JOINT NATURE CONSERVATION COMMITTEE

Marine Nature Conservation Review

Sector 14

Sealochs in the Outer Hebrides

Area summaries

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Coasts and seas of the United Kingdom – MNCR series

9 Loch Odhairn

Location		
Position (centre)	NB 410 145	58°03'N 06°23'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

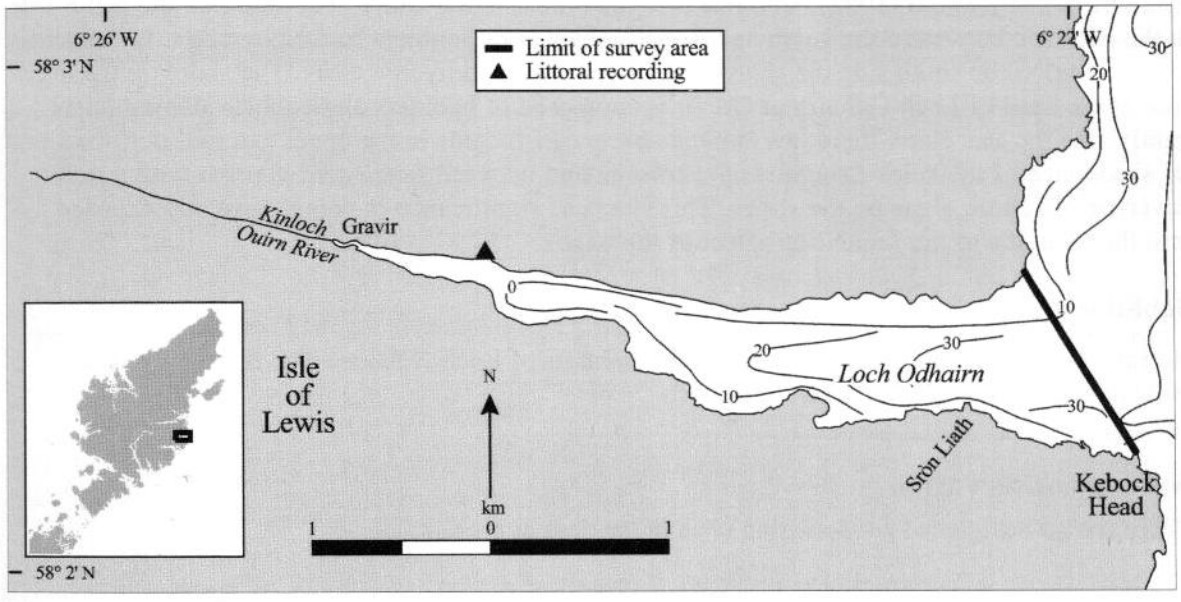

Figure 9.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Open sealoch with no sills
Length of coast	10.4 km
Length of inlet	4.35 km
Area of inlet	2.0 km^2
Bathymetry	Maximum depth 30 m at the entrance becoming shallower towards the head
Wave exposure	Moderately exposed to sheltered
Tidal streams	No data available
Tidal range	4.1 m (mean springs); 1.7 m (mean neaps) (Loch Shell)
Salinity	No data available

Introduction

Loch Odhairn is a small sealoch on the east coast of Lewis situated between Lochs Erisort and Shell in the district known as Park or Pairc. It marks the eastern end of a major fault-line passing through the head of Loch Seaforth westwards to Loch Resort. The Glen Ouirn/Kinloch Ouirn River running in an east–west direction connects the head of Loch Odhairn to the head of Loch Seaforth (*Area summary* 13), forming a continuous watercourse some 37 km long.

Marine biology

Marine biological surveys				
	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota)	1	May 1977	Smith (1982)

Littoral

Information on the biology of Loch Odhairn is very limited and comes mainly from a brief visit made in 1977 by Smith (1982), who refers to the loch as Loch Ouirn. The shore on the south side at the entrance between Sròn Liath and Kebock Head is of boulders backed by cliffs. In the mid-loch region on the south side the shore is of bedrock backed by low cliffs. The shore on the north side at the head of Loch Odhairn at Gravir is composed of boulders and cobbles sloping fairly gently into the sea. Here, there is a marked absence of fucoids in the upper and mid-eulittoral but an abundance of the kelps *Laminaria hyperborea* and oarweed *Laminaria digitata* with a rich covering of foliose algae on the stipes. This site is of significance in being unusually exposed far into the loch due to the funnelling effect of the winds.

Sublittoral

No information is available on the sublittoral habitats of Loch Odhairn. The Admiralty chart indicates mud in the central part of the loch.

Nature conservation

There are no designated conservation sites in the area at present.

Human influences

Coastal developments and uses

The village of Gravir is situated at the head of Loch Odhairn, and scattered housing extends along two minor roads which run for 2 km eastwards from Gravir on both sides of the loch. There are no shore-based industries. The outer reaches of Loch Odhairn are inaccessible by land.

Marine developments and uses

There are many moorings, a jetty on the north side and two boat slips at Gravir used mainly by fishing boats creeling for crabs and lobsters *Homarus gammarus* within and outside the loch. Three salmon farm leases have been granted since 1988, two of which were occupied at the time of writing, and one licence was granted in 1993 for the discharge of effluent from salmon-rearing cages.

References and further reading

Bennett, T.L., Mitchell, R. & Burgoyne, C. 1989. *Hebridean Coastwatch 1989 field report.* Unpublished, Nature Conservancy Council, Peterborough (Internal report).

Smith, S.M. 1982. The shores of the east coast of Lewis and Harris between Lochs and Leverburgh, with emphasis on the Mollusca. (Contractor: S.M. Smith, Edinburgh.) *Nature Conservancy Council, CSD Report*, No. 410.

