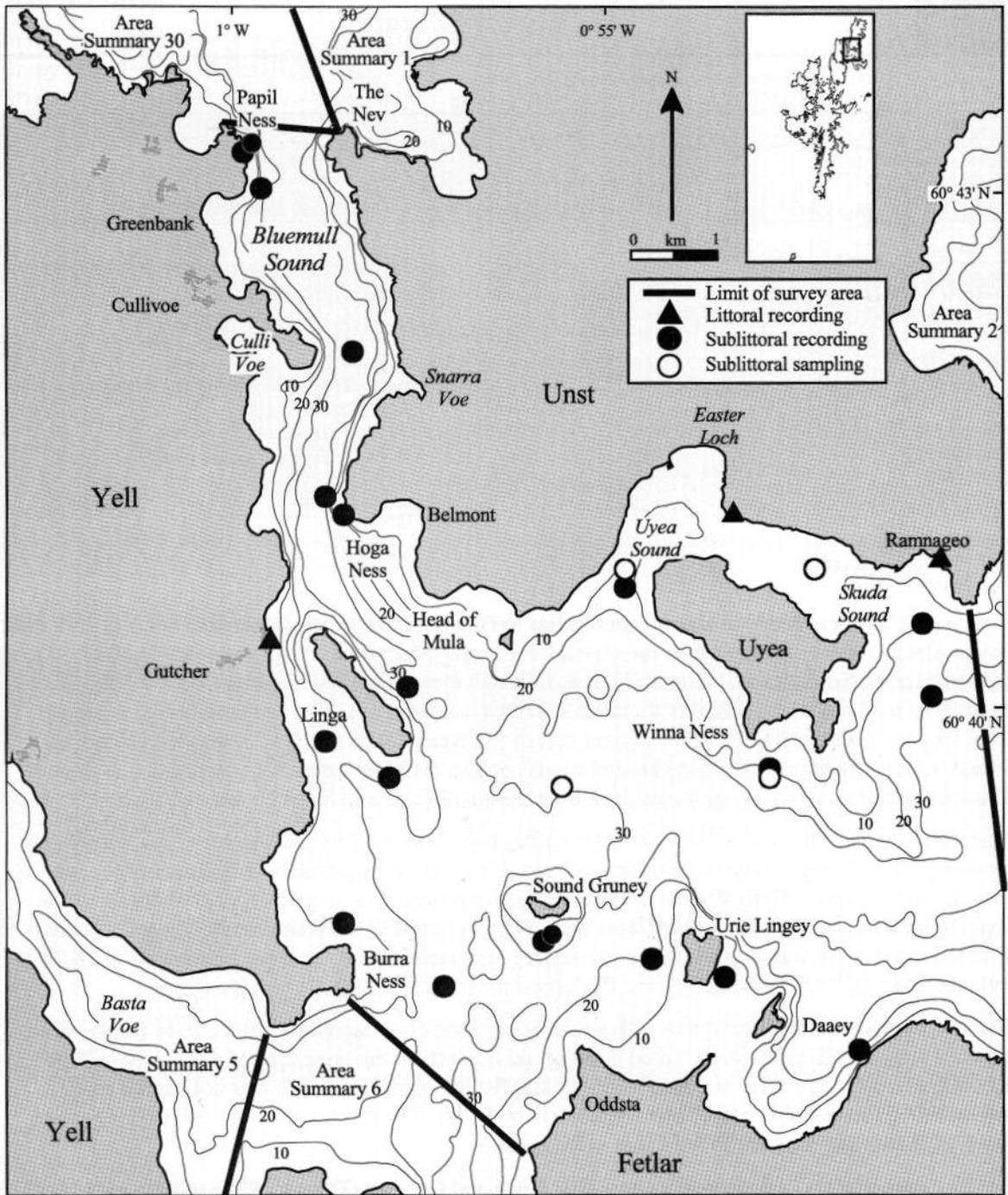
Bluemull Sound, which lies along a north-south trend, divides the island of Unst from the island of Yell. Area 3 also includes the eastern approaches to Bluemull Sound, between the islands of Yell and Fetlar. Strong tides of up to 5 knots run through the sound which reaches a maximum depth of 40 m in the centre and 55 m between Fetlar and Uyea, although most of the sea bed is between 20 and 35 m in depth. The majority of the sound is sheltered from wave action, but there is a gradient of exposure from very exposed conditions in the eastern part of the area and the northern entrance to Bluemull Sound, to very sheltered conditions around islands and in the inner parts of Uyea and Skuda Sounds. There are a number of small embayments, including the small Culli and Snarra Voes

Bluemull Sound is fringed by bedrock and boulder shores, many of which are steep, but there are sandy beaches in some of the more open bays and shingle overlying muddy sediment in more enclosed areas such as Culli Voe. In the sublittoral, steep rock inshore gives way at about 15-20 m depth to boulder, cobble and pebble plains with rocky outcrops in the centre of the channel. There is little sediment in the sound itself, but in the eastern approaches there are mixed sediments at 15-20 m and maerl at 20-25 m. This maerl forms the largest maerl bed described from Shetland.

The area is predominantly rural although a road fringes the coast along the west side of the sound and there are several villages with scattered housing, particularly at the northern end. The main village here is Cullivoe where there is a small harbour and fishing piers. There is a pier at Gutcher from where ferries run to Belmont on Unst and Oddsta on Fetlar. There is no fringing road on the eastern shore, with just one road to the ferry pier at Belmont.

Other coastal habitats include lagoons at Easter Loch and Gutcher (Thorpe 1998) and moorland with rough grazing. The houses in the area have septic tanks with no centralised sewerage, and water quality is excellent.

The north coast of Fetlar and nearby islands are an important breeding site for grey seals *Halichoerus grypus* and common seals *Phoca vitulina*. The area is important for moulting and wintering seabirds and wildfowl (SNH information).



**Figure 3.1** Main features of the area, showing sites surveyed.

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## Marine biology

### Marine biological surveys

	Survey methods	No. of sites	Date(s) of survey	Source
Littoral	Recording	2	July - August 1974	Institute of Terrestrial Ecology (1975)
	Recording	1	August 1987	Howson (1988)
Sublittoral	Recording	4	August 1987	Howson (1988)
	Recording	2	July-August 1987	Moss & Ackers (1987)
	Recording	14	August 1988	Hiscock (1988)
	Infauanal sampling (dredge)	4	August 1987	Howson (1988)

### Littoral

A very sheltered shore near Gutcher is a steep slope of vertically-bedded rock with ridges which run parallel to the shore and boulders and cobbles on the lower shore. There are also records for a sheltered boulder, gravel and pebble shore in Skuda Sound. The biotopes on these shores are characteristic of sheltered shores in Shetland and likely to be widely distributed within this area.

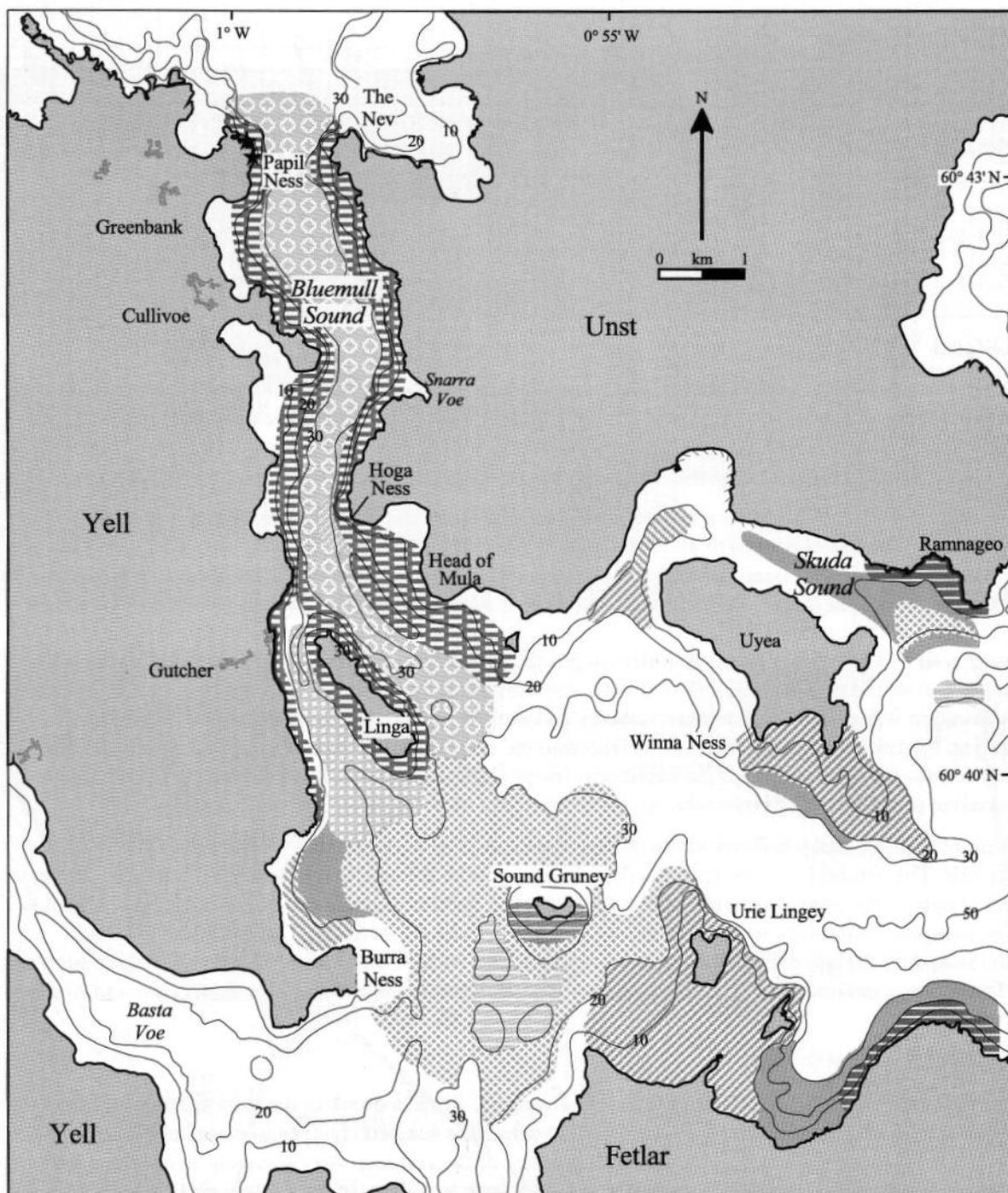
Vertical rock in the littoral fringe at both sites is covered by the black lichen *Verrucaria maura* (Ver.Ver). The lower zones are all dominated by furoid algae, and at Gutcher, the more sheltered of the two sites, there are bands of *Pelvetia canaliculata* and barnacles (PelB) and then *Fucus spiralis* in the upper eulittoral (Fspi). The mid-eulittoral here is blanketed by the furoid *Ascophyllum nodosum* (Asc.Asc) with numerous barnacles on the rock surface beneath the algae whilst the lower eulittoral has *Fucus serratus* (Fser.Fser). Boulders in Skuda Sound have a zone of *Fucus vesiculosus* in the upper part of the mid-eulittoral (Fves) with *A. nodosum* in the lower part. In the lower eulittoral, the substratum is a mixture of boulders, cobbles and muddy gravel, and the canopy of *F. serratus* is broken by patches of green algae *Enteromorpha* sp. and barnacles (FserX). On both shores, kelp *Laminaria digitata* dominates the sublittoral fringe (Ldig.Ldig). There are numerous long, narrow coralline pools with *Enteromorpha* sp. between ridges of bedrock at Gutcher (Cor).

A more exposed steep bedrock shore at Ramnageo on Unst is dominated by animals rather than furoids. The littoral fringe is dominated by *V. maura* with the addition of scattered barnacles in the lower part of the zone. The mid-eulittoral has a broad band of limpets *Patella vulgata* and barnacles *Semibalanus balanoides* with small mussels *Mytilus edulis* (BPat.Sem). The lower eulittoral is dominated by thongweed *Himantalia elongata* mixed with *F. serratus* and foliose red algae such as *Mastocarpus stellatus* (Him). This gives way to a sublittoral fringe with kelps *L. digitata* and *Alaria esculenta*.

### Sublittoral

In Bluemull Sound itself, where the tides are strongest, steep bedrock in the littoral zone continues into the sublittoral to a depth of about 15-20 m, where the sea bed changes to plains of boulder, cobble and pebble with rocky outcrops in the centre of the channel. Any sediment in the main part of the sound is confined to pockets of coarse sand between boulders. In the eastern section of Area 3, between Unst and Fetlar, the lower limit of the rock is between about 25 and 30 m. Coarse sand and maerl are widely distributed in this area, with firmer sand in Uyea and Skuda Sounds.

At the northern entrance to Bluemull Sound, there are surge gullies and caves in the steep bedrock. These have characteristic surge-tolerant communities on their walls with encrusting sponges *Halichondria panicea* and *Pachymatisma johnstonia*, ascidians *Diplosoma spongiforme* and anemones *Metridium senile* and *Sagartia elegans*. The rear walls of a U-shaped cave with two entrances are covered with the sponge *Clathrina coriacea* and the ascidian *Dendrodoa grossularia* (SCAs.DenCla) whilst the lower parts of the walls are abraded and dominated by the barnacle *Balanus crenatus* (CC.BalPom). Both the gully and cave for which there are records have boulder floors with the crabs *Hyas araneus* and *Cancer pagurus* sheltering between the boulders (CC.Mob).



	Littoral rock with barnacles, fucoids and red algae (PelB; BPat.Sem; Him)		Circalittoral rock with hydroids and bryozoans (Flu.SerHyd)
	Littoral rock with dense fucoid algae (Fspi; Fves; Asc.Asc; Fser.Fser; Ldig.Ldig)		Tide-swept <i>Modiolus</i> beds (ModT)
	Littoral boulders and cobbles on mixed sediments (AscX; FserX)		Circalittoral rock or mixed substrata with dense brittlestars (Oph; Oph.Oacu)
	Sublittoral caves (SCAn; SCAn.Tub; SCAs.DenCla; CC.Mob)		Infralittoral gravels and sands (IGS)
	Kelp <i>Laminaria hyperborea</i> with dense red algae (Lhyp.Ft; AlcByH)		Maerl beds (Phy.R; Phy.HEc)
	Tide-swept kelp <i>Laminaria hyperborea</i> with faunal turf (Lhyp.TFt; Lhyp.TPk)		Sublittoral muddy sand with <i>Echinocardium cordatum</i> and bivalves (EcorEns)
	Mixed kelps <i>Laminaria hyperborea</i> and <i>Laminaria saccharina</i> (LhypLsac.Ft; LhypLsac.Pk)		Sublittoral mixed sediment with <i>Laminaria saccharina</i> (LsacX)
	Tide-swept circalittoral rock with dense <i>Alcyonium digitatum</i> (AlcC)		

< **Figure 3.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 3.1, cited literature and additional field observations).

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The strong tidal streams which run through Bluemull Sound create a variety of tide-swept biotopes. Bedrock in shallow water supports dense *Laminaria hyperborea* kelp forest to a depth of about 20 m and kelp park below this to 25 m (Lhyp.TFt; Lhyp.TPk). Dead-man's fingers *Alcyonium digitatum* is abundant on rock surfaces beneath the kelp. In areas of boulders and cobbles, additional kelp species *Laminaria saccharina* and *Saccorhiza polyschides* are found amongst the *L. hyperborea*. The kelp stipes are covered with large colonies of *H. panicea* and there are anemones *Urticina felina* and *Cereus pedunculatus* in sand between the boulders.

In shallower and less tide-swept water around the small islands north-west of Fetlar, there are very mixed substrata in the infralittoral zone with bedrock, boulders, cobbles, pebbles and shell-gravel in depths of 15-20 m. *L. saccharina* is the dominant kelp species and there a variety of foliose algae are present, including the red algae *Nitophyllum punctum* and *Porphyra miniata* and the green alga *Ulva* sp. (LsacX).