Sites surveyed

Survey 93: 1982 Smith Lewis & Harris littoral mollusc survey (Smith 1982).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
93	10	Gravir	NB NB 637 082	58°00.04'N 06°24.5'W	MLR, MIR

Compiled by: Ruth Beaver and Frances Dipper

10 Loch Shell (Loch Sealg)

Location		
Position (centre)	NB 350 105	58°01'N 06°29'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

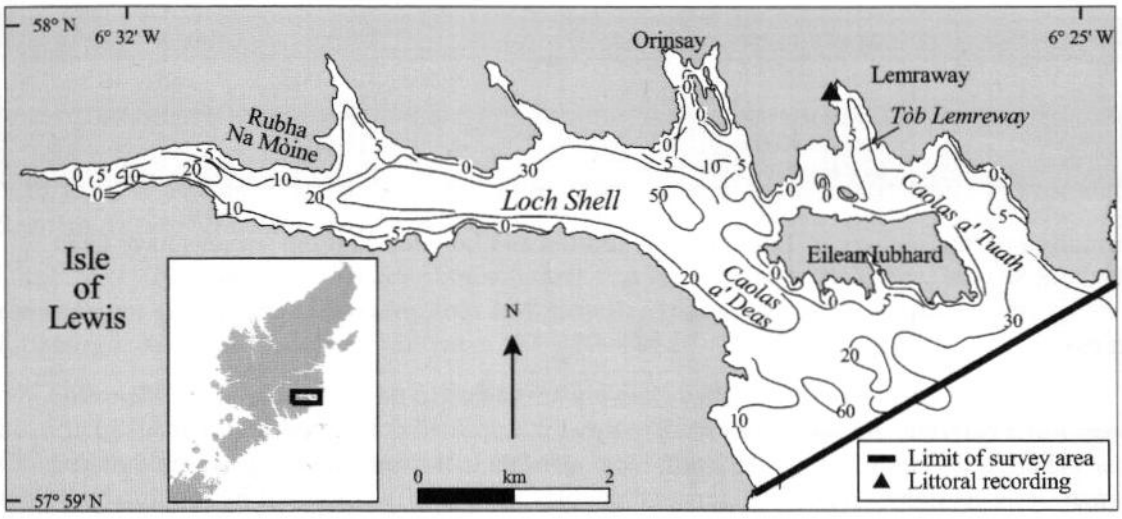

Figure 10.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Fjordic sealoch with two sills
Length of coast	36.1 km (47.0 km including islands)
Length of inlet	10.2 km
Area of inlet	15.4 km^2 (14.0 km^2 excluding islands)
Bathymetry	Maximum depth 61 m west of Eilean Iubhard; most of loch deeper than 30 m
Wave exposure	Exposed to extremely sheltered
Tidal streams	Weak to very weak
Tidal range	4.1 m (mean springs); 1.7 m (mean neaps) (Loch Shell)
Salinity	No data available

Introduction

Loch Shell (or Loch Sealg) is located on the south-east coast of Lewis in the district known as Park or Pairc, to the north of Lochs Seaforth, Claidh and Bhrollum. It lies in a very remote region and the land to the west and south consists of high mountains and steep valleys, dominated by the summits of Beinn Mhór, Muaithabhal and Mór Mhonadh, all of which are over 400 m high. The whole area to the south and west between Loch Shell and Loch Seaforth (*Area summary* 13) is now completely uninhabited and used for deer and sheep grazing.

Loch Shell is typically fjordic in character with two basins and two sills. The entrance is divided into two channels by Eilean Iubhard. The north channel is obstructed by a number of rocks and islets, making navigation difficult. The entrance sill lies to the south of this island at a depth of 12 m. The second sill lies in the upper loch and runs south from Rubha na Mòine, rising to a depth of 11 m at its shallowest point. The outer basin of the loch has a maximum depth of 61 m, whilst the

basin in the upper loch has a maximum depth of 27 m. There are many rivers which feed into small shingle bays leading into Loch Shell, and these probably give rise to localised lowered salinity. The northern shore of the loch is indented with several bays, whilst the southern shore has no embayments of any size.

Loch Shell is an important nursery area for sprat *Sprattus sprattus* and herring *Clupea harengus* and a spawning area for cod *Gadus morhua*.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota with emphasis on molluscs)	1	May 1977	Smith (1982)

Information on the biology of Loch Shell is limited and no wide-ranging surveys have been carried out.

Littoral

The littoral extent within Loch Shell is relatively small due to the steepness of the shoreline. Shores in the entrance are rocky and backed by cliff slopes. Tòb Lemreway is a small inlet which forms a sheltered muddy bay on the north side, and this is the only shore for which detailed information is available. Here, boulders and cobbles are patchily colonised by fucoid algae *Fucus* spp. and periwinkles *Littorina* spp. The upper shore at Lemreway is more gravelly, with patches of sand and freshwater runoff, and the mussel *Mytilus edulis* is one of the few species present in numbers (MytX). Boulders on the lower shore support dense *Fucus serratus* (Fserr.VS) and the kelp *Laminaria digitata* in its cape form (Ldig). The water here is turbid and leaves a heavy deposit on the algae. The diversity and abundance of molluscs, particularly of small molluscs, is high, especially on algal fronds. The rough periwinkle *Littorina saxatilis* is abundant (Smith, 1982).

Sublittoral

Information on the sublittoral environment is restricted to a survey of polychaete species of Eilean Iubhard by George (1979), who recorded the presence of *Nereimyra punctata* on scallop shells and *Hydroides norvegica* amongst kelp holdfasts, as well as *Chaetopterus variopedatus*, *Sabellides octocirrata* and *Polydora caulleryi*. The calcareous tubeworms *Janua pagenstecheri* and *Pomatoceros triqueter* were found on stones and limpet *Patella* sp. shells.

Nature conservation

There are no designated conservation sites in the area at present.

Human influences

Coastal developments and uses

The B8060 road crosses the moorland to the north before branching in two and ending at the neighbouring villages of Orinsay and Lemreway around two bays on the north side of outer Loch Shell. There are no settlements and no road access to the moorland south of the loch, which is used for sheep and deer grazing.

Marine developments and uses

Leases for nine salmon *Salmo salar* farms and one for mussel farming have been granted (data correct at 10 March 1997). There are many moorings in Tòb Lemreway, used mainly by yachts and fishing boats. Periwinkles *Littorina littorea* are regularly harvested from the shores around Lemreway.

References and further reading

Bennett, T.L., Mitchell, R. & Burgoyne, C. 1989. *Hebridean Coastwatch 1989 field report.* Unpublished, Nature Conservancy Council, Peterborough (Internal report).

George, J.D. 1979. The polychaetes of Lewis and Harris with notes on other marine invertebrates. In: *The natural environment of the Outer Hebrides*, ed. by J.M. Boyd. *Proceedings of the Royal Society of Edinburgh. Series B: Biological Sciences*, 77: 189–216.

McKay, D.W. & Fowler, S.L. 1997. Review of winkle, *Littorina littorea*, harvesting in Scotland. *Scottish Natural Heritage Review*, No. 69.

Smith, S.M. 1979. Mollusca of rocky shores: Lewis and Harris, Outer Hebrides. In: *The natural environment of the Outer Hebrides*, (ed. J.M. Boyd). *Proceedings of the Royal Society of Edinburgh. Series B: Biological Sciences*, 77: 173–187.

Smith, S.M. 1982. The shores of the east coast of Lewis and Harris between Lochs and Leverburgh, with emphasis on the Mollusca. (Contractor: S.M. Smith, Edinburgh.) *Nature Conservancy Council, CSD Report*, No. 410.