The deeper parts of Area 3, between 20 and 40 m, have biotopes related to both the stability of the substratum and the speed of the tidal streams. Bedrock outcrops and boulders, particularly in the northern part of the channel, are covered with fields of *A. digitatum* with patches of the hydroids *Sertularia argentea*, *Abietinaria abietina* and *Tubularia indivisa*, which support caprellids and other amphipods (AlcC). In the southern part of the channel and east of Uyea, where there is more sediment between the boulders, *A. digitatum* characterises the rock and boulders, large numbers of the horse mussel *Modiolus modiolus* are found between boulders and cobbles (ModT) and beds of brittlestars *Ophiothrix fragilis* and *Ophiocomina nigra* cover cobbles and pebbles (Oph). Species-richness is generally low and there are large expanses of boulder and cobble with patches of shell-gravel with the boulders covered with algal crusts and the keel worm *Pomatoceros triqueter* (FaAIC).

At depths of 20-25 m in the eastern part of Area 3, the hard substrata give way to duned, coarse shell-gravel and maerl which, although subject to strong tidal streams, is less scoured than the main sound. The distribution of the animals on this extensive maerl bed is patchy with brittlestars concentrated in some areas, *M. modiolus* in others. Both brittlestars and *M. modiolus* are concentrated in the dune troughs and there are unusually high numbers of the brittlestar *Ophiopholis aculeata*, a normally cryptic species, mixed with the more usual *O. fragilis* and *O. nigra* lying on the sediment surface (Oph.Oacu). The holothurian *Neopentadactyla mixta* occurs in the maerl and the bivalves *Ensis arcuatus*, *Dosinia exoleta* and *Venus striatula*, the northern brittlestar *Ophiura affinis* and sand-eels *Ammodytes* sp. are found (Phy.HEc). Of particular interest are large numbers of two northern species, the urchin *Strongylocentrotus droebachiensis* and the holothurian *Cucumaria frondosa*.

Firmer sand in Uyea Sound has the bivalves *Ensis* sp. and *Mya truncata* and algae including *Ulva* sp. and *L. saccharina* (EcorEns). *M. modiolus* occurs amongst sand and boulders south of Uyea.

## Nature conservation

Conservation sites		
Site name	Status	Main features
North Sandwich	SSSI; GCR	Geological
Easter Loch	SSSI	Ornithological
Gutcher	SSSI; GCR	Geological
Fetlar	SPA; RSPB	Ornithological
North Fetlar	SSSI; GCR	Botanical; ornithological; seals
Tressa Ness to Colbinsoft	SSSI; GCR	Geological
Ness of Cullivoe	SSSI; GCR	Geological
Shetland Islands	ESA	Agri-environmental scheme
Daacy	NTS	Island

## Human influences

### Coastal developments and uses

Area 3 is predominantly rural although the B9082 road fringes the coast along the west side of Bluemull Sound and there are several villages with scattered housing, particularly at the northern end. The main village here is Cullivoe where there is a small harbour and fishing piers. There is a pier at Gutcher from where ferries run to Unst and Fetlar and corresponding piers at Belmont on Unst and Oddsta on Fetlar. There is no fringing road on the eastern shore of Bluemull Sound, with just one road to the ferry pier at Belmont, and none along the north shore of Fetlar.

The igneous rock is quarried at Gutcher.

### Marine developments and uses

The piers at Cullivoe provide a base for fishing boats, with potting for crustaceans being particularly important. There are many salmon *Salmo salar* farms in Area 3.

## References and further reading

Hiscock, K. 1988. *Marine Nature Conservation Review: Marine biological surveys in Shetland, 28<sup>th</sup> May-5<sup>th</sup> June 1988. Field Report*. Unpublished, Nature Conservancy Council, Peterborough.

Howson, C.M. 1988. *Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) Nature Conservancy Council, CSD Report, No. 816.*

Institute of Terrestrial Ecology. 1975. Report to the Nature Conservancy Council on some aspects of the ecology of Shetland. Part 6.2. Littoral biota of rocky shores. *Nature Conservancy Council, CSD Report, No. 27.*

Moss, D., & Ackers, G. 1987. *A sublittoral survey of Shetland, 1987*. Unpublished, Marine Conservation Society.

Thorpe, K. 1998. *Marine Nature Conservation Review Sectors 1 & 2. Lagoons in Shetland and Orkney: area summaries*. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series.)

## Sites surveyed

Survey 1: 1988 MNCR survey of Shetland (Hiscock 1988).

Survey 227: 1987 MCS sublittoral survey of Shetland (Moss & Ackers 1987).

Survey 261: 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Howson 1988).

Survey 434: 1974 ITE report on rocky shore ecology of Shetland (Institute of Terrestrial Ecology 1975).

Littoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
261	88	Gutcher, S of Pier, Yell, Linga Sound.	HU 549 991	60°40.3'N 00°59.7'W	YG; Ver.Ver; PelB; Fspi; Asc.Asc; Fser.Fser; Cor; Ldig.Ldig
434	31	Osman Skerries, Unst.	HP 623 000	60°40.7'N 00°51.5'W	YG; Ver.Ver; BPat.Sem; Him; Fser.Fser; Ldig.Ldig; Lhyp.Ft
434	32	Clivocast, Unst.	HP 600 005	60°41.0'N 00°54.0'W	Ver.Ver; Fves; AscX; Fser.Fser; FserX; Ldig.Ldig

## Sublittoral sites

Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
1	205	Uyea Sound, NW of Winna Ness.	HU 588 997	60°40.6'N 00°55.4'W	LsacX
1	206	W of Urie Lingey.	HU 591 956	60°38.4'N 00°55.1'W	LsacX
1	209	South of Sound Gruney, Fetlar.	HU 579 958	60°38.5'N 00°56.4'W	Oph.Oacu; Oph; Phy.HEc
1	212	Scuta, Fetlar.	HU 614 946	60°37.8'N 00°52.6'W	Lhyp.Ft; Ant; IGS
1	215	E of Urie Lingey, Fetlar.	HU 599 954	60°38.2'N 00°54.2'W	LsacX
1	216	S of Linga, Bluemull Sound.	HU 562 976	60°39.5'N 00°58.3'W	ModT
1	217	Between Burra Ness and Sound Gruney.	HU 568 953	60°38.2'N 00°57.6'W	Phy.HEc
1	218	Wreck S of Sound Gruney.	HU 579 958	60°38.5'N 00°56.4'W	Lhyp.Lsac.Ft; AlcByH; Phy.HEc
1	219	NE of Linga, Bluemull Sound.	HU 564 986	60°40.0'N 00°58.0'W	AlcC
1	222	Papil Ness, Bluemull Sound.	HP 548 041	60°43.0'N 00°59.7'W	LhypGz.Ft; Lhyp.TPk
1	224	E of Ness of Cullivoe, Unst.	HP 558 023	60°42.0'N 00°58.6'W	AlcC
1	229	E entrance to Scuda Sound, Unst.	HU 621 993	60°40.3'N 00°51.8'W	IGS; Phy.R
1	234	Winna Ness, Unst.	HU 604 977	60°39.5'N 00°53.7'W	LsacX
1	235	W of Haaf Gruney.	HU 622 985	60°39.9'N 00°51.7'W	Oph
227	18	Hoga Ness, Unst.	HP 557 005	60°41.0'N 00°58.8'W	Lhyp.TFt
227	19	Bluemull Sound, Unst.	HP 555 007	60°41.1'N 00°59.0'W	Lhyp.TPk; AlcByH; Flu.SerHyd
261	99	Linga Sound, Yell.	HU 555 980	60°39.7'N 00°59.0'W	ModT
261	100	N of Burra Ness, Yell, Basta Voe.	HU 557 960	60°38.6'N 00°58.8'W	IGS; Phy.R; EcorEns
261	102	Cave, Papil Ness, Yell, Bluemull Sound.	HP 546 045	60°43.2'N 00°59.9'W	SCAs.DenCla; SCAn; CC.Mob
261	103	N Papil Ness, Bluemull Sound, Yell.	HP 547 046	60°43.2'N 00°59.8'W	Lhyp.TFt; Lhyp.TPk; Lhyp.Ft; AlcByH; SCAn.Tub; CC.BalPom; AlcC
261	D14	N of Sound Gruney, Shetland.	HU 581 975	60°39.4'N 00°56.2'W	Phy.HEc
261	D16	Winna Ness, Uyea, Shetland.	HU 604 976	60°39.4'N 00°53.7'W	IGS
261	D17	Uyea Sound, Unst, Shetland.	HU 588 999	60°40.7'N 00°55.4'W	EcorEns
261	D18	Skuda Sound, Unst, Shetland.	HU 609 999	60°40.7'N 00°53.1'W	IGS

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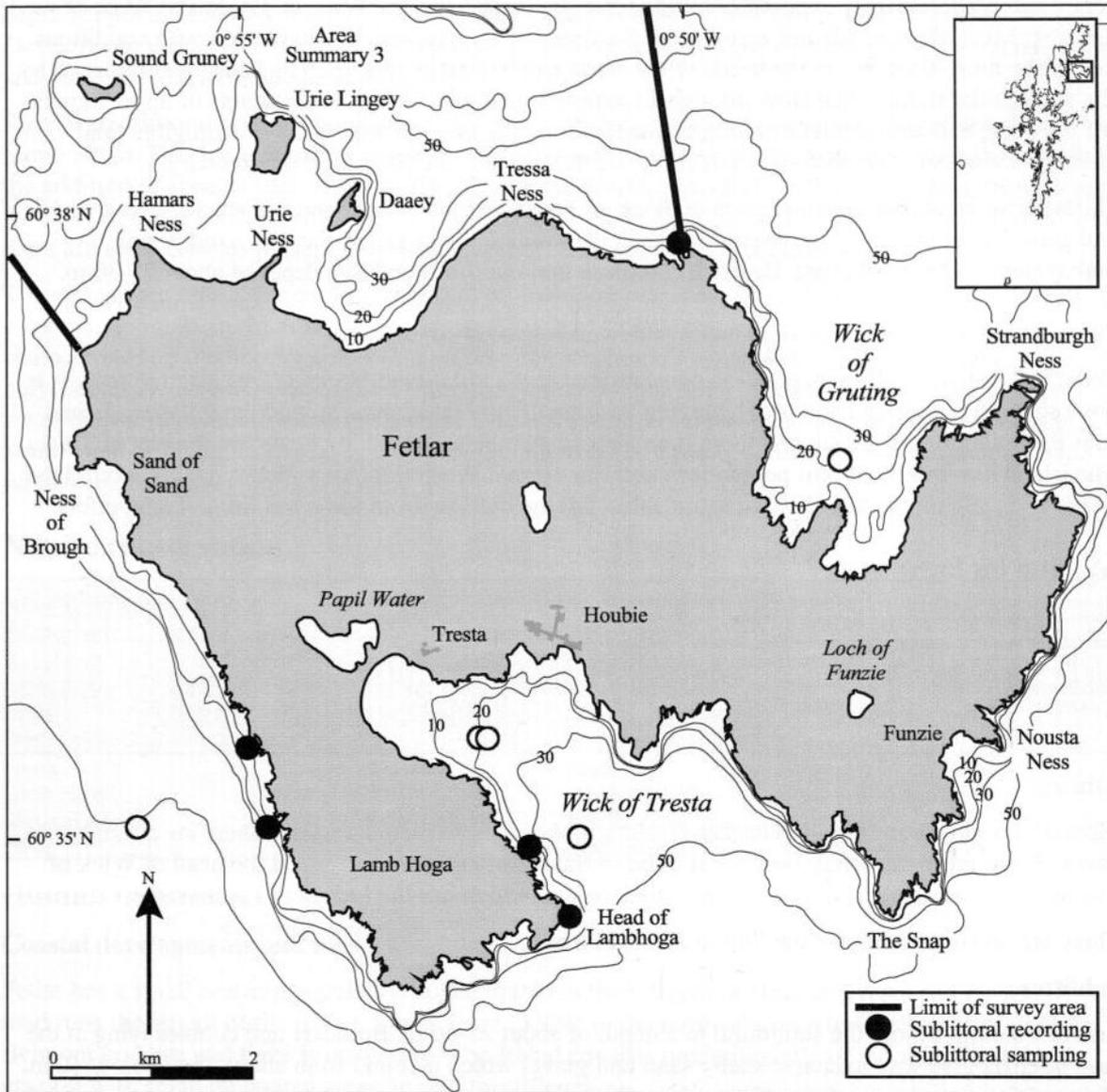
Christine Howson

4

## Fetlar

## Location

<i>Position (centre)</i>	HU 630 920	60°25.5'N 00°44.7'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)



**Figure 4.1** Main features of the area, showing sites surveyed.

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### Physical features

<i>Physiographic type</i>	Island (open coast with embayments)
<i>Length of coast</i>	Fetlar: 57.2 km
<i>Bathymetry</i>	50 m contour within 1 km of south and east coasts; west shallower
<i>Wave exposure</i>	Very exposed on open east-facing coast to locally sheltered in bays
<i>Tidal streams</i>	Strong off north and west coasts and around headlands; weak to negligible elsewhere
<i>Tidal range</i>	2.1 m (mean springs); 0.9 m (mean neaps)
<i>Salinity</i>	Fully marine

### Introduction

The island of Fetlar lies off the east coast of Yell at the southern entrance to Bluemull Sound. It has a rocky and predominantly exposed coastline with two large bays, the Wick of Tresta and Wick of Gruting. Most of the south and east-facing coastline is very exposed to wave action with conditions becoming more sheltered in the heads of the inlets and behind headlands. The island is influenced by the strong tidal streams that flow through Bluemull Sound with strong tidal streams of up to 5 knots off the north and west coasts and around headlands on the east but with weak or negligible tidal streams elsewhere. The north-western corner of the island is included in *Area summary 3*.

Cliffs surround all but the inner parts of Wick of Tresta and there are numerous stacks, caves, arches and geos. There are sandy beaches at the head of Wick of Tresta and in Sand of Sand, a small embayment on the west coast. Bedrock continues into the sublittoral to a depth of about 25-30 m. Coarse shelly sand and gravel is found from about 25 to below 40 m and finer sand from 40 to at least 70 m, with the absence of mud indicating the wave-exposed conditions.

Fetlar has a small crofting population concentrated in the villages of Houbie, Tresta and Funzie. It is predominantly moorland and rough grazing with small cultivated areas around the villages. A road runs the length of the island, and there is an airstrip. A number of fishing boats use the pier at Tresta. The island has important bird populations and is a Special Protection Area. Water quality around the island is excellent; the houses have septic tanks but the outflow from these has little, if any, effect.

### Marine biology

#### Marine biological surveys

<i>Survey methods</i>	<i>No. of sites</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Sublittoral</i> Recording	5	August 1988	Hiscock (1988)
Infaunal sampling (anchor dredge)	3	August 1987	Howson (1988)
Infaunal sampling (van Veen grab)	2	1963	Pearson, Coates & Duncan (1994)

#### Littoral

Most of the shoreline of Fetlar consists of cliffs broken by geos and stacks and there are a number of caves. There are clean sandy beaches at Sand of Sand on the west coast and at the head of Wick of Tresta. The latter is backed by a shingle ridge, behind which lies the lochan of Papil Water.

There are no survey data for the littoral zone in Area 4.

#### Sublittoral

Bedrock continues into the sublittoral to a depth of about 25-30 m. Boulders and cobbles lying at the base of cliffs give way to coarse shelly sand and gravel which is found from about 25 to below 40 m. Plains of finer sand occur from 40 to at least 70 m with the absence of mud indicating wave-exposed conditions and the lack of any major source of silt from onshore.

Upper infralittoral rock in the wave exposed conditions of Lamb Hoga and along the west coast of the island supports *Laminaria hyperborea* kelp forest to a depth of about 10-15 m (Lhyp.Ft) with kelp park of mixed *Laminaria saccharina* and *L. hyperborea* in the lower infralittoral (LsacSac), the relative abundances of the kelp species varying between sites. The deepest kelp plants are found at about 25 m. On the still more exposed north-west facing coast, the kelp has a rich turf of red algae and animals beneath it (LhypFa, LhypR.Pk). Where the bedrock beneath the kelp is vertical, there is a

mixed turf of animal and algal species with dead-man's fingers *Alcyonium digitatum* particularly abundant. Elsewhere in the upper infralittoral, there is a moderate amount of grazing by the sea urchin *Echinus esculentus*, but in contrast to more sheltered sites where algae are confined to the kelp stipes, some foliose algae survive on the rock beneath the canopy. These include the red alga *Nitophyllum punctum* and the brown algae *Dictyota dichotoma* and *Desmarestia* spp. Grazing is more significant in the lower infralittoral where boulders and rock faces are dominated by the keel worm *Pomatoceros triqueter* and encrusting coralline algae (LhypGz.Pk) with only scattered kelp plants. Large numbers of the brittlestar *Ophiothrix fragilis* are found at some sites (Oph) and horse mussels *Modiolus modiolus* occur in small numbers between boulders in this zone.

On the south-west corner of Fetlar, where tidal streams are moderately strong, a cobble plain at 27 m depth supports a scoured community of scattered *L. saccharina* plants mixed with bushes of *Desmarestia viridis* (XKScrR). The fauna includes species such as the ascidian *Clavelina lepadiformis* and the hydroid *Kirchenpaueria pinnata*.

Ridged circalittoral bedrock with ledges and small vertical faces is found around the peninsula of Lamb Hoga. This has encrusting communities similar to the lower infralittoral described above with the addition of species such as the featherstar *Antedon bifida*, ascidians including *Ascidia mentula* and the bivalve *Chlamys distorta* (Ant). The vertical faces have jewel anemones *Corynactis viridis*. Where there are more cobbles present, the brittlestar *Ophiocolina nigra* is common.

Throughout the area, coarse, clean shell-gravel and sand, occasionally with maerl, replaces the rock at depths of about 25 m. In Wick of Gruting and Wick of Tresta, this supports a community characterised by the bivalve *Chamelea gallina*, the amphipod *Perioculodes longimanus* and polychaetes *Magelona mirabilis* and *Chaetozone setosa* (SpiSpi). The sand becomes finer in deeper water below 40 m and towards the head of Wick of Tresta, where *M. modiolus* is present (FabMag). South-west of Fetlar, in depths of 68-70 m, the polychaetes *Chaetopterus variopedatus* and *Owenia fusiformis* are found (CGS).

## Nature conservation

Conservation sites		
Site name	Status	Main features
Fetlar	SPA	Ornithological
North Fetlar	SSSI	Botanical; ornithological
Virva	SSSI; GCR	Geological
Trona Mires	SSSI	Botanical; ornithological
Funzie	SSSI; GCR	Geological
Lamb Hoga	SSSI	Ornithological
Shetland Islands	ESA	Agri-environmental scheme
Fetlar	RSPB	Ornithological

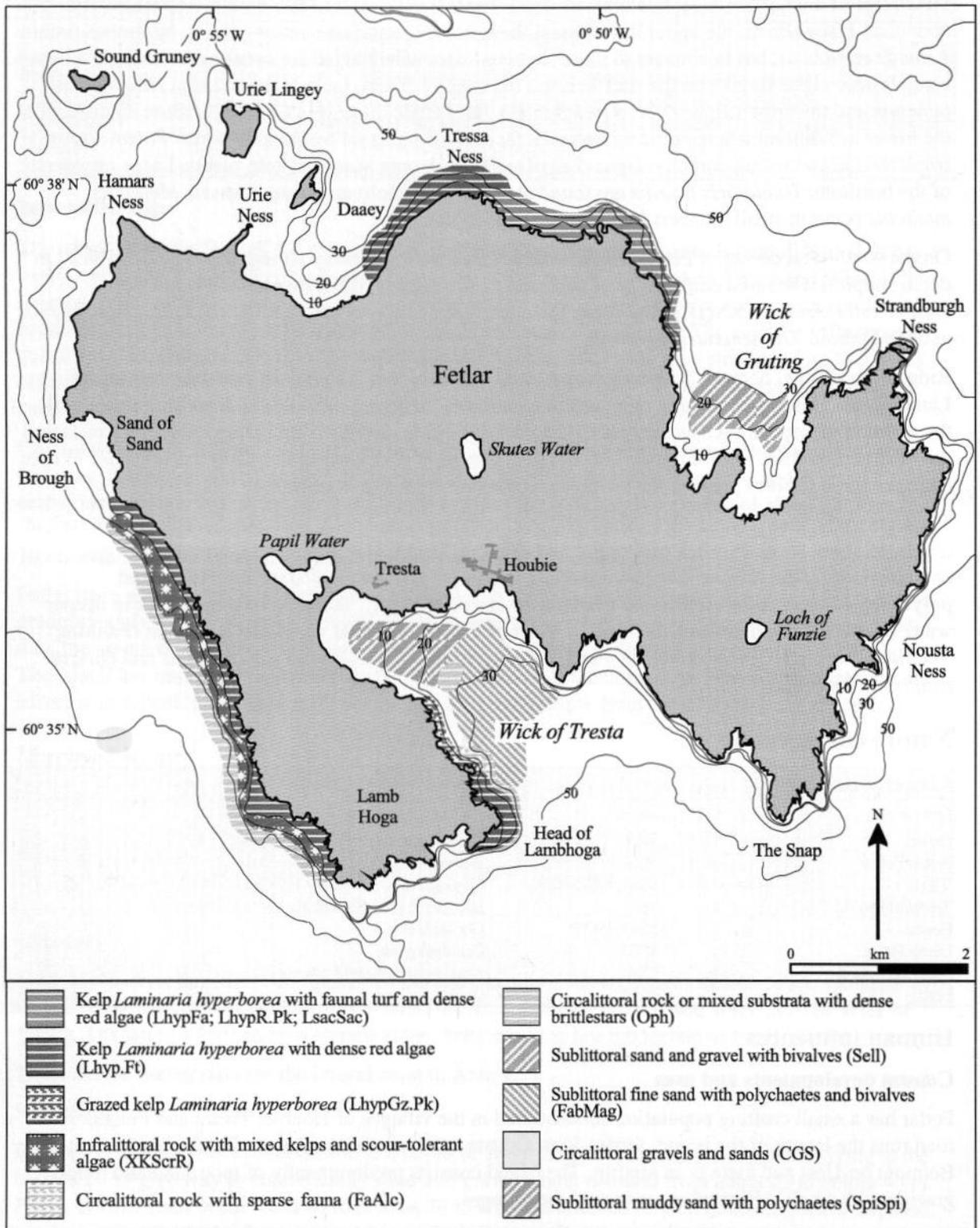
## Human influences

### Coastal developments and uses

Fetlar has a small crofting population concentrated in the villages of Houbie, Tresta and Funzie. A road runs the length of the island, ferries from Oddsta in the north-west run to Gutcher on Yell and Belmont on Unst and there is an airstrip. The island consists predominantly of moorland and rough grazing with small cultivated areas around the villages.

Water quality around the island is excellent; the houses have septic tanks but the outflow from these has little, if any, effect.

The island attracts a number of visitors, primarily to see the important bird populations. There is a small museum at Houbie. Sailing yachts occasionally visit the area.



**Figure 4.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 4.1, cited literature and additional field observations).

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### Marine developments and uses

There is a whitefish fishing-ground south of Fetlar and some potting for crustaceans takes place around the island. A number of fishing boats use the pier at Tresta.

### References and further reading

- Hiscock, K. 1988. *Marine Nature Conservation Review: Marine biological surveys in Shetland, 28<sup>th</sup> May-5<sup>th</sup> June 1988. Field Report*. Unpublished, Nature Conservancy Council, Peterborough.
- Howson, C.M. 1988. *Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987*. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 816.
- Pearson, T.H., Coates, A., & Duncan, J.A.R. 1994. *Shetland subtidal sediment community analysis. Report on analysis of subtidal sediment data from Shetland to identify community types present*. (Contractor: SEAS Ltd, Oban.) *JNCC Report*, No. 191. (Marine Nature Conservation Review Report, No. MNCR/OR/20.) (SEAS Report, No. SR64.).

### Sites surveyed

Survey 1: 1988 MNCR survey of Shetland (Hiscock 1988).

Survey 261: 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Howson 1988).

Survey 377: 1963 DAFS sublittoral survey at Shetland (Pearson, Coates & Duncan 1994).

Sublittoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
1	214	Stack of Birrier, Fetlar.	HU 637 946	60°37.8'N 00°50.1'W	LhypFa; LhypR.Pk
1	221	S of Shebirswilse, Lambhoga, Fetlar.	HU 594 895	60°35.1'N 00°54.9'W	XKScrR; Oph
1	220	Midberg, W Lambhoga, Fetlar.	HU 596 887	60°34.6'N 00°54.7'W	XKScrR
1	211	Big Holm, Fetlar.	HU 622 885	60°34.5'N 00°51.8'W	LhypGz.Pk; FaAIC; Oph
1	213	Head of Lambhoga, Fetlar.	HU 626 878	60°34.1'N 00°51.4'W	Lhyp.Ft; LsacSac; Ant; Oph
377	8	N of Rousker, Wick of Tresta, Fetlar.	HU 617 896	60°35.1'N 00°52.4'W	SpiSpi
377	11	N of Grut Ness, Wick of Gruting, Fetlar.	HU 653 924	60°36.6'N 00°48.4'W	Sell, SpiSpi
261	D1	Silda Wick, Wick of Tresta, Fetlar, Shetland.	HU 617 896	60°35.1'N 00°52.4'W	Oph
261	D2	Big Holm, Wick of Tresta, Fetlar, Shetland.	HU 627 886	60°34.5'N 00°51.3'W	FabMag
261	D3	Off Midberg, Colgrave Sound, Fetlar, Shetland.	HU 583 887	60°34.6'N 00°56.1'W	CGS

Compiled by: Christine Howson

## 5

## Basta Voe and Mid Yell Voe

Location		
<i>Position (centre)</i>	HU 535 935	60°37.5'N 01°01.3'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)

Physical features	
<i>Physiographic type</i>	Voes
<i>Length of coast</i>	26.1 km
<i>Area of inlet</i>	Basta Voe: 4.6 km <sup>2</sup> Mid Yell Voe: 2 km <sup>2</sup>
<i>Bathymetry</i>	Basta Voe: maximum depth 23 m at voe entrance; 40% of voe is shallower than 10 m; Mid Yell Voe: maximum depth 21 m at voe entrance; 75% of voe is shallower than 10 m. Both voes get gradually shallower towards head
<i>Wave exposure</i>	Sheltered to extremely sheltered
<i>Tidal streams</i>	Negligible within voes; moderate outside entrances
<i>Tidal range</i>	1.9 m (mean springs); 0.8 m (mean neaps)
<i>Salinity</i>	Fully marine; perhaps reduced occasionally at voe heads

## Introduction

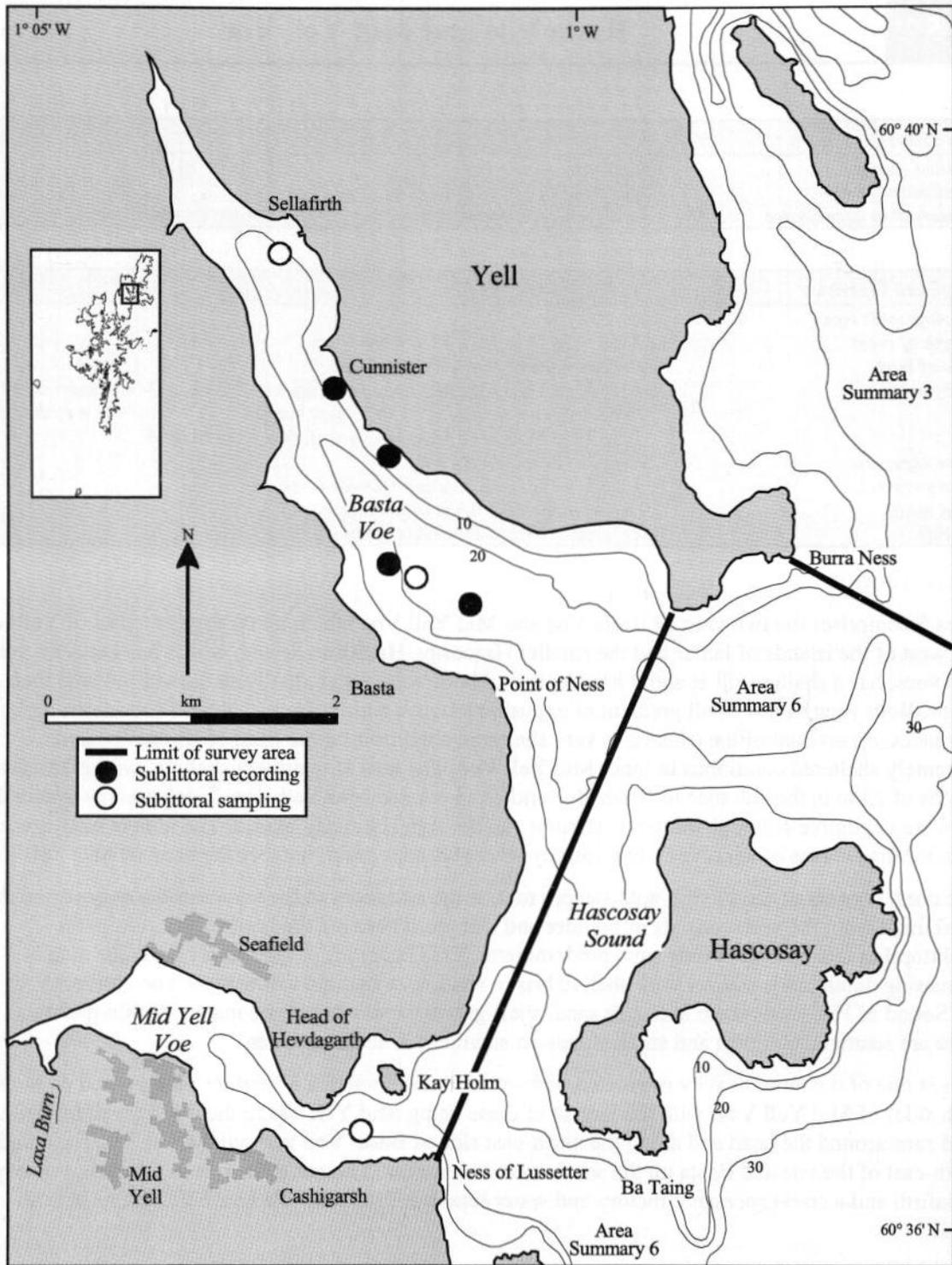
Area 5 comprises the two voes of Basta Voe and Mid Yell Voe which lie on the east coast of Yell to the west of the islands of Fetlar and the smaller Hascosay. Hascosay Sound, which lies between the two voes, has a shallow sill at about 8 m depth and both voes get gradually shallower towards their heads. Both voes have a small gradient of exposure to wave action, from sheltered conditions at the entrances, on account of the islands, to very sheltered conditions at the head of Basta Voe and extremely sheltered conditions in inner Mid Yell Voe. The area is relatively shallow, with maximum depths of 23 m in the entrance to Basta Voe and 21 m outside Mid Yell Voe. Tidal streams within the voes are negligible although moderate streams run through Hascosay Sound. The area is fully marine, with localised areas of variable or low salinity where streams enter, notably the head of Mid Yell Voe.

The coast is generally low-lying with steeper rock at the entrances to the voes and the majority of the shoreline within the voes consists of boulder and shingle. There is little hard substratum in the sublittoral in this area and sandy mud predominates. This becomes progressively muddier with increasing depth but is coarser with shell debris in shallow water and towards the voe entrances. In the Sound of Hascosay, there is coarse sand, shell-gravel, stones and some maerl. Within the voes, there are scattered boulders and small stones on sediment in shallow water.

This is one of the more heavily populated parts of northern Shetland. There are villages and piers on both sides of Mid Yell Voe, with the largest of these being Mid Yell where there is a small harbour. A road runs around the head and along the north-east side of Basta Voe with villages at Sellafirth on the north-east of the voe and Basta on the south-west and scattered housing elsewhere. There is a quarry at Sellafirth and a crab-processing factory and water intake at Mid Yell. There are fish farms in both voes.

## Marine biology

Marine biological surveys			
<i>Survey methods</i>	<i>No. of sites</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Sublittoral</i> Recording	4	1986	Hiscock (1986)
Infaunal sampling (van Veen grab)	2	1962	Pearson, Coates & Duncan (1994)
Infaunal sampling (Anchor dredge)	1	1987	Howson (1988)



**Figure 5.1** Main features of the area, showing sites surveyed.  
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**Littoral**

The coast is low-lying within the voes but steeper at the entrances where the shores are formed of steep bedrock. The majority of the shoreline within the voes consists of boulder and shingle with

several sandy beaches such as those at Basta on Basta Voe and Cashigarsh on Mid Yell Voe. There is a small shingle spit near Cunnister in Basta Voe and an extensive area of muddy sediment at the head of Mid Yell Voe where the Laxa Burn enters the sea. The piers and harbour of Mid Yell provide stretches of artificial substrata.