Sites surveyed

Survey 93: 1982 Smith Lewis Lewis & Harris littoral mollusc survey (Smith 1982).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
93	11	Lemreway, Loch Shell	NB 379 116	58°0.9'N 06°26.1'W	MytX; Fserr.VS, LMX, Ldig

Compiled by: Ruth Beaver and Frances Dipper

11 Loch Bhrollum

Location		
Position (centre)	NB 315 030	57°56'N 06°32'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

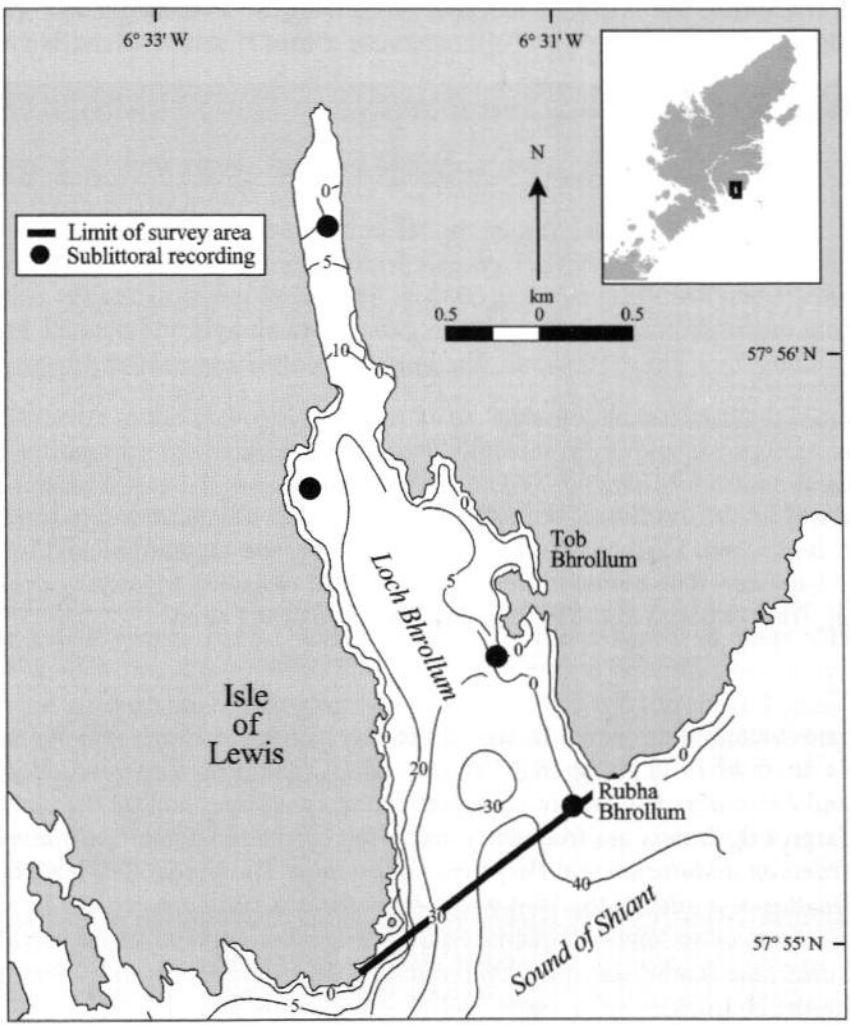

Figure 11.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Open sealoch
Length of coast	12 km
Length of inlet	4.2 km
Area of inlet	2.8 km^2
Bathymetry	Maximum depth 30 m
Wave exposure	Exposed at loch mouth, becoming sheltered at head
Tidal streams	Weak to very weak
Tidal range	4.2 m (mean springs); 1.6 m (mean neaps) (East Loch Tarbert)
Salinity	Fully marine

Introduction

Loch Bhrollum is one of the most remote sealochs in the Outer Hebrides, having no roads or habitation within 12 km of its shores. It is a small sealoch situated in the area known as Park or Pairc, between Loch Seaforth and Loch Erisort. Loch Bhrollum is classed as an open sealoch because it has no sill. It measures 4 km long and just over 1 km wide at its mouth. The seabed gradually slopes upwards from 27 m at the mouth and ends in a narrow but long shingle and mud beach at the head. The character of the marine biotopes is mostly influenced by the marked increase in exposure to wave action from the head towards the mouth of the loch.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Sublittoral	Recording (epibiota)	4	July–August 1988	Howson (1989)

Littoral

The littoral zone of Loch Bhrollum consists of steep bedrock slopes down to the sublittoral fringe with the exception of the shores at the head where a beach of shingle and pebbles backed by steep craggy slopes extends for 1 km southwards. No detailed information is available on the littoral zone.

Sublittoral

In the outer parts of Loch Bhrollum, sublittoral bedrock and boulders extend to around 30 m depth before sediment is reached. Further into the loch, rock slopes are shorter and end in sediment between 6 and 11 m deep. The communities in the loch are subjected to varying degrees of wave exposure ranging from exposed at the entrance to sheltered at the head.

Infralittoral rock

In the mid to lower loch region, which is exposed to wave action, a *Laminaria hyperborea* kelp forest grows to a depth of 11 m (Lhyp.Ft). The red algae *Cryptopleura ramosa*, *Plocamium cartilagineum* and *Phycodrys rubens* are abundant on the kelp stipes and on the bedrock beneath, whilst the old, large kelp fronds are frequently colonised by the red algae *Callithamnion tetragonum*, *Ceramium nodulosum* and *Porphyra umbilicalis*. The bryozoans *Scrupocellaria scruposa* and *Bicellariella ciliata*, the keel worm *Pomatoceros triqueter* and the brown alga *Dictyota dichotoma* are common or frequent in this habitat. Below 7 m, the cup coral *Caryophyllia smithii*, the featherstar *Antedon bifida* and the barnacle *Balanus crenatus* become more frequent on the bedrock.

Further into the loch as bedrock gives way to boulders and cobbles, *L. hyperborea* is replaced by a dense kelp forest of *Laminaria saccharina* and *Saccorhiza polyschides* which extends down to 7 m depth (Lsac.Ft). Few other species are found here due to the shading effect of the dense canopy, and the understorey consists mainly of *Delesseria sanguinea* and red coralline algae. The most abundant animals are the topshells *Calliostoma zizyphinum* and *Gibbula cineraria*, the ascidian *Ascidia mentula*, *C. smithii* and the common urchin *Echinus esculentus*, the grazing activities of which contribute to the sparseness of the understorey.