There are no survey data for the littoral zone in this area.

### Sublittoral

There is little hard substratum in the sublittoral in this area and muddy sand predominates. Muddy sand and shell-gravel in shallow water around the edges of the voes becomes increasingly muddy with depth although there is coarser, cleaner sediment in the moderate tidal streams of Hascosay Sound. Within the voes, there are scattered boulders and small stones on sediment in shallow water. There is no information available for the inshore areas at the voe entrances.

In the mid-section of Basta Voe, the shallow sediments support kelp *Laminaria saccharina* and the green alga *Ulva* sp. attached to scattered stones with the kelp reaching a maximum depth of about 9-12 m (LsacX). The sediment is heavily worked with numerous mounds and burrows present in the wave-sheltered conditions. The lugworm *Arenicola marina* is one of the most conspicuous members of the infaunal community with the bivalves *Ensis* sp. and *Mya truncata*, the sand mason worm *Lanice conchilega* and the snake blenny *Lumpenus lumpretaeformis* all present. The whelk *Buccinum undatum* and crabs *Carcinus maenas* and *Pagurus bernhardus* are found on the sediment surface. Between depths of about 12-18 m, there are loose mats of filamentous algae, predominantly *Trailliella*, lying on the muddy sediment (Tra) with mats of a free-living form of the foliose red alga *Phyllophora crispa* (Pcri) occurring deeper. The sediment beneath the mats has similar megafaunal burrowers to those described above.

There are beds of the horse mussel *Modiolus modiolus* at depths of 12-14 m on soft muddy sediment in the inner parts of Basta Voe (ModHAs). These support a reasonably diverse flora and fauna, similar to other parts of the voe, but with the addition of large numbers of brittlestars *Ophiothrix fragilis*, *Ophiocomina nigra* and *Ophiopholis aculeata*. Towards the entrance to Basta Voe, the sea-pen *Virgularia mirabilis* is common in fine muddy sand in depths of 18-21 m (VirOph). Amongst the sea-pens there are scattered mats of *P. crispa* which forms a zone immediately shallower.

Sediment at a depth of 23 m in the deepest part of outer Basta Voe and at 12 m in the entrance to Mid Yell Voe consists of black sandy mud containing species such as polychaetes *Scoloplos armiger* and *Nephtys* spp., bivalves *Abra alba* and *Mysella bidentata* and amphipods *Corophium sextonae* and *Dexamine* sp. (TubeAP).

## Nature conservation

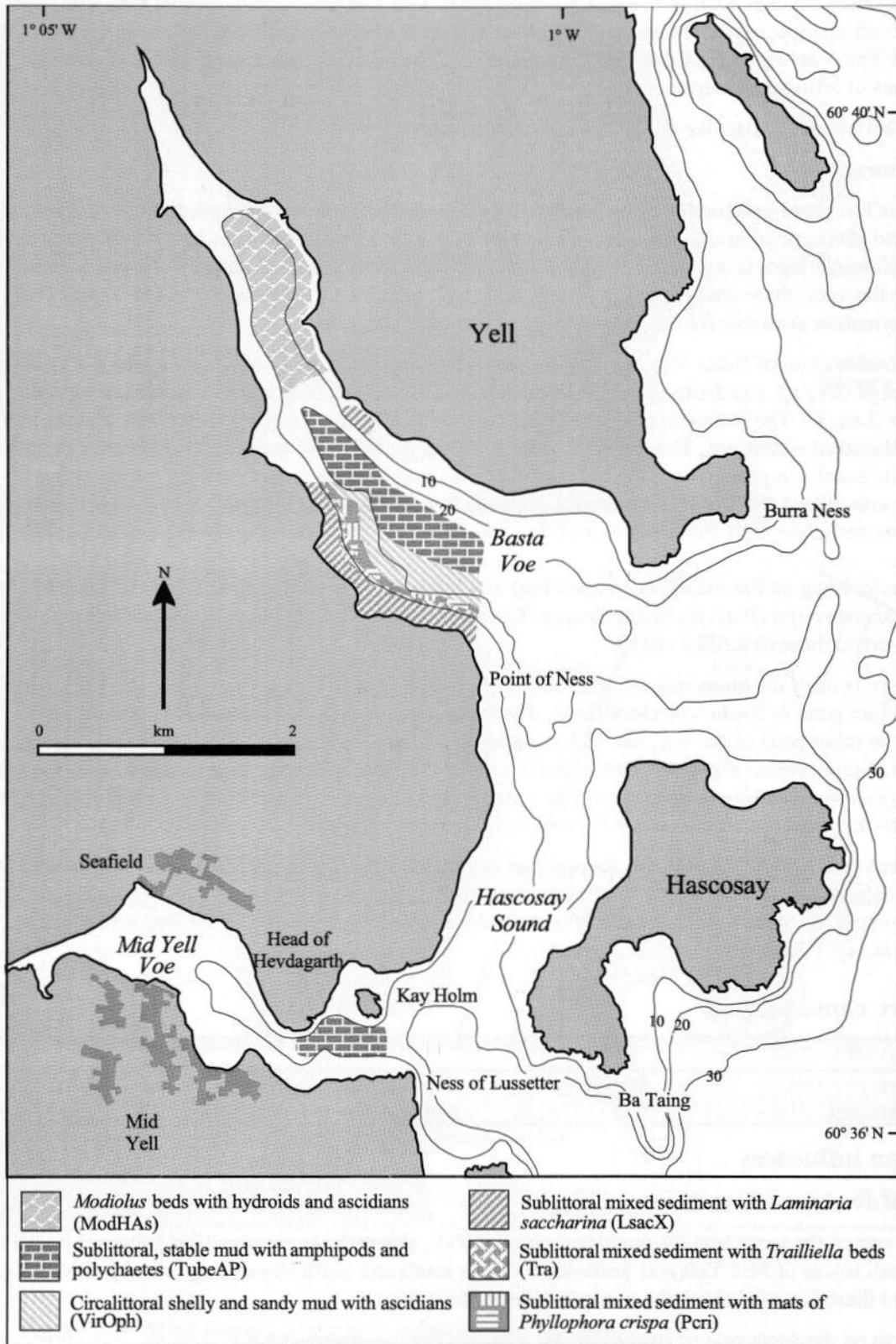
Conservation sites		
Site name	Status	Main features
Shetland Islands	ESA	Agri-environmental scheme

## Human influences

### Coastal developments and uses

This is one of the more heavily-populated parts of Yell, although the number of inhabitants is still low. The small towns of Mid Yell and Seafield lie on the south and north shores respectively of Mid Yell Voe and there is a road along the northern side of Basta Voe.

Sellafirth on the north side of Basta Voe has a quarry for the igneous rock.



**Figure 5.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 5.1, cited literature and additional field observations).

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### Marine developments and uses

There are fin-fish farms and mussel *Mytilus edulis* farms in both Basta and Mid Yell Voes. Potting for crustaceans is carried out around the inshore rocky areas. There is a small harbour at Mid Yell where there is a crab-processing factory and water intake.

### References and further reading

- Hiscock, K. 1986. Marine biological surveys in Shetland. August 1986. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 678.
- Howson, C.M. 1988. Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 816.
- Pearson, T.H., Coates, A., & Duncan, J.A.R. 1994. Shetland subtidal sediment community analysis. Report on analysis of subtidal sediment data from Shetland to identify community types present. (Contractor: SEAS Ltd, Oban.) *JNCC Report*, No. 191. (Marine Nature Conservation Review Report, No. MNCR/OR/20.) (SEAS Report, No. SR64.)

### Sites surveyed

- Survey 261: 1987 OPRU/MNCR Survey of Shetland, Foula and Fair Isle (Hiscock 1986; Howson 1988).
- Survey 377: 1963 DAFS sublittoral survey of Shetland (Pearson, Coates & Duncan 1994).

Sublittoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
261	11	Point of Ness, Basta Voe.	HU 534 949	60°38.0'N 01°01.4'W	VirOph; Pcri; Tra
261	12	Basta, Basta Voe.	HU 528 952	60°38.2'N 01°02.0'W	LsacX; Pcri; Tra
261	13	Cunnister, Basta Voe.	HU 524 965	60°38.9'N 01°02.4'W	ModHAs
261	14	Basta Voe.	HU 528 960	60°38.6'N 01°02.0'W	IMS; SS
377	9	SW of Kay Holm, Mid Yell Voe.	HU 526 910	60°35.9'N 01°02.3'W	TubeAP
377	10	NE of Basta, Basta Voe, Yell.	HU 530 951	60°38.1'N 01°01.8'W	TubeAP
261	D9	Head of Basta Voe, Shetland.	HU 520 975	60°39.4'N 01°02.9'W	ModHAs

6

## Yell (east)

Location		
<i>Position (centre)</i>	HU 545 875	60°34'N 01°0.3'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)

Physical features	
<i>Physiographic type</i>	Open coast
<i>Length of coast</i>	Yell: 30.5 km; Hascosay: 11.4 km
<i>Bathymetry</i>	50 m contour close inshore in southern part of area; approx. 2 km offshore east of Hascosay
<i>Wave exposure</i>	Moderately exposed on open coast to very sheltered on west coast of Hascosay and in localised areas in inlets
<i>Tidal streams</i>	Moderate in north of area, Hascosay Sound and east of Yell Sound; negligible elsewhere
<i>Tidal range</i>	1.9 m (mean springs); 0.8 m (mean neaps)
<i>Salinity</i>	Fully marine

## Introduction

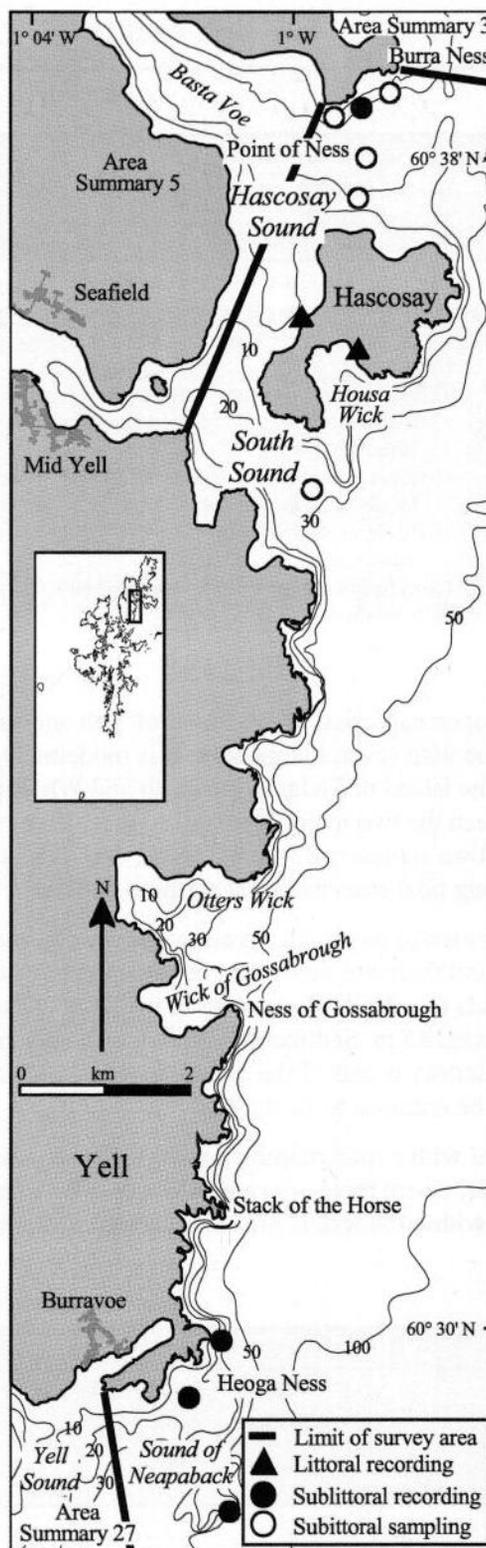
Area 6, which consists of the open east coast of the island of Yell and includes the small island of Hascosay, has a rocky coastline with several large bays. It is moderately exposed along most of its length, deriving shelter from the island of Fetlar in the north and Whalsay and Out Skerries in the south-east. The area lies between the two major Shetland sounds, Bluemull Sound (*Area summary 3*) in the north and Yell Sound (*Area summary 27*) in the south, and thus both the north and south of the area are influenced by the strong tidal streams that flow through these.

The area has low cliffs along much of its length, creating steep rocky shores. Lower-lying areas within the bays have boulder shores and there are sandy beaches at some bay heads. In the northern part of the area, sublittoral rock extends to a depth of about 15 m whilst in the south, at the entrance to Yell Sound, there is bedrock to beyond 45 m. Sediments are predominantly coarse, clean shell-gravel and sand; maerl to the north of Hascosay is part of the extensive maerl bed at the entrance to Bluemull Sound. There is finer sand in the entrance to Basta Voe.

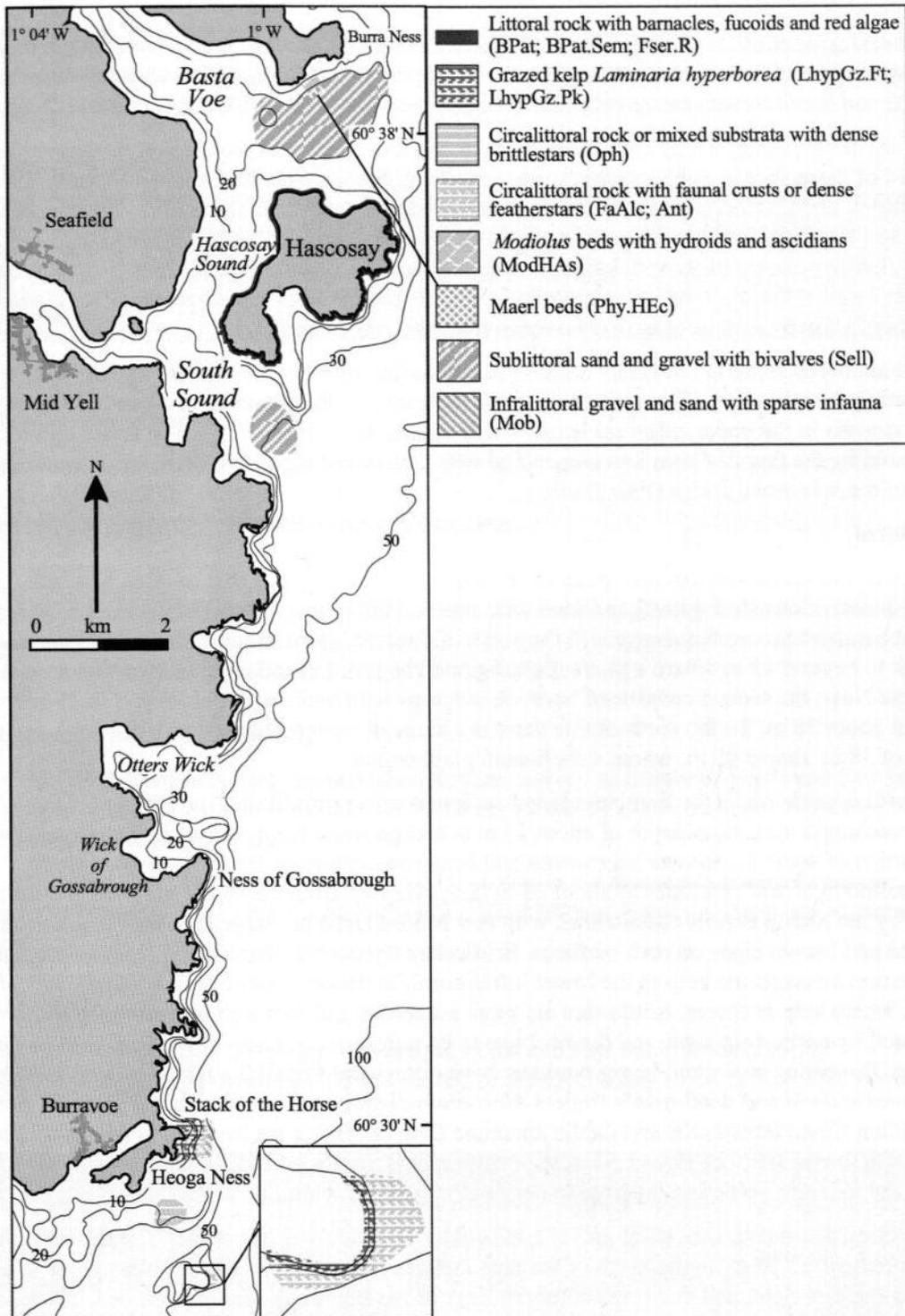
The area is predominantly rural with a road running a short distance inland and side roads coming down the coast at the bay heads, where there are small villages. The island of Hascosay is uninhabited. Most of the land within the area is grazed moorland and water quality is excellent.

## Marine biology

Marine biological surveys				
	<i>Survey methods</i>	<i>No. of sites</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	2	1982	Williams, Cohen & Boyce (1983)
<i>Sublittoral</i>	Recording	4	1987	Howson (1988)
	Infaunal sampling (anchor dredge)	5	1987	Howson (1988)



**Figure 6.1** Main features of the area, showing sites surveyed.  
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**Figure 6.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 6.1, cited literature and additional field observations).

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### Littoral

The littoral zone consists of steep slopes of bedrock on the open coast, with a small number of gullies, caves and arches. In the more sheltered locations, the shores are generally less steeply-sloping bedrock and boulders with sandy beaches at the bay heads in Wick of Gossabrough and Otters Wick.

There are descriptions of only two littoral sites in this area, both rocky shores on Hascosay. The more exposed of these shores, in Housa Wick, has few if any furoid algae in the mid-eulittoral. The supralittoral zone is dominated by yellow and grey lichens with the black lichen *Verrucaria maura* in the littoral fringe (YG; Ver.Ver). At the top of the upper eulittoral is a band of small amounts of the furoid *Pelvetia canaliculata* with barnacles *Semibalanus balanoides* (PelB). There are few algae on the remainder of the shore which is covered with *S. balanoides* and the limpet *Patella vulgata* (BPat.Sem). There is no information for the sublittoral fringe here.

A more sheltered shore in Hascosay Sound has similar biotopes with barnacles and limpets dominating the mid-shore. The greater shelter is indicated by the presence of a band of the furoid *Fucus spiralis* in the upper eulittoral below the *P. canaliculata* zone (Fspi). The lower eulittoral is dominated by the furoid *Fucus serratus* mixed with foliose red algae (Fser.R), and *F. serratus* is also found in the sublittoral fringe (Fser.Fser).

### Sublittoral

Bedrock in the sublittoral extends to about 15 m depth in the northern part of Area 6, where it gives way to coarse, clean shell-gravel and sand with maerl. This coarse sediment continues to at least 26 m, the maximum depth surveyed. In the south of the area, at the entrance to Yell Sound, there is bedrock to beyond 45 m where a plain of shell-gravel begins. In the Sound of Neapaback, just south of Heoga Ness, the seabed consists of bedrock outcrops with boulders, cobbles and shell-gravel in a depth of about 26 m. To the north of this there is a slope of ridged bedrock with shell-sand pockets in depths of 18 to almost 40 m, where a shell-sand plain begins.

*Laminaria hyperborea* is the dominant kelp species on upper infralittoral rock (LhypGz.Ft), with kelp forest reaching a maximum depth of about 13 m at Heoga Ness. Kelp park of *L. hyperborea* but with the addition of some *Laminaria saccharina* and occasional plants of the bushy brown alga *Desmarestia aculeata* continues to about 23 m (LhypGz.Pk). Both the forest and the park are heavily grazed by the urchin *Echinus esculentus*, with few foliose algae but large expanses of encrusting coralline and brown algae on rock surfaces. Brittlestars *Ophiothrix fragilis* and *Ophiocoma nigra* are common amongst the kelp in the lower infralittoral. In deeper water in this southern part of Area 6, where kelp is absent, brittlestars are more numerous and rock surfaces continue to be dominated by encrusting algae and the keel worm *Pomatoceros triqueter* (FaAIC; Oph) to a depth of 30-35 m. Projecting rocks and larger boulders have occasional hydroids such as *Halecium halecinum* and *Thuiaria thuja* and dead-man's fingers *Alcyonium digitatum*. The cushion star *Porania pulvillus*, the ascidian *Ciona intestinalis* and dahlia anemone *Urticina felina* are frequent in this zone. From about 35 m depth, south of Heoga Ness, the brittlestars are replaced by large numbers of the featherstar *Antedon bifida* but otherwise species composition is similar to the shallower zone (Ant).

Coarse, clean sediments with shell-gravel and pebbles are widely distributed in the area in depths from 15 to beyond 50 m. In the north of the area, between Hascosay and Burra Ness, there is some maerl on the sediment, and this is the southern limit of the Bluemull Sound maerl bed. The horse mussel *Modiolus modiolus* is common in the sediment and, in depths of 16-24 m in the Sound of Hascosay, a dense bed of mussels has large numbers of brittlestars, *A. bifida*, starfish *Solaster endeca* and *Asterias rubens*, the holothurian *Cucumaria frondosa* and the whelks *Buccinum undatum* and *Neptunea antiqua* (ModHAs). Below 24 m, there are fewer mussels and maerl is more common. Scour-tolerant species such as the hydroid *Hydrallmania falcata* and the bryozoan *Alcyonidium diaphanum* are found attached to stones amongst the maerl (Phy.HEC). The sediment infauna in this part of the area has species such as the bivalve *Ensis* sp., the crab *Ebalia tuberosa* and the polychaete *Nephtys ciliata*. Slightly finer sand towards the entrance to Basta Voe and near Hascosay is

characterised by the urchin *Echinocyamus pusillus*, polychaetes *Pisione remota* and *Aonides paucibranchiata* and bivalves *Abra prismatica* and *Moerella pygmaea* (Sell).

At the entrance to Yell Sound, clean shell-gravel occurs from 38 m to below 50 m. There are few faunal records for this sediment although the anemone *Cerianthus lloydii* is common.

## Nature conservation

### Conservation sites

Site name	Status	Main features
Hascosay	SSSI; GCR	Botanical; geological
Aywick/Queyon	NTS	
Shetland Islands	ESA	Agri-environmental scheme

## Human influences

### Coastal developments and uses

There are no large centres of population in the area although there are several villages scattered along the coast, mostly around the bays. The B9081 road runs slightly inland with side roads to the villages. The houses have septic tanks and water quality is excellent.

### Marine developments and uses

There are salmon *Salmo salar* farms north of Hascosay. There are no piers or harbours in this area but fishing boats moor in the bays at times. There is a whitefish fishing-ground east of Yell and potting for crustaceans takes place around the inshore rocky areas.

## References and further reading

Howson, C.M. 1988. Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 816.

Williams, J., Cohen, S., & Boyce, J. 1983. *Ecological studies in the maritime approaches to the Shetland Oil Terminal 1982 part 1. Littoral studies*. Unpublished, Leicester Polytechnic, School of Life Sciences.

## Sites surveyed

Survey 261: 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Howson 1988).

Survey 376: 1982 Leicester Polytechnic littoral survey of the approaches to the Sullom Oil Terminal, 1982 (Williams, Cohen & Boyce 1983).

### Littoral sites

Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
376	13	Whinifirth, Hascosay.	HU 553 918	60°36.3'N 00°59.3'W	YG; Ver.Ver; PelB; BPat.Sem; BPat
376	17	Middle of the Bow of Hascosay.	HU 546 922	60°36.6'N 01°00.1'W	YG; Ver.Ver; Pel; Fspi; BPat.Sem; Fser.R; Fser.Fser

<b>Sublittoral sites</b>						
<i>Survey</i>	<i>Site</i>	<i>Site name</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes recorded</i>	
261	84	Cloa Rock, S Yell, Yell Sound.	HU 537 775	60°28.6'N 01°01.3'W	LhypGz.Ft; LhypGz.Pk; Ant; CGS; FaAIC	
261	85	Off Windi Clett, Yell Sound.	HU 536 796	60°29.8'N 01°01.4'W	LhypGz.Ft; LhypGz.Pk; LsacSac; Ant; Mob	
261	86	Sound of Neapaback, Yell Sound.	HU 532 789	60°29.4'N 01°01.9'W	Oph	
261	98	S Burra Ness, Yell, Basta Voc.	HU 554 948	60°38.0'N 00°59.2'W	ModHAs; Phy.HEc	
261	D4	Lower South Sound, Yell, Shetland.	HU 547 901	60°35.4'N 01°00.0'W	Sell	
261	D5	N of Hascosay, Shetland.	HU 553 937	60°37.4'N 00°59.3'W	Sell	
261	D6	S of Burra Ness, Shetland.	HU 554 942	60°37.6'N 00°59.2'W	Sell	
261	D7	E Burra Ness, Shetland.	HU 557 950	60°38.1'N 00°58.9'W	Sell	
261	D8	SW Burra Ness, Shetland.	HU 550 947	60°37.9'N 00°59.6'W	Sell	

Compiled by:

Christine Howson

7

## Lunna Ness (east) and Vidlin Voe

## Location

Position (centre)	HU 525 700	60°24.2'N 01°02.8'W
Administrative area	Shetland Islands	
Conservation agency/area	Scottish Natural Heritage	North Areas (Northern Isles)

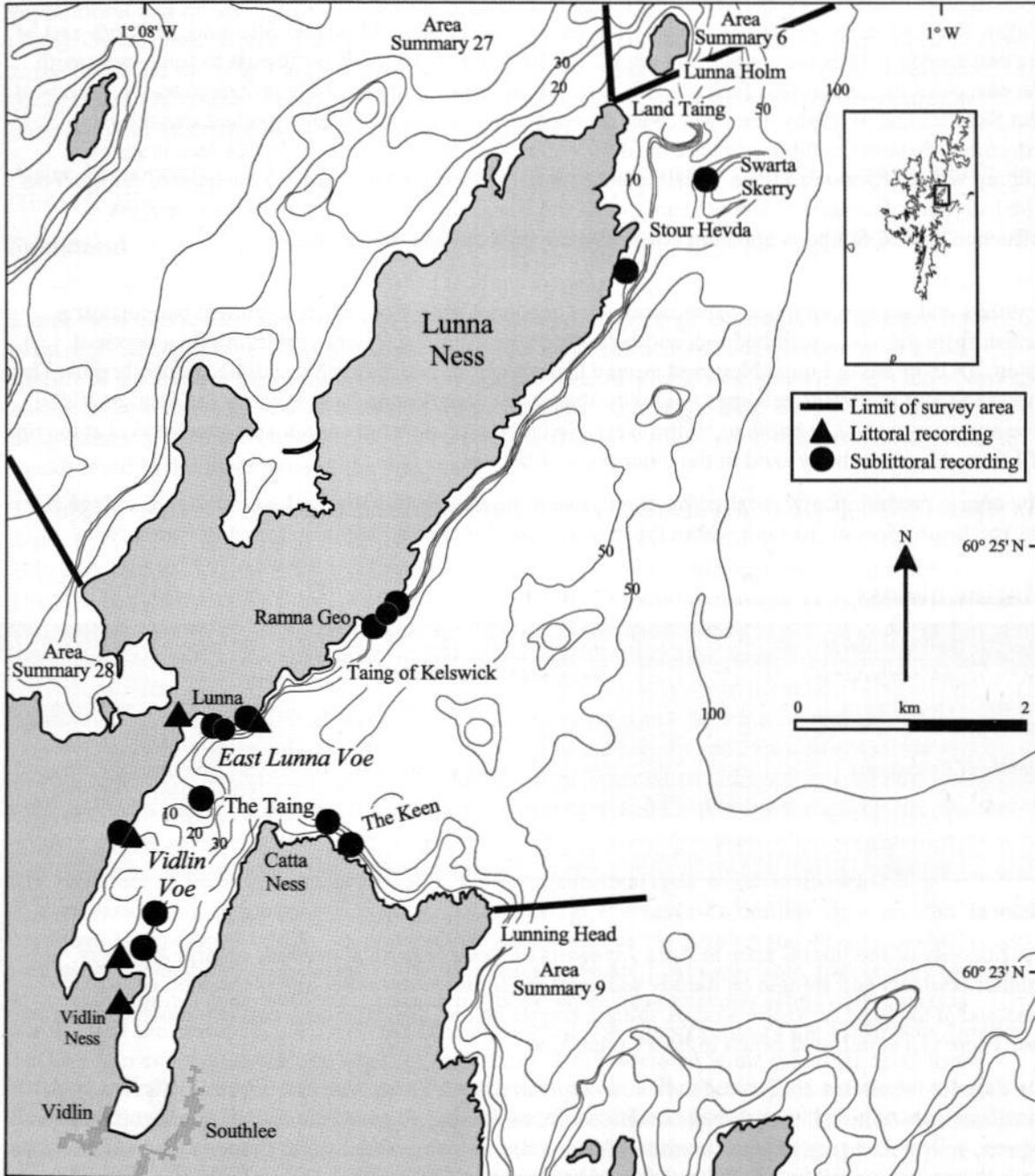


Figure 7.1 Main features of the area, showing sites surveyed.

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Physical features	
<i>Physiographic type</i>	Open coast; voe
<i>Length of coast</i>	21.9 km
<i>Area of inlet</i>	Vidlin Voe: 3 km <sup>2</sup>
<i>Bathymetry</i>	Maximum depth of Vidlin Voe: 40 m at entrance; 88 m east of Lunna Ness
<i>Wave exposure</i>	Exposed on east side of Lunna Ness to extremely sheltered at head of Vidlin Voe
<i>Tidal streams</i>	Mostly negligible, although moderate around islands at tip of Lunna Ness
<i>Tidal range</i>	1.9 m (mean springs); 0.9 m (mean neaps)
<i>Salinity</i>	Fully marine; perhaps occasionally variable at head of Vidlin Voe

## Introduction

Vidlin Voe and the peninsula of Lunna Ness, on the east coast of Mainland Shetland, lie south-east of the entrance to Yell Sound (*Area summary 27*). The trend of Area 7 is north-east to south-west with the east coast of Lunna Ness facing south-east. As the area is only partially protected by the islands of Out Skerries and Whalsay, the open coast is exposed to wave action with a gradual transition to extremely sheltered conditions at the head of Vidlin Voe. Most of the land in this area is steeply-sloping with cliffs along Lunna Ness but with more low-lying ground around the head of Vidlin Voe. Tidal streams of moderate strength run around the islands at the tip of Lunna Ness where the influence of Yell Sound is apparent but elsewhere tidal streams are negligible.

The littoral zone consists predominantly of steep or vertical bedrock or large boulders with smaller boulders and shingle on muddy sediment at the head of Vidlin Voe, where a shingle bar cuts off a lochan from the voe. Steep bedrock and boulder slopes continue into the sublittoral to a depth of about 30-36 m along Lunna Ness and around Catta Ness, at which depth a sediment slope begins. This rock-sediment boundary becomes gradually shallower along Lunna Ness towards the head of Vidlin Voe and occurs at 12 m depth at Vidlin Ness. Sediments grade from very coarse shell-gravel at the tip of Lunna Ness to muddy sand in the inner parts of the voe.

The area is predominantly rural with a road around most of Vidlin Voe and a small linear village at the voe head. Most of the land within the area is grazed moorland and water quality is excellent.

## Marine biology

Marine biological surveys				
	<i>Survey methods</i>	<i>No. of sites</i>	<i>Date(s) of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	5	July-August 1974	Institute of Terrestrial Ecology (1974a)
<i>Sublittoral</i>	Recording	2	July-August 1974	Institute of Terrestrial Ecology (1974b); Earll (1982)
	Recording	1	August 1986	Hiscock (1986)
	Recording	5	July-August 1987	Moss & Ackers (1987)
	Recording	6	August 1987	Howson (1988)

### Littoral

The majority of the littoral zone in Area 7 consists of steep or vertical bedrock or large boulders. Smaller boulders and shingle on muddy sediment are found in the small bay to the west of Vidlin Ness and at the head of Vidlin Voe. A shingle barrier behind the shore here cuts off a lochan from the voe. There is a small sand beach in East Lunna Voe.