Circalittoral rock

The lower infralittoral and upper circalittoral zones consist of steeply sloping bedrock in the mid-loch region on the east side, or very large boulders at the loch entrance at Rubha Bhrollum. This outer part of the loch is moderately exposed and slightly tide-swept and is characterised by the northern sea-fan *Swiftia pallida* (ErSSwi). Other common species include the hydroid *Kirchenpaueria pinnata*, the encrusting bryozoan *Parasmittina trispinosa*, the cup coral

Caryophyllia smithii, the football ascidian *Diazona violacea*, and the squat lobster *Munida rugosa*. Slight differences in species composition and abundance can be seen in this biotope according to distance up the loch. The solitary ascidians *Ascidia mentula, Ascidiella scabra, Ciona intestinalis* and *Molgula* sp., which are tolerant of silt, are frequent in the mid-loch region but rare or absent at the loch entrance. In contrast, the colonial ascidians *Botryllus schlosseri* and *Botrylloides leachi* are found at Rubha Bhrollum, at the loch entrance, but not within the loch. Sponges are poorly represented in both areas, which makes this example of the biotope unusual since in other Scottish locations the biotope ErSSwi is usually characterised by a variety of erect sponges. Ross coral *Pentapora foliacea*, infrequently recorded in northern Britain, is present in the mid-loch region. The brown alga *Carpomitra costata* that occurs at the entrance to the loch has been classed as nationally scarce (Plaza & Sanderson 1997).

Sublittoral sediment

Sediments throughout Loch Bhrollum range from 6–29 m depth, with the exception of the loch head, and are predominantly a mixture of mud or fine sand mixed with coarse sand, pebbles and shell gravel in varying amounts. These sediments are mainly characterised by the sea-pen *Virgularia mirabilis* and the brittlestar *Ophiura albida* (VirOph) with the deeper sediments supporting the sea-pen *Pennatula phosphorea* and the burrowing brittlestar *Amphiura chiajei*. The dragonet *Callionymus lyra*, the burrowing anemone *Cerianthus lloydii* and the scallop *Pecten maximus* occur throughout these sediments.

The deepest sediments in the loch, below about 30 m, have not been surveyed. However, there are references in the literature to studies on the Norway lobster *Nephrops norvegicus*, and the burrowing crustacean *Calocaris macandreae* in this loch (Chapman, Johnstone & Rice 1975; Nash *et al.* 1984). It is therefore likely that the deepest areas consist of soft mud with sea-pens and burrowing megafauna (SpMeg).

At the loch head, at a depth of 6 m, the sediment is of very soft mud with a small proportion of empty shells and shell-gravel. Here, the mud is typical of the sediment in many sheltered loch heads and is covered with a diatom film. The mud is sculptured with burrows, mounds and casts, some of which are attributable to lugworms *Arenicola marina* and the snake blenny *Lumpenus lumpretaeformis*. Pebbles and stones provide attachment surfaces for *L. saccharina*. Loose-lying *Ceramium nodulosum* plants are scattered over the site (LsacX).

Nature conservation

Conservation sites		
Site name	***Status***	***Main features***
South Lewis, Harris and North Uist	NSA	Landscape

Human influences

Coastal developments and uses

The whole area around Loch Bhrollum is completely uninhabited with no road access, and is used for deer and sheep grazing.

Marine developments and uses

Yachts may occasionally use Loch Bhrollum as an anchorage. One lease has been granted for an Atlantic salmon farm (data correct at 1 April 1993).

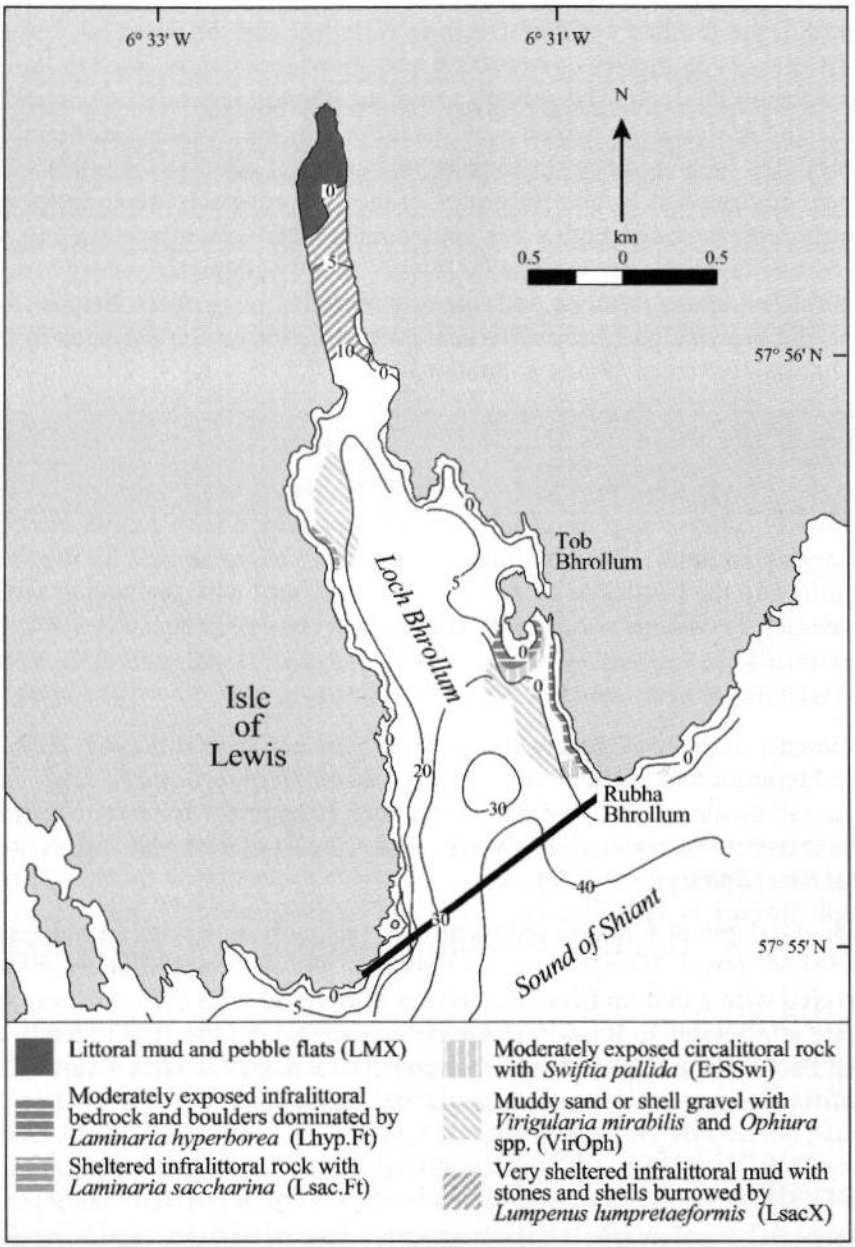

Figure 11.2 Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 11.1, cited literature and additional field observations).

References and further reading

Chapman, C.J., Johnstone, A.D. & Rice, A.L. 1975. Ecology of juvenile and adult *Nephrops*. In: *The biology and management of lobsters. Volume II, ecology and management*, (ed. J.S. Cobb & B. Philips) 143–178. Academic Press.

Howson, C.M. 1989. Surveys of Scottish sealochs. Sealochs on the Isles of Harris and Lewis. (Contractor: University Marine Biological Station, Millport.) *Nature Conservancy Council, CSD Report*, No. 982.

Howson, C.M., Connor, D.W. & Holt, R.H.F. 1994. The Scottish sealochs. An account of surveys undertaken for the Marine Nature Conservation Review. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 164. (Marine Nature Conservation Review Report, No. MNCR/SR/27.)

Nash, R.D.M., Chapman, C.J., Atkinson, R.J.A. & Morgan, P.J. 1984. Observations on the burrows and burrowing behaviour of *Calocaris macandreae* (Crustacea: Decapoda: Thalassinoidea). *Journal of Zoology*, 202: 425–439.

Plaza, J. and Sanderson, W.G. (1997) Chapter 5.4 Rare sea-bed species. In: *Coasts and seas of the United Kingdom. Regions 15 & 16 North-west Scotland: the Western Isles and west Highland* (ed. J.H. Barne, C.F. Robson, S.S. Kaznowska, J.P. Doody, N.C. Davidson & A.L. Buck.) 116–121. Peterborough, Joint Nature Conservation Committee (Coastal Directories Series.)

Sites surveyed

Survey 21: 1988 UMBSM survey of sealochs of Harris and Lewis (Howson 1989).

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	43	Head of loch, Loch Bhrollum, Lewis	NB 311 050	57°57.1'N 06°32.7'W	LsacX
21	44	W side, mid-loch, Loch Bhrollum, Lewis	NB 310 036	57°56.4'N 06°32.7'W	VirOph; Lsac.Ft
21	45	Headland on E side, Loch Bhrollum, Lewis	NB 320 027	57°55.9'N 06°31.6'W	ErSSwi; VirOph; FaSwV; Lhyp.Ft
21	46	SW of Rubha Bhrollum, Loch Bhrollum, Lewis	NB 324 019	57°55.5'N 06°31.2'W	VirOph; ErSSwi

Compiled by: Ruth Beaver and Frances Dipper

12 Loch Claidh

Location		
Position (centre)	NB 270 030	57°56'N 06°37'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

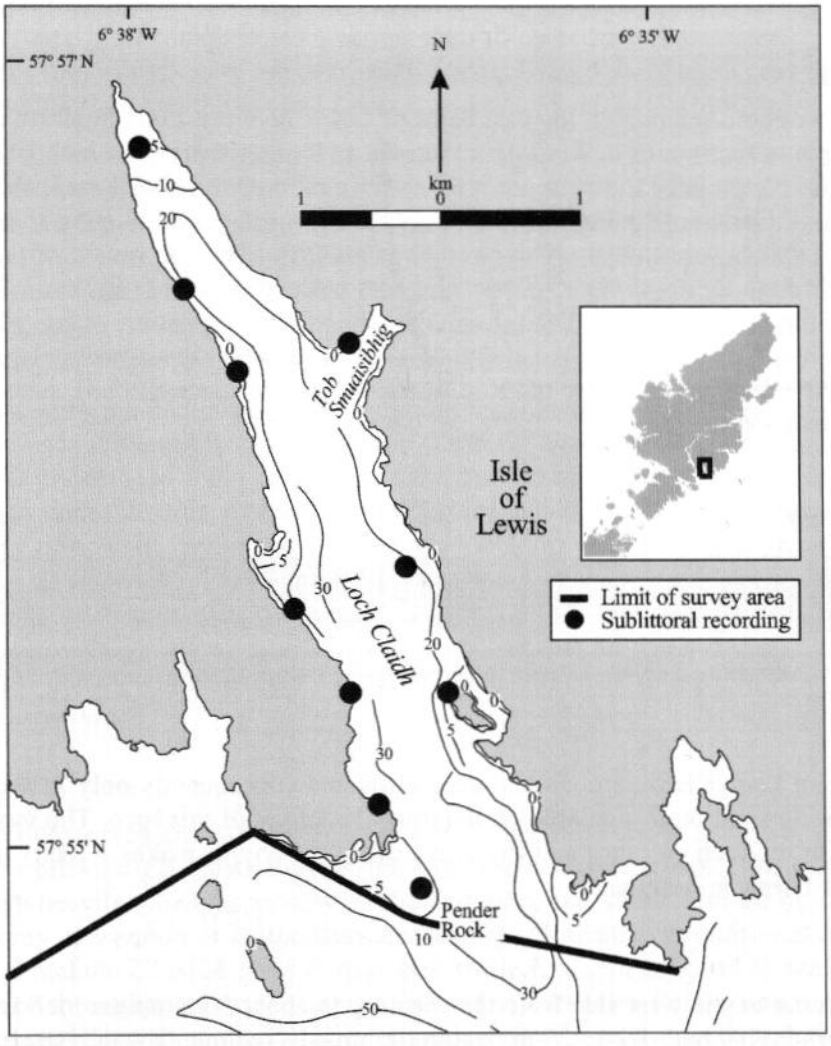

Figure 12.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Fjordic sealoch with one sill
Length of coast	17.9 km (18.9 km including islands)
Length of inlet	6.66 km
Area of inlet	5.77 km^2 (5.74 km^2 excluding islands)
Bathymetry	Maximum depth 47 m in loch basin
Wave exposure	Moderately exposed in lower loch; sheltered at head to mid-loch
Tidal streams	Weak to very weak
Tidal range	4.2 m (mean springs); 1.6 m (mean neaps) (East Loch Tarbert)
Salinity	Fully marine; variable at head

Introduction

Loch Claidh is a remote sealoch on the east coast of Lewis between Loch Seaforth and Loch Erisort in the area of mountains and moorland known as Park or Pairc. The loch is surrounded by steep-sided cliffs, particularly in the upper reaches towards the head. Tob Smuaisibhig in the upper reaches on the east side is the only bay and here the more gently-sloping shore is of shingle and mud which extends sublittorally. The river Abhainn Gleann Claidh runs down a steeply-sloping valley through the foothills of Lewis's highest peak, Beinn Mhór (572 m), 3 km to the north, before joining the loch at the head. Loch Claidh is fjordic in nature with a wide entrance sill at 22 m depth and a maximum basin depth of 47 m. The shores are moderately exposed to the south-east but the effects of swell are reduced by the narrow entrance and sill, such that the upper reaches of the loch are sheltered.