The data for the shores are limited to five rocky sites around Vidlin Voe but illustrate effectively the transition from exposed to sheltered conditions. In moderately exposed conditions at the entrance to the voe, yellow and grey lichens dominate the supralittoral whilst the littoral fringe has a band of the black lichen *Verrucaria maura* with scattered barnacles (YG; Ver.Ver). Below this, the eulittoral is animal-dominated with a zone of small mussels *Mytilus edulis* mixed with the barnacle *Chthamalus stellatus* (MytB) followed by the barnacle *Semibalanus balanoides* and the limpet *Patella vulgata* (BPat.Sem). Algae such as *Corallina officinalis* and *Mastocarpus stellatus* are found in the lower eulittoral and the kelp *Alaria esculenta* dominates the sublittoral fringe with *M. edulis* (Ala.Myt).

As conditions become more sheltered there are variations on this pattern. The mussel zone disappears and is replaced by a band of the furoid *Polydora canaliculata* on boulders in east Lunna Voe (PelB) and by an upward extension of the barnacles and limpets on bedrock inside Vidlin Voe. On both these shores, barnacles and limpets dominate the mid-eulittoral zone (BPat.Sem). The furoid *Fucus serratus*, rather than red algae alone, forms the lower eulittoral in East Lunna Voe (Fser.Fser) and *Laminaria digitata* is the main kelp in the sublittoral fringe (Ldig.Ldig), although it is mixed with *A. esculenta* inside Vidlin Voe (Ala.Ldig).

In increased shelter inside Vidlin Voe, furoid algae become more prominent although there is a difference between communities on rock and those on boulders. In both cases, lichens dominate the supralittoral and littoral fringe followed by zones of *P. canaliculata* (Pel) and then *Fucus spiralis* (Fspi). On bedrock, there is then a pronounced band of limpets and barnacles followed in successive zones down the shore by *Fucus vesiculosus* (Fves), *F. serratus* (Fser.Fser) and finally *L. digitata* (Ldig.Ldig). On boulder shores, the limpet-barnacle zone is replaced by *Ascophyllum nodosum* (Asc.Asc) but otherwise the zonation pattern is similar.

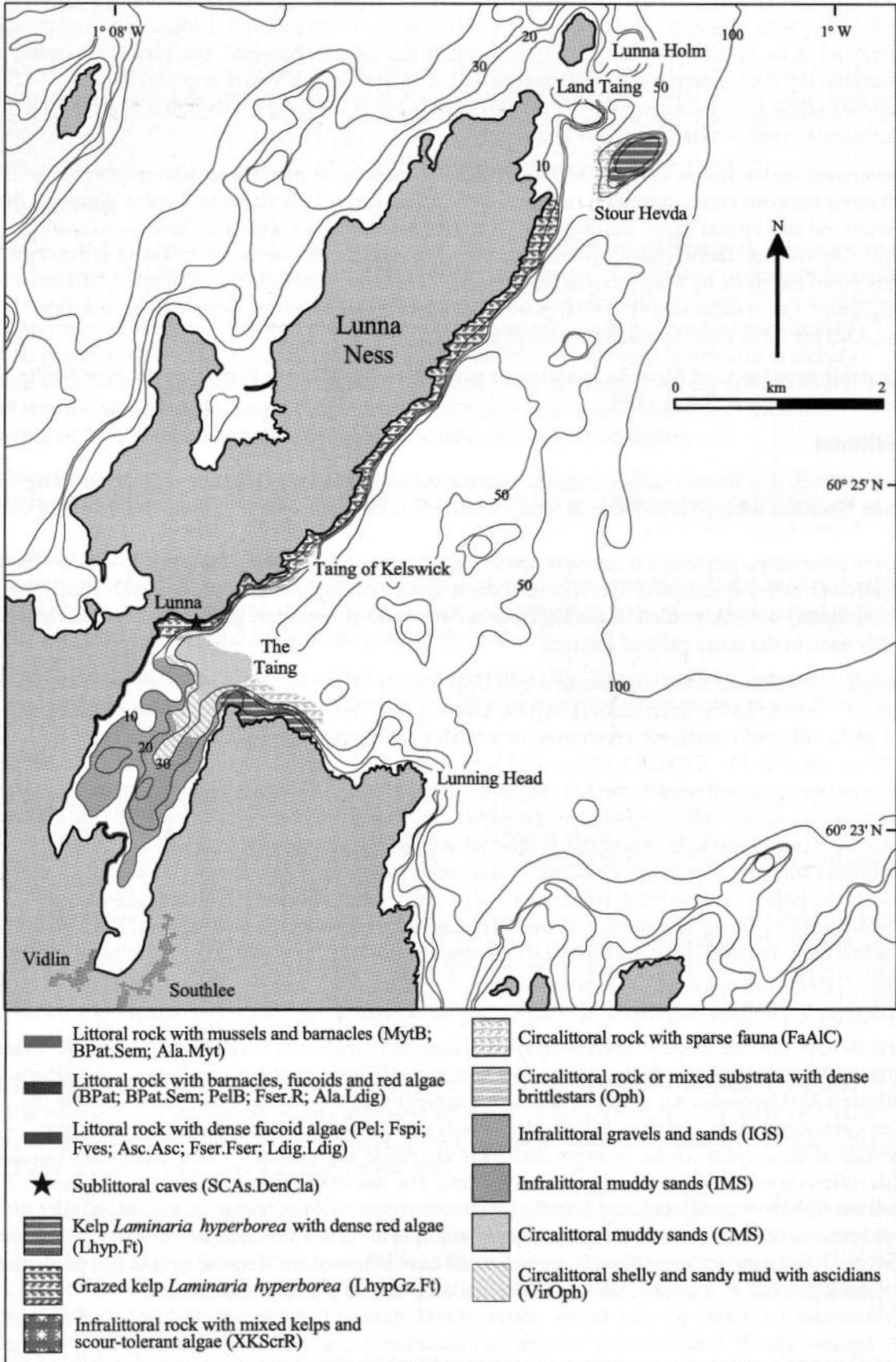
A sizeable population of *Elminius modestus*, a non-native Australasian barnacle, occurs in Vidlin Voe (Hiscock, Hiscock & Baker 1978).

### Sublittoral

Steep bedrock and boulder slopes continue into the sublittoral to a depth of about 30-36 m along Lunna Ness and around Catta Ness, at which depth a sediment slope begins, although there is a cobble plain at 37 m depth off the Keen at Catta Ness. The rock-sediment boundary becomes gradually shallower southwards along Lunna Ness towards the head of Vidlin Voe; it is 12 m at Vidlin Ness and is shallower in the inner arm of the voe. Sediments grade from very coarse shell-gravel, consisting predominantly of broken tubes of the keel worm *Pomatoceros triqueter*, at the tip of Lunna Ness to muddy sand in the inner parts of the voe.

The upper infralittoral zone is dominated by a kelp forest of *Laminaria hyperborea* which extends to a depth of 12-18 m on the open coast (Lhyp.Ft; LhypGz.Ft). This is followed by a lower infralittoral kelp park, either of *Laminaria saccharina* or a mixture of the two kelp species, which reaches 19-20 m (LhypGz.Pk; XKScrR). Occasional kelp plants are found as deep as 33 m, which indicates that water clarity would enable the kelp forest to extend deeper. However, both the upper and lower infralittoral zones are heavily grazed by the urchin *Echinus esculentus* with few foliose algae on either the rock surface or the kelp stipes, and at most sites there is a very sharp boundary between the infralittoral and the circalittoral. Coralline crusts are common and there are several animal species in crevices, including the brittlestar *Ophiopholis aculeata*, the holothurian *Pawsonia saxicola* and ascidians such as *Ciona intestinalis*. At the tip of Lunna Ness, where tidal streams are strongest, there are a few more red algal species, such as *Phycodrys rubens* and *Cryptopleura ramosa* amongst the kelp.

The influence of heavy grazing is also apparent on circalittoral rock which is dominated by *E. esculentus*, grazing-tolerant encrusting species such as *P. triqueter*, coralline algae and the bryozoan *Parasmittina trispinosa*, and mobile species such as the cushion star *Porania pulvillus* and brittlestars *Ophiocoma nigra* and *Ophiothrix fragilis* (FaAIC). At some sites, particularly in the lower circalittoral, these brittlestars form dense beds which have a similar effect to the grazing activities of the urchins (Oph). At other sites there are dense aggregations of the featherstar *Antedon bifida*, often concentrated along edges of rock (Ant). The associated fauna is similar in all these situations. Crevices in the rock and boulder interstices support a wider range of species, similar to those found in the infralittoral. These include, in addition to those species mentioned above, the ascidians *Ascidia mentula* and *Ascidia virginea* and terebellid worms. Encrusting species, particularly coralline algae and *P. triqueter*, also dominate the deep cobble plain off Catta Ness.



< **Figure 7.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 7.1, cited literature and additional field observations).  
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The coarse shelly sediments off Lunna Ness in depths of 20-36 m support scallops *Pecten maximus* and occasional horse mussels *Modiolus modiolus* with the brittlestar *Ophiura albida* and the northern whelk species *Colus islandicus* (IGS). Sediment becomes sandier from Ramna Geo towards Vidlin Voe, with species such as *P. maximus*, razor clams *Ensis* sp., the swimming crab *Liocarcinus depurator*, the pelican's foot shell *Aporrhais pespelecani* and the ascidian *Molgula oculata*. At the entrance to Vidlin Voe, a steep muddy shell-gravel slope has a dense bed of the sea-pens *Virgularia mirabilis* and *Pennatula phosphorea* with *P. maximus*, small numbers of the burrowing anemone *Peachia cylindrica* and the crab *Atelecyclus rotundatus* (VirOph).

The sediments are muddier within Vidlin Voe, with the sediment slope beginning in a depth of about 12 m. There are *L. saccharina* plants attached to the cobbles, pebbles and shell debris lying on the sediment surface, and scattered plants reach a depth of 20 m (LsacX). There are a few other algal species present including the brown algae *Chorda filum* and *Asperococcus fistulosus* and the red *Ceramium* spp. *C. intestinalis* is frequent on shells and stones whilst the sediment has casts of lugworm *Arenicola marina*, the topshell *Gibbula magus*, *P. maximus*, *M. oculata* and the starfish *Asterias rubens*.

A small cave at Lunna is exposed to considerable surge and has a boulder and cobble floor. *L. hyperborea* is restricted to the boulders at the cave mouth whilst further in there are crustaceans and the anemone *Urticina felina* in the interstices. The cave walls have surge-tolerant encrusting species of ascidians, sponges and bryozoans (SCAs.DenCla).

## Nature conservation

Conservation sites		
Site name	Status	Main features
Yell Sound Coast	SSSI; cSAC	Marine interest for otters <i>Lutra lutra</i>
Shetland Islands	ESA	Agri-environmental scheme

## Human influences

### Coastal developments and uses

There are two small villages around the head of Vidlin Voe, Vidlin and Southlee, forming a linear development along the road. A pier at Vidlin is the base for the ferries to Whalsay and Out Skerries. A road runs alongside most of Vidlin Voe but there is none on the east side of Lunna Ness, which has steep cliffs on its eastern side. The area is predominantly rural with rough grazing on the moorland.

The houses have septic tanks and water quality is excellent.

### Marine developments and uses

There are fin-fish farms on Vidlin Voe, and potting for crustaceans takes place around the inshore rocky areas. A major North Sea oil pipeline makes landfall on the east side of Lunna Ness.

## References and further reading

- Earll, R.C. 1982. Report on a sublittoral survey of Shetland. (Contractor: Underwater Conservation Society, Ross-on-Wye.) *Nature Conservancy Council, CSD Report*, No. 466.
- Hiscock, K. 1986. Marine biological surveys in Shetland. August 1986. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 678.

- Hiscock, K., Hiscock, S., & Baker, J.M. 1978. The occurrence of the barnacle *Elminius modestus* in Shetland. *Journal of the Marine Biological Association of the United Kingdom*, 58: 627-629.
- Howson, C.M. 1988. Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 816.
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- Institute of Terrestrial Ecology. 1975b. Report to the Nature Conservancy Council on some aspects of the ecology of Shetland. 6.4: Sublittoral biota. *Nature Conservancy Council, CSD Report*, No. 30.
- Moss, D., & Ackers, G. 1987. *A sublittoral survey of Shetland, 1987*. Unpublished, Marine Conservation Society.

### Sites surveyed

- Survey 227: 1987 MCS sublittoral survey of Shetland (Moss & Ackers 1987).
- Survey 230: 1974 ITE report on sublittoral biota of Shetland (Earl 1982; Institute of Terrestrial Ecology 1975b).
- Survey 261: 1986/87 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Hiscock 1986; Howson 1988).
- Survey 434: 1974 ITE report on rocky shore ecology of Shetland (Institute of Terrestrial Ecology 1975a).

Littoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
434	14	Little Holm, Vidlin Voe.	HU 480 669	60°23.0'N 01°07.7'W	Ver.Ver; Pel; Fspi; FvesB; Fves; Asc.Asc; Fser.Fser; Ldig.Ldig
434	36	Quadaberg, Vidlin Voe.	HU 480 680	60°23.6'N 01°07.7'W	YG; Ver.Ver; MytB; BPat; BPat.Sem; Ldig.Ldig; Ala.Ldig
434	37	E Vidlin Ness, Vidlin Voe.	HU 480 665	60°22.8'N 01°07.7'W	YG; Ver.Ver; PelB; Fspi; BPat.Sem; FvesB; Fves; Ldig.Ldig
434	58	East Lunna Voe, Vidlin Voe.	HU 485 690	60°24.1'N 01°07.1'W	YG; Ver.Ver; Ver.Ver; PelB; Pel; BPat; BPat.Sem; Fser.R; Fser.Fser; Ldig.Ldig
434	72	Lunna, Vidlin Voe.	HU 491 690	60°24.1'N 01°06.5'W	Ver.Ver; MytB; BPat.Sem; Ala.Myt

<b>Sublittoral sites</b>					
<i>Survey</i>	<i>Site</i>	<i>Site name</i>	<i>Grid reference</i>	<i>Latitude/longitude</i>	<i>Biotopes recorded</i>
261	15	N of Ramna Geo, Lunna Ness.	HU 504 700	60°24.6'N 01°05.0'W	Lhyp; Ant; FaAIC; IGS
261	154	Swarta Skerry, Vidlin Voe, Lunna Ness.	HU 487 683	60°23.7'N 01°06.9'W	VirOph
261	155	E of Catta Ness, Lunna Ness.	HU 500 679	60°23.5'N 01°05.5'W	Lhyp.Ft; Ant
261	156	N Vidlin Ness, Vidlin Voe, Lunna Ness.	HU 482 670	60°23.0'N 01°07.5'W	IGS; IMS
261	157	NW Swarta Skerry, Lunna Ness.	HU 531 737	60°26.6'N 01°02.0'W	Lhyp.Ft; XKScrR; FaAIC; Sell
261	158	Off Ward of Outrabister, Lunna Ness.	HU 524 729	60°26.2'N 01°02.8'W	LhypGz.Ft; XKScrR; FaAIC; Ant
261	159	The Keen, Catta Ness, Lunna Ness.	HU 498 681	60°23.6'N 01°05.7'W	FaAIC
227	32A	Ramna Geo A, Vidlin Voe.	HU 502 698	60°24.5'N 01°05.3'W	LhypGz.Pk; FaAIC
227	32B	Ramna Geo B, Vidlin Voe.	HU 503 699	60°24.6'N 01°05.2'W	Oph
227	33A	E Lunna Voe A, Vidlin Voe.	HU 489 689	60°24.0'N 01°06.7'W	LhypGz.Ft; LhypGz.Pk; Oph; CMS
227	33B	E Lunna Voe B, Vidlin Voe.	HU 488 689	60°24.1'N 01°06.8'W	SCAs.DenCla; Lhyp; XKScrR
227	34	The Backs, Vidlin Voe.	HU 483 673	60°23.2'N 01°07.4'W	IMS
230	16	Lunna, Vidlin Voe.	HU 491 690	60°24.1'N 01°06.5'W	MIR; MCR
230	27	Vidlin Voe.	HU 480 680	60°23.6'N 01°07.7'W	SIR