Marine biology

Marine biological surveys				
	Survey methods	***No. of sites***	***Date(s) of survey***	***Source***
Sublittoral	Recording (epibiota)	10	July–August 1988	Howson (1989)

Littoral

The shores around Loch Claidh are mainly steep cliffs and consequently only 11% of the loch area is intertidal. No information is available on the littoral ecology of this loch. The moderately exposed nature of the loch entrance and the steepness of the shores makes it likely that many littoral areas are barnacle-dominated.

Sublittoral

The sublittoral zone on the west side from the entrance to about 5 km up the loch is of steeply sloping and overhanging bedrock to 28 m, leading to muddy sediments which slope to a maximum depth of 47 m. The rock–sediment boundary becomes generally shallower in the upper reaches of the loch, where it is mostly less than 12 m. On the east side, the rock–sediment boundary occurs at 22 m at Eilean Thinngarstaigh, the only site fully surveyed on this side, and again becomes shallower towards the head. The boundary is often blurred because rock outcrops occur in the sediment below the main rock slope throughout the loch.

Infralittoral rock

On the steeply sloping bedrock of the west side of outer Loch Claidh, there is a sublittoral fringe of kelp *Laminaria digitata* with some *Laminaria hyperborea* (Ldig.Ldig). The rock underneath the kelp is rather barren with encrusting algae abundant along with scattered foliose algae, particularly *Plocamium cartilagineum* and *Phycodrys rubens*. Few animals are present, with the ascidians *Botryllus schlosseri*, *Botrylloides leachi* and the grey topshell *Gibbula cineraria* most frequently recorded.

Pender Rock at the entrance to the loch is sufficiently exposed to support a grazed *Laminaria hyperborea* kelp park down to about 20 m (LhypGz.Pk). In the lower loch region the top 3–6 m of the sublittoral also consists of a *L. hyperborea* forest with a rich growth of epiphytes (Lhyp.Ft), whilst below this is a park of predominantly *Laminaria saccharina*. In the *L. hyperborea* forest, the algae *Callophyllis laciniata*, *Rhodophyllis divaricata*, *Membranoptera alata*, *Ceramium nodulosum*, *Cryptopleura ramosa* and *Porphyropsis coccinea* colonise the kelp stipes. A dense carpet of the algae *P. rubens*, *Odonthalia dentata*, *P. cartilagineum*, *Dictyota dichotoma* and the nationally scarce red alga *Polysiphonia furcellata* make up the understorey. Animal species and numbers are low and include the common urchin *Echinus esculentus*, the keel worm *Pomatoceros triqueter*, *G. cineraria*, *B. schlosseri* and the cup coral *Caryophyllia smithii*. The sea hare *Aplysia punctata* can be found well camouflaged amongst the foliose red algae *Delesseria sanguinea* and *P. rubens*. Parts of the bedrock here are overhanging and covered with dense growths of the soft coral *Alcyonium digitatum* and the sponge *Leucosolenia botryoides* (CorMetAlc).

The kelp park of *L. saccharina* is mixed with some *L. hyperborea* (Lsac.Pk). Brown algal crusts *Pseudolithoderma extensum* and *Cutleria multifida* (*Aglaozonia*) and pink algal crusts are common beneath the foliose understorey made up of *Bonnemaisonia hamifera*, *Bonnemaisonia asparagoides* and *P. rubens*. Epifauna include *A. digitatum*, the anemone *Sagartia elegans*, the featherstar *Antedon bifida*, *B. schlosseri* and the octocoral *Parerythropodium coralloides*. The latter is a very localised, nationally scarce species with only three confirmed locations in Scotland, of which Loch Claidh is the most northerly (Plaza & Sanderson 1997).

L. saccharina becomes the dominant kelp throughout the infralittoral in the mid and upper regions of the loch, which are sheltered from wave action (Lsac.Ft; Lsac.Pk). The forest extends to between 2 and 13 m depth. In some areas, such as in Tob Smuaisibhig, *L. saccharina* grows in its cape form and has dense growths of epiphytic hydbroids and bryozoans on its fronds. Most rock surfaces are steep or upward-facing and all surfaces, including kelp fronds, are heavily silted. In general, few species grow on upward-facing surfaces, with the exception of coralline and brown algal crusts, due to the combined smothering effect of the dense kelp canopy and silt. The most frequent understorey foliose algae are *P. rubens*, *D. dichotoma*, *P. cartilagineum* and *Brongniartella byssoides*, while the most abundant animals include *C. smithii*, *P. triqueter* and the ascidian *Ascidia mentula*.

Circalittoral rock

Vertical and steeply sloping circalittoral bedrock below the kelp park in the lower loch is dominated by the brown algal crusts *P. extensum* and pink coralline crusts. Upward-facing rock surfaces are often heavily silted, especially on the east side, and are dominated by solitary ascidians including *A. mentula* or featherstars *Antedon* sp. (AmenCio). Additional epifauna commonly found include *C. smithii* and *P. triqueter*, while *E. esculentus* and *B. schlosseri* are less frequent but found throughout areas with this habitat. The barnacles *Balanus balanus* and *Balanus crenatus* are frequent throughout the circalittoral, although *B. crenatus* tends to have a shallower distribution. On the west side opposite Tob Smuaisibhig, an infralittoral bedrock slope continues as circalittoral rock outcrops to 25 m depth. These silty outcrops have a cover of hydroids, especially *Obelia dichotoma*, cup coral *C. smithii* and scattered algae at the shallower depths. The sea-fan *Swiftia pallida* is only present at the entrance to the loch where water movement is greater around Pender Rock (ErSSwi).

Sublittoral sediments

Tob Smuaisibhig is a small, sheltered bay in the upper end of Loch Claidh with a seabed of muddy shell gravel scattered with stones and pebbles down to 12 m depth. Considerable amounts of loose-lying algae accumulate due to the calm, sheltered conditions and become heavily covered with silt. These include *Bonnemaisonia hamifera (Trailliella)*, *Asperococcus turneri*, *Stictyosiphon tortilis* and *Ceramium nodulosum*. Algae tolerant of silty conditions such as *Gracilaria verrucosa* and *Phyllophora crispa* are also present, with *(Trailliella) L. saccharina* and *Chorda filum*

attached to larger stones (LsacX). Fauna here are low in abundance and species richness, and include the burrowing anemone *Cerianthus lloydii*, the dragonet *Callionymus lyra* and the scavenging crustaceans *Liocarcinus depurator* and *Pagurus bernhardus*.