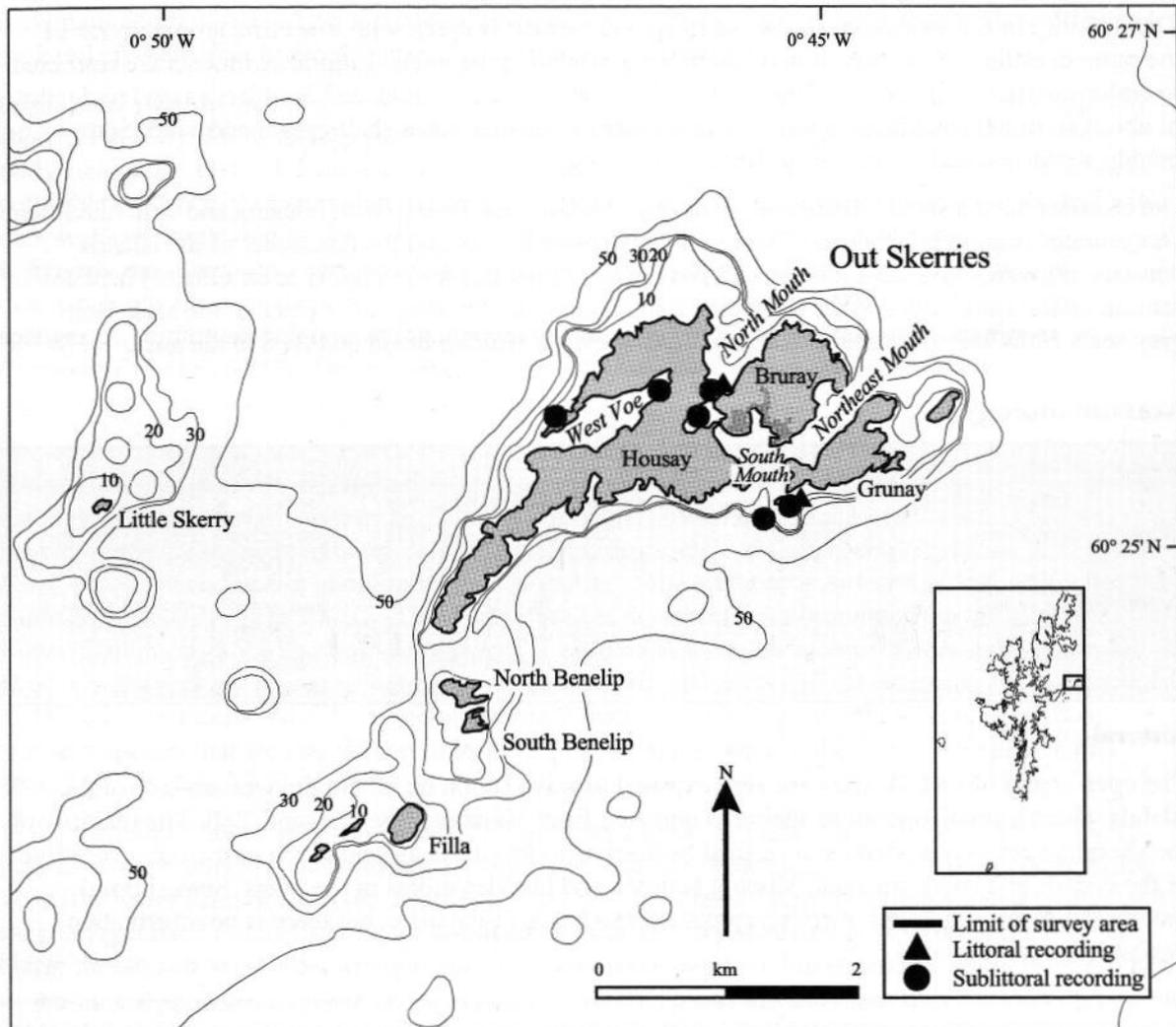
Compiled by: Christine Howson

## 8

## Out Skerries

## Location

<i>Position (centre)</i>	HU 670 720	60°25.6'N 00°46.9'W
<i>Administrative area</i>	Shetland Islands	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North Areas (Northern Isles)



**Figure 8.1** Main features of the area, showing sites surveyed.

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## Physical features

<i>Physiographic type</i>	Islands (open coast with inlets)
<i>Length of coast</i>	28.4 km
<i>Bathymetry</i>	50 m contour within 500 m of coast along all coasts except south of Housay where it is about 1.5 km offshore
<i>Wave exposure</i>	Very exposed on open coasts to extremely sheltered in inner voes; most of coastline exposed
<i>Tidal streams</i>	Moderate around open coast headlands; weak or negligible elsewhere
<i>Tidal range</i>	1.8 m (mean springs); 0.8 m (mean neaps)
<i>Salinity</i>	Fully marine

## Introduction

Out Skerries are a small group of islands and rocks lying about 15 km east of Lunna Ness and about 6 km north-east of Whalsay off the east coast of Mainland Shetland. There are three main islands, two of which are joined by a bridge, and a number of outlying skerries and rocks. The islands have a very exposed rocky coastline, with low cliffs around much of their outer coast broken by gullies and geos. There is one voe, West Voe on Housay, and a number of small sounds between the islands, one of which broadens out between the islands of Housay and Bruray to form an enclosed harbour. These inlets provide a transition from wave-exposed to wave-sheltered conditions. Moderate tidal streams run around the outer coasts and through the sounds. The area is fully marine.

The majority of the shoreline consists of steep and vertical bedrock with low cliffs around much of the outer coastline of the islands and lower-lying ground in the inlets. Littoral sediments are restricted to embayments and the heads of the inlets. On the open coast, bedrock and boulders extend to depths of about 40 m with sediment beyond this consisting of coarse, clean shell-gravel and sand. Soft muddy sublittoral sediments are confined to the inlets.

Out Skerries have a small crofting population on Housay and Bruray with housing and cultivated fields concentrated around the harbour. There is an airstrip on Bruray and the remainder of the islands consists of grazed moorland. The houses have septic tanks and water quality is excellent. There are salmon *Salmo salar* cages in the inlets and a small amount of potting takes place in the area. Both grey seals *Halichoerus grypus* and common seals *Phoca vitulina* breed and feed in the area.

## Marine biology

Marine biological surveys				
	Survey methods	No. of sites	Date(s) of survey	Source
Littoral	Recording	2	July-August 1974	Institute of Terrestrial Ecology (1975a)
Sublittoral	Recording	3	July-August 1974	Institute of Terrestrial Ecology (1975b)
	Recording	2	August 1986	Hiscock (1986)
	Recording	1	July-August 1987	Moss & Ackers (1987)

### Littoral

The open coasts of Out Skerries are very exposed to wave action on all but the western side of the islands where a small amount of shelter is obtained from Mainland Shetland and Yell. The majority of the shoreline consists of steep and vertical bedrock with low cliffs around much of the outer coastline of the islands and more gradually-sloping bedrock and boulder shores in the inlets. Some littoral muddy sediments are found in embayments and the heads of the inlets but there is no information available for these shores.

Biological data for the littoral zone are sparse. The open coast supports biotopes characteristic of the wave exposed conditions, with the mid-eulittoral dominated by the mussel *Mytilus edulis*, the barnacle *Semibalanus balanoides* and the limpet *Patella vulgata* (MytB). In the sublittoral fringe, *Alaria esculenta* kelp forest is found to a depth of 5 m, with large numbers of *M. edulis* and the coralline alga *Corallina officinalis* (Ala.Myt). In slightly more sheltered conditions in North Mouth, the mid-eulittoral is similarly dominated by mussels, barnacles and limpets but the furoid *Fucus serratus* and thongweed *Himanthalia elongata* are present in the lower eulittoral (Fser.R) and kelp *Laminaria digitata* occurs in the sublittoral fringe (Ldig.Ldig). In very sheltered conditions at the head of West Voe, the furoid *Ascophyllum nodosum* dominates the eulittoral with large numbers of littorinid molluscs, dogwhelks *Nucella lapillus* and occasional mussels. Pools have the green alga *Codium tomentosum* whilst the sublittoral fringe is characterised by kelp *Laminaria saccharina* (Lsac.Ft).

### Sublittoral

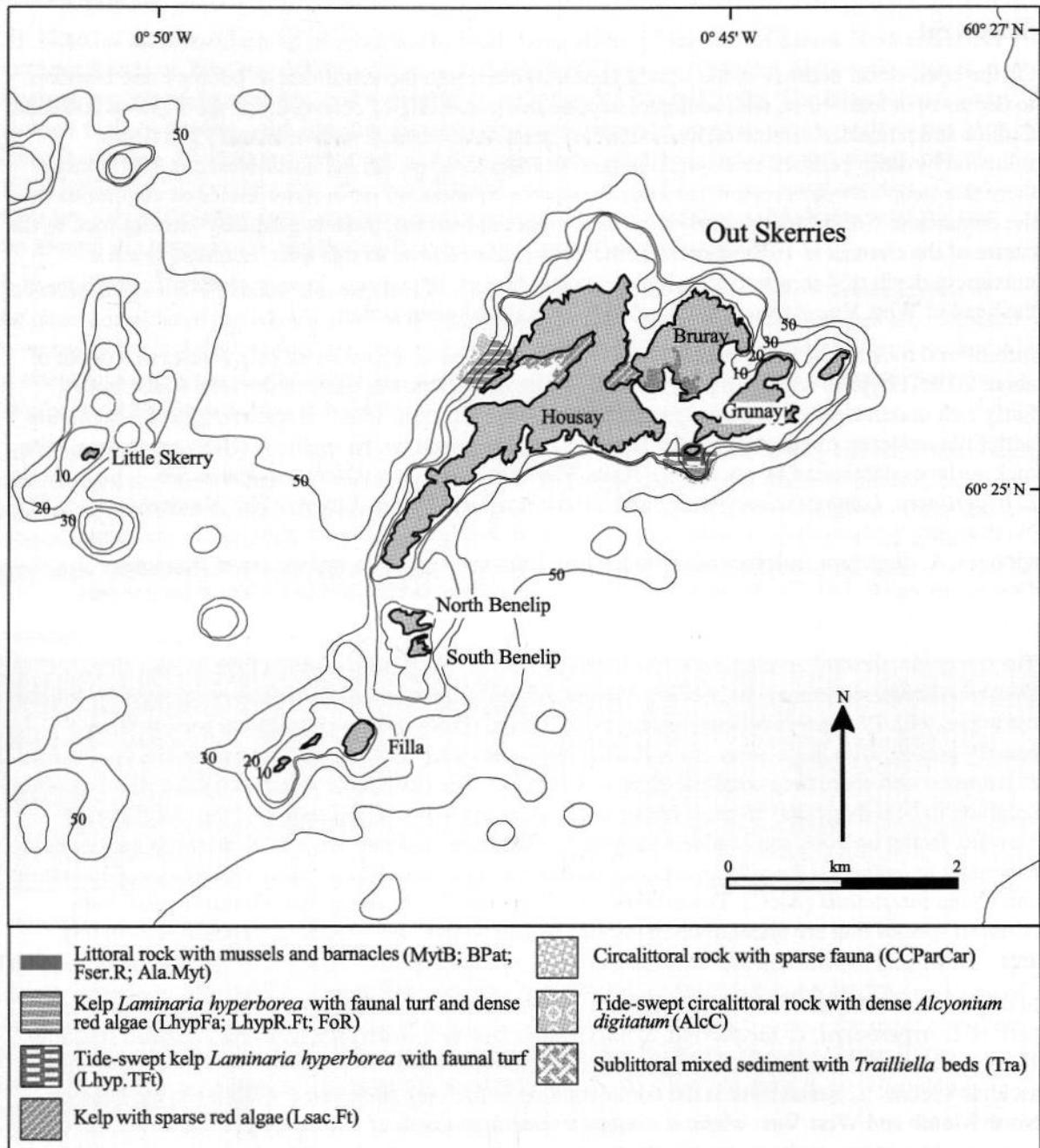
On the open coast, bedrock in the littoral zone continues into the sublittoral as bedrock and boulders to depths of at least 40 m, with sediment beyond this consisting of coarse, clean shell-gravel and sand. Gullies and pinnacles inshore on the south-east coast have vertical walls to about 15 m depth, followed by steep bedrock to about 25 m and boulders to 40 m. On the north-west coast of Housay, there is a steep unbroken rock slope from the surface to about 40 m. In more sheltered conditions in the entrance to North Mouth, where there is a slight tidal stream, there is gradually-sloping rock to the centre of the channel at 16 m whereas in the very sheltered head of this inlet, boulders reach a maximum depth of 4 m where a muddy sand plain begins. In contrast, in very sheltered conditions at the head of West Voe, bedrock reefs outcrop from a mud plain at 8 m.

Infralittoral rock on the open coast is dominated by *Laminaria hyperborea* kelp forests to a depth of about 20 m (LhypFa) with kelp park reaching 26 m. The shallower parts of the kelp forest have a fairly rich understorey of foliose algae and animals such as dead-man's fingers *Alcyonium digitatum* with little evidence of grazing, but the deeper parts are grazed by the urchin *Echinus esculentus*, with rock surfaces dominated by encrusting algae. The kelp park is a mixture of kelp species *L. hyperborea*, *Laminaria saccharina* and *Saccorhiza polyschides* (LhypGz.Pk). Vertical and overhanging walls in shallow water are covered with encrusting animals, particularly ascidians, sponges, *A. digitatum*, colonies of the tubeworm *Filograna implexa* and the jewel anemone *Corynactis viridis* (AlcC). Deeper vertical faces are dominated by the keel worm *Pomatoceros triqueter* and encrusting bryozoans and coralline algae.

The upper circalittoral zone extends from about 25-30 m depth, with a band of the brown alga *Dictyota dichotoma* immediately below the laminarian zone followed by a zone dominated by foliose red algae, with *Phycodrys rubens* particularly common (FoR). Lower circalittoral rock is fairly heavily grazed, with large areas of encrusting bryozoans such as *Parasmittina trispinosa*, keel worms *P. triqueter* and encrusting coralline algae (CCParCar). The featherstar *Antedon bifida*, which is often common in heavily grazed areas, is dense in places in the lower infralittoral and the circalittoral. Upward-facing bedrock and boulders support *A. digitatum*, hydroids such as *Nemertesia antennina*, *Halecium halecinum*, *Plumularia setacea* and *Halopteris catharina* and the ascidians *Ascidia mentula* and *Ciona intestinalis* (AlcC). The echinoderms *Hippasteria phrygiana* and *Ophiura sarsi*, both northern species that are uncommon in inshore British waters, were found at exposed sites in this area.

In the increased shelter of North Mouth, *L. hyperborea* forest extends to a depth of 9 m with a kelp park of *L. hyperborea*, *L. saccharina*, *S. polyschides* and the brown alga *Halidrys siliquosa* reaching 16 m, the lower limit of the rock. There is a fairly rich associated fauna including various sponge and ascidian species. *L. saccharina* is the dominant kelp in the very sheltered conditions at the head of North Mouth and West Voe, where it reaches a maximum depth of 5 m (Lsac.Ft). There is little other than coralline crusts on the rock surfaces beneath the kelp plants although both *H. siliquosa* and the green alga *Codium tomentosum* are found amongst the kelp in West Voe.

Coarse shelly gravel in a depth of 40 m on the open coast has a large proportion of tubes of *P. triqueter* and supports epifaunal hydroids and bryozoans attached to stones and shell debris. These include the scour-tolerant bryozoan *Flustra foliacea* and the hydroid *Schizotricha frutescens* (CGS). The scallop *Pecten maximus* is frequent on the gravel surface. In contrast, muddy sand at a depth of 4-6 m in the shelter of North Mouth has numerous casts of lugworm *Arenicola marina*, the burrowing anemone *Cerianthus lloydii*, razor clams *Ensis* sp., the hermit crab *Pagurus bernhardus* and sand gobies *Pomatoschistus* sp. Scallops are also found here, as are queen scallops *Aequipecten opercularis* and there are plants of the brown alga *Asperococcus bullosus* lying loose on the sediment surface (LsacX). Soft mud in depths of up to 8 m in West Voe has mats of filamentous algae and the opisthobranch *Akera bullata* (Tra).



**Figure 8.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 8.1, cited literature and additional field observations).

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### Nature conservation

Conservation sites		
Site name	Status	Main features
Shetland Islands	ESA	Agri-environmental scheme

## Human influences

### Coastal developments and uses

Out Skerries have a small crofting population on Housay and Bruray concentrated around the harbour. There are cultivated areas around the crofts but much of the land is grazed moorland. There is an airstrip on Bruray and the ferry to Lerwick and Vidlin runs from a pier in the harbour. A short stretch of road runs around the harbour and through the village, and a bridge connects the islands of Bruray and Housay across the sounds of North Mouth and South Mouth. The houses have septic tanks and water quality is excellent.

### Marine developments and uses

There are several fishing boats based at the harbour on Out Skerries and there is a whitefish ground to the north-east of the islands. Potting for crustaceans takes place in the inshore rocky areas. There are fin-fish farms in the sounds.

## References and further reading

- Hiscock, K. 1986. Marine biological surveys in Shetland. August 1986. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 678.
- Institute of Terrestrial Ecology. 1975a. Report to the Nature Conservancy Council on some aspects of the ecology of Shetland. Part 6.2. Littoral biota of rocky shores. *Nature Conservancy Council, CSD Report*, No. 27.
- Institute of Terrestrial Ecology. 1975b. Report to the Nature Conservancy Council on some aspects of the ecology of Shetland. 6.4: Sublittoral biota. *Nature Conservancy Council, CSD Report*, No. 30.
- Moss, D., & Ackers, G. 1987. *A sublittoral survey of Shetland, 1987*. Unpublished, Marine Conservation Society.

## Sites surveyed

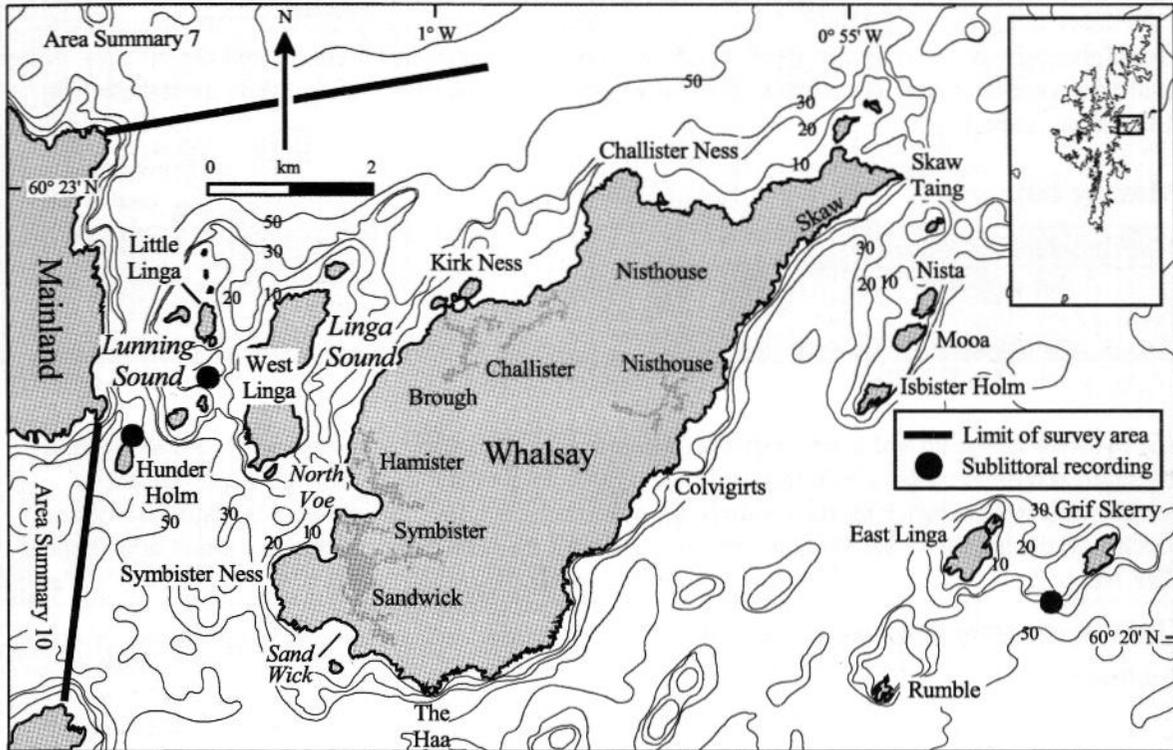
- Survey 227: 1987 MCS sublittoral survey of Shetland (Moss & Ackers 1987).
- Survey 230: 1974 ITE report on sublittoral biota of Shetland (Institute of Terrestrial Ecology 1975b).
- Survey 261: 1986 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Hiscock 1986).
- Survey 434: 1974 ITE report on rocky shore ecology of Shetland (Institute of Terrestrial Ecology 1975a).

Littoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
434	30	Blogarth, Out Skerries.	HU 684 720	60°25.5'N 00°45.4'W	MytB; BPat; Fser.R; Ldig.Ldig
434	65	Old Man's Stack, Out Skerries.	HU 690 711	60°25.1'N 00°44.8'W	Ala.Myt

Sublittoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
261	32	S of the North Mouth of Out Skerries.	HU 683 718	60°25.4'N 00°45.5'W	Lsac.Ft; LsacX
261	33	The Hogg, Housay, Out Skerries.	HU 672 718	60°25.5'N 00°46.7'W	LhypR.Ft; LhypGz.Ft; LhypGz.Pk; FoR; AlcC; CGS
227	28	Stoura Stack, Out Skerries.	HU 688 710	60°25.0'N 00°45.0'W	Lhyp.TFt; LhypFa; AlcC; CCParCar; Flu.HByS;
230	31	Old Man's Stack, Out Skerries.	HU 690 711	60°25.1'N 00°44.8'W	EIR
230	32	Blogarth, Out Skerries.	HU 684 720	60°25.5'N 00°45.4'W	EIR
230	33	West Voe, Out Skerries.	HU 680 720	60°25.6'N 00°45.8'W	Lsac.Ft; Tra

## Location

Position (centre)	HU 580 640	60°21.3'N 00°56.9'W
Administrative area	Shetland Islands	
Conservation agency/area	Scottish Natural Heritage	North Areas (Northern Isles)



**Figure 9.1** Main features of the area, showing sites surveyed.

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## Physical features

<i>Physiographic type</i>	Island (open coast)
<i>Length of coast</i>	Whalsay: 34.7 km; W Linga: 6.4 km; E Linga: 2.3 km
<i>Bathymetry</i>	50 m contour within about 2 km of west coast, 4 km of east coast, 300 m of south-east corner
<i>Wave exposure</i>	Very exposed on open east-facing coast to sheltered around islands and in bays in west of area
<i>Tidal streams</i>	Strong tides through Lunning and Linga Sounds and around north-east corner of Whalsay; weak elsewhere
<i>Tidal range</i>	1.8 m (mean springs); 0.8 m (mean neaps)
<i>Salinity</i>	Fully marine

## Introduction

Area 9, off the east coast of Mainland Shetland, includes the islands of Whalsay and the smaller West Linga, Lunning and Linga Sounds, associated skerries and rocks and a short stretch of the Mainland coast. It has a rocky and predominantly wave-exposed coastline with most of the south- and east-facing coastline very exposed to wave action. Conditions becoming more sheltered in the west of the area with sheltered conditions in localised areas around the small islands here and in the bays. The area is influenced by the strong tidal streams that flow through Yell Sound (*Area summary 27*) with strong tides running through Lunning and Linga Sounds and around the north-east corner of Whalsay.

The majority of the shoreline is bedrock with low cliffs along much of the south and east coasts of Whalsay and higher cliffs on the adjacent mainland coast. A number of small bays on Whalsay have sandy beaches at their heads but otherwise there is no littoral sediment. Bedrock continues into the sublittoral to depths of over 40 m in Lunning Sound, and over 30 m around Griff Skerry in the east of the area. Coarse sand and gravel replaces the rock at these depths, with a large amount of shell debris and some maerl in Lunning Sound.

Whalsay is one of the more populous of the smaller islands in Shetland with a crofting population concentrated in a series of villages along the west coast. There is a harbour with several piers at Symbister, used by commercial fishing boats and ferries to the Mainland. Roads run the length of the west coast and across to Isbister on the east coast. The hinterland is predominantly moorland and rough grazing with a number of freshwater lochs and small cultivated areas around the villages. Water quality around the island is excellent; the houses have septic tanks and the outflow from these has little, if any, effect.

## Marine biology

### Marine biological surveys

Survey methods	No. of sites	Date(s) of survey	Source
Sublittoral Recording	1	August 1987	Howson (1988)
Recording	2	August 1987	Moss & Ackers (1987)

### Littoral

The majority of the littoral zone consists of steep or vertical bedrock with low cliffs along much of the south and east coasts of Whalsay and higher cliffs on the adjacent mainland coast. There is a boulder and shingle beach on the southern tip of Little Linga. Littoral sediment is restricted to sandy beaches in the bays of Sand Wick, North Voe and Kirk Ness on Whalsay and to a small houb behind Kirk Ness.

There are no survey data for the littoral zone in Area 9.

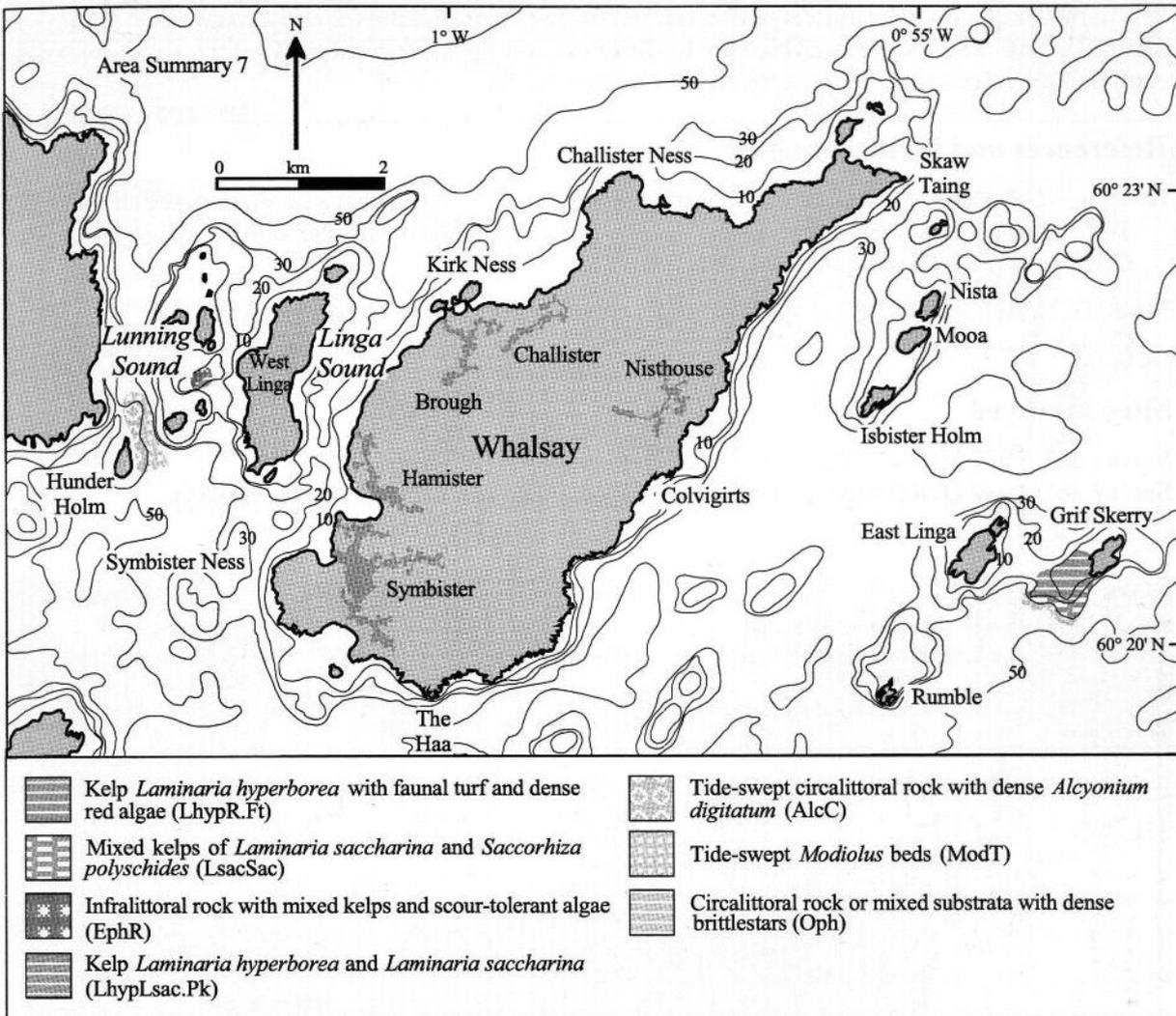
### Sublittoral

Unbroken bedrock continues into the sublittoral to depths of over 40 m in Lunning Sound, and over 35 m around Grif Skerry in the east of the area, where pinnacles and gullies with vertical walls and boulder floors are prominent. Coarse sand and gravel replaces the rock at these depths, with a large amount of shell debris and some maerl in Lunning Sound.

Rock in the infralittoral zone is dominated by a kelp forest of *Laminaria hyperborea*, with sponges and some foliose algae in the understorey (LhypR.Ft), to a depth of about 22 m followed by a kelp park of *L. hyperborea* and *Saccorhiza polyschides* with bushes of the brown alga *Desmarestia aculeata* to about 26 m (LsacSac). The soft coral *Alcyonium digitatum* is abundant in the circalittoral to about 35 m with large clumps of the tubeworm *Filograna implexa*, keel worms *Pomatoceros triqueter*, encrusting algae and the brittlestar *Ophiocoma nigrum* (AlcC). At Grif Skerry, brittlestars are abundant in the lower circalittoral (Oph) whilst in the tide-swept conditions of Lunning Sound, there is a band of horse mussels *Modiolus modiolus* with the northern epifaunal holothurian *Cucumaria frondosa* on the bedrock slope at 30-35 m (ModT). There is another band of *A. digitatum* beyond the horse mussels, with hydroids including *Nemertesia* spp., extending to the lower limit of rock at 42 m (AlcC).

The only information available for the sediment biotopes in this area relates to the epifauna. In Lunning Sound, bedrock outcrops, coarse sand and shell-gravel in 23-27 m support scattered plants of the kelp *Laminaria saccharina* and an unusually diverse range of associated algal and animal species which reflect the conditions of strong tidal flow and mixed scoured and unstable substrata (EphR). Species present include scattered maerl, the red alga *Scinaia turgida*, the hydroid *Nemertesia* sp., the erect bryozoan *Bugula* sp., the northern sea urchin *Strongylocentrotus droebachiensis*, the topshell

*Gibbula magus*, the ascidian *Molgula oculata* and the scallop *Pecten maximus*. There is no biological information for the coarse sand noted at Grif Skerry.



**Figure 9.2** Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 9.1, cited literature and additional field observations).

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## Nature conservation

### Conservation sites

Site name	Status	Main features
Shetland Islands	ESA	Agri-environmental scheme

## Human influences

### Coastal developments and uses

Whalsay is one of the most populous of the smaller islands with several villages. Roads run along the west coast and across the island to Nisthouse on the east. There are several lochs in the centre of the

island and much of the land is grazed moorland. There is a harbour at Symbister from where the ferries to Vidlin and Flugarth run. The airstrip is at Skaw in the north-east.

### Marine developments and uses

The harbour supports a small fleet of commercial fishing boats. Potting for crustaceans takes place around the inshore rocky areas. There are fin-fish farms off the north coast of Whalsay, and a dredge-spoil dumping-ground at the southern end of Lunning Sound.

### References and further reading

Howson, C.M. 1988. Marine Nature Conservation Review: survey of Shetland, Foula and Fair Isle, 1987. (Contractor: Field Studies Council, Oil Pollution Research Unit, Pembroke.) *Nature Conservancy Council, CSD Report*, No. 816.

Moss, D., & Ackers, G. 1987. *A sublittoral survey of Shetland, 1987*. Unpublished, Marine Conservation Society.

### Sites surveyed

Survey 227: 1987 MCS sublittoral survey of Shetland (Moss & Ackers 1987).

Survey 261: 1987 OPRU/MNCR survey of Shetland, Foula and Fair Isle (Howson 1988).

Sublittoral sites					
Survey	Site	Site name	Grid reference	Latitude/longitude	Biotopes recorded
261	153	Hunder Holm, Lunning Sound.	HU 515 638	60°21.3'N 01°03.9'W	ModT; AlcC
261	199	S of Little Linga, Lunning Sound.	HU 524 645	60°21.7'N 01°03.0'W	LhypLsac.Pk; EphR; Phy.HEc
227	29	Longa Skerries, Out Skerries.	HU 625 618	60°20.1'N 00°52.0'W	LsacSac; LhypR.Ft; AlcC; Oph

Compiled by: Christine Howson