The head of Loch Claidh has a seabed of soft mud with stones and cobbles to 13 m depth and frequent holes and casts of lugworms *Arenicola marina* (IMU). Drift and dying kelp lie scattered across the mud together with heavily silted foliose algae *P. rubens*, *B. hamifera*, *R. divaricata* and *P. crispa* (Pcri). Occasional molluscs *Pecten maximus* and *Aporrhais pespelecani* are present.

Bedrock at the edges of the loch gives way to a muddy sediment slope at depths of 12–39 m. The sea-pen *Virgularia mirabilis* and the brittlestars *Ophiura albida* and *Ophiura ophiura* are characteristic of the sediment down to a depth of 24 m (VirOph). The swimming crab *L. depurator*, the turret shell *Turritella communis*, the burrowing anemone *C. lloydii* and *P. maximus* are typically found associated with this biotope. Towards the loch entrance the seabed changes to a muddy shelly gravel. This area has the same dominant and frequently occurring species but the abundance of pebbles and cobbles provides attachment sites for additional species, mainly the anthozoans *Stomphia coccinea*, *Epizoanthus couchii*, *Sarcodictyon roseum*, *A. digitatum* and *C. smithii*, while the increase in the gravel component of the sediment provides a suitable substratum for the sandmason worm *Lanice conchilega* (VirOph.HAs).

The deeper areas of mud in the central part of Loch Claidh, at depths of 24–39 m, have little or no coarse material and are dotted with the distinctive burrows of Norway lobster *Nephrops norvegicus*, the mud-burrowing shrimp *Callianassa subterranea* and the snake blenny *Lumpenus lumpretaeformis* (SpMeg). The sea-pen *Funiculina quadrangularis* is present below about 35 m, mid-way down the east side of the loch and may extend across the whole of this deep basin. The smaller sea-pens *V. mirabilis* and *Pennatula phosphorea* are also present in this habitat (SpMeg.Fun; SpMeg). The boundaries between the finer, soft, burrowed mud with sea-pens (SpMeg) and the slightly coarser shelly mud with sea-pens and ophiuroids (VirOph) are not distinct and are not completely surveyed.

Nature conservation

Conservation sites

Site name	*Status*	*Main features*
South Lewis, Harris and North Uist	NSA	Landscape

Human influences

Coastal developments and uses

The whole area around Loch Claidh is completely uninhabited with no road access, and is used for deer and sheep grazing.

Marine developments and uses

Loch Claidh is a popular anchorage for yachts, and occasional diving parties from Tarbert also visit the loch. Boats from outside the loch fish for lobsters *Homarus gammarus* and Norway lobsters *Nephrops norvegicus* and there have been two licences granted for three Atlantic salmon farms (data correct at 10 March 1997).

References and further reading

Bennett, T.L., Mitchell, R. & Burgoyne, C. 1989. *Hebridean Coastwatch 1989 field report.* Unpublished, Nature Conservancy Council. (Internal report.)

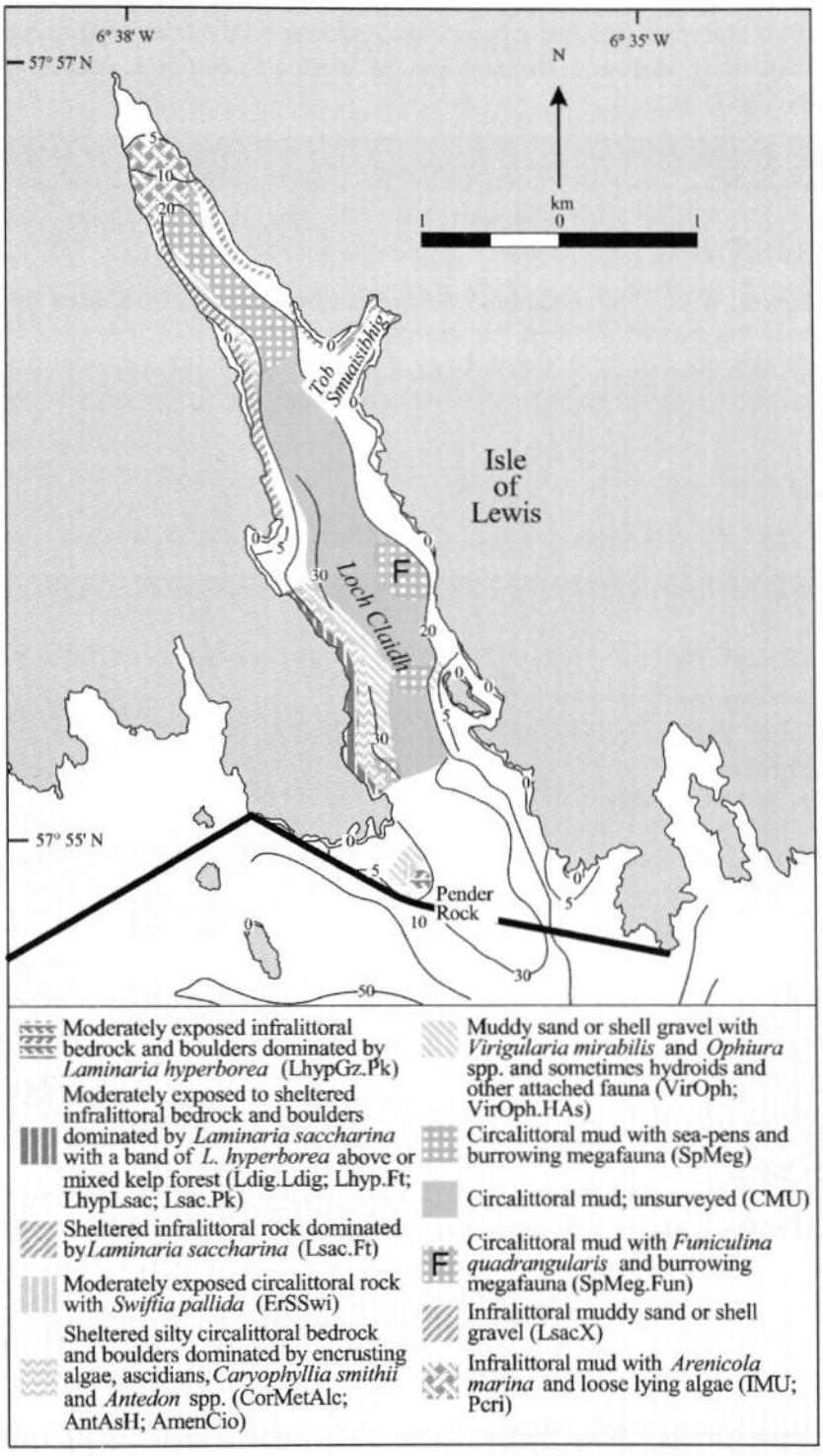

Figure 12.2 Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 12.1, cited literature and additional field observations).

Howson, C.M. 1989. Surveys of Scottish sealochs. Sealochs on the Isles of Harris and Lewis. (Contractor: University Marine Biological Station, Millport.) *Nature Conservancy Council, CSD Report*, No. 982.

Howson, C.M., Connor, D.W. & Holt, R.H.F. 1994. The Scottish sealochs. An account of surveys undertaken for the Marine Nature Conservation Review. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 164. (Marine Nature Conservation Review Report, No. MNCR/SR/27.)

Plaza, J. & Sanderson, W.G. 1997. Chapter 5.4 Rare sea-bed species. In: *Coasts and seas of the United Kingdom. Regions 15 & 16 North-west Scotland: the Western Isles and west Highland* (ed. J.H. Barne, C.F. Robson, S.S. Kaznowska, J.P. Doody, N.C. Davidson & A.L. Buck) 116–121. Peterborough, Joint Nature Conservation Committee (Coastal Directories Series.)

Sites surveyed

Survey 21: 1988 UMBSM survey of sealochs of Harris and Lewis (Howson 1989).

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	5	E of Loch an Eich, Loch Claidh, Lewis	NB 270 023	57°55.5'N 06°36.7'W	Ldig.Ldig; Lhyp.Ft; LhypLsac;Lsac.pk; AmenCio; VirOph
21	6	S of Goban Rainich, Loch Claidh, Lewis	NB 266 029	57°55.8'N 06°37.1'W	Lhyp.Ft; CorMetAlc; AmenCio; VirOph
21	7	N of Rubh an Aiseig, Loch Claidh, Lewis	NB 262 046	57°56.7'N 06°37.6'W	Lhyp.Ft; LhypLsac; Lsac.Ft; AntAsH; SpMeg
21	8	SW side near head of loch, Loch Claidh, Lewis	NB 258 052	57°57.1'N 06°38.3'W	Lsac.Ft; VirOph; SpMeg
21	9	Head of loch, Loch Claidh, Lewis	NB 255 062	57°57.6'N 06°38.4'W	IMU; Pcri
21	10	Tob Smuaisibhig, Loch Claidh, Lewis	NB 270 048	57°56.9'N 06°36.8'W	Lsac.Ft; LsacX
21	11	N of Eilean Smuaisibhig, Loch Claidh, Lewis	NB 274 032	57°56.0'N 06°36.3'W	SpMeg.Fun
21	12	N of Eilean Thinngarstaigh, Loch Claidh, Lewis	NB 277 023	57°55.6'N 06°36.0'W	Lsac.Ft; Lsac.Pk; AmenCio; VirOph.Has; SpMeg
21	13	Inside of entrance, Loch Claidh, Lewis	NB 272 015	57°55.1'N 06°36.4'W	CMX; AmenCio; SpMeg
21	47	N of Pender Rock, Loch Claidh, Lewis	NB 275 009	57°54.8'N 06°36.1'W	LhypGz.Pk; ErSSwi VirOph.HAs

Compiled by: Ruth Beaver and Frances Dipper

13 Loch Seaforth

Location		
Position (centre)	NB 220 060	57°57'N 06°42'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

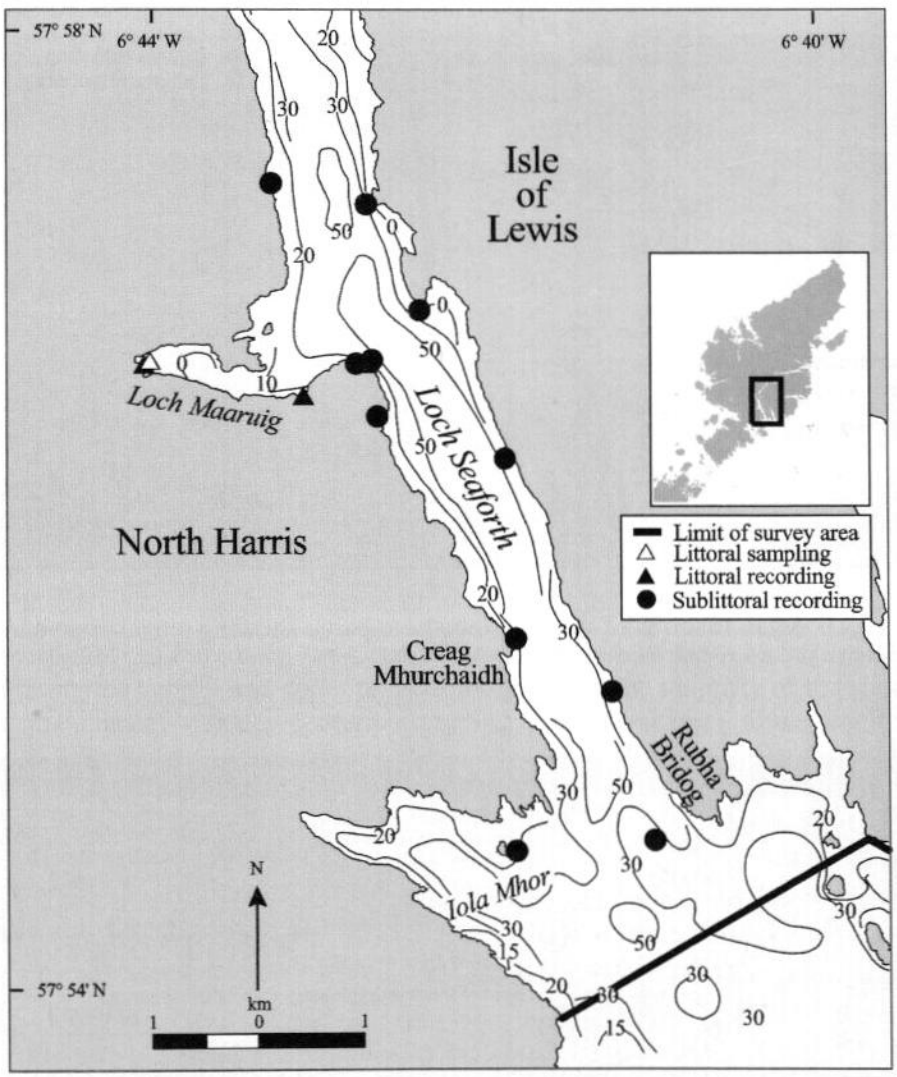

Figure 13.1a Main features of the area (southern part), showing sites surveyed.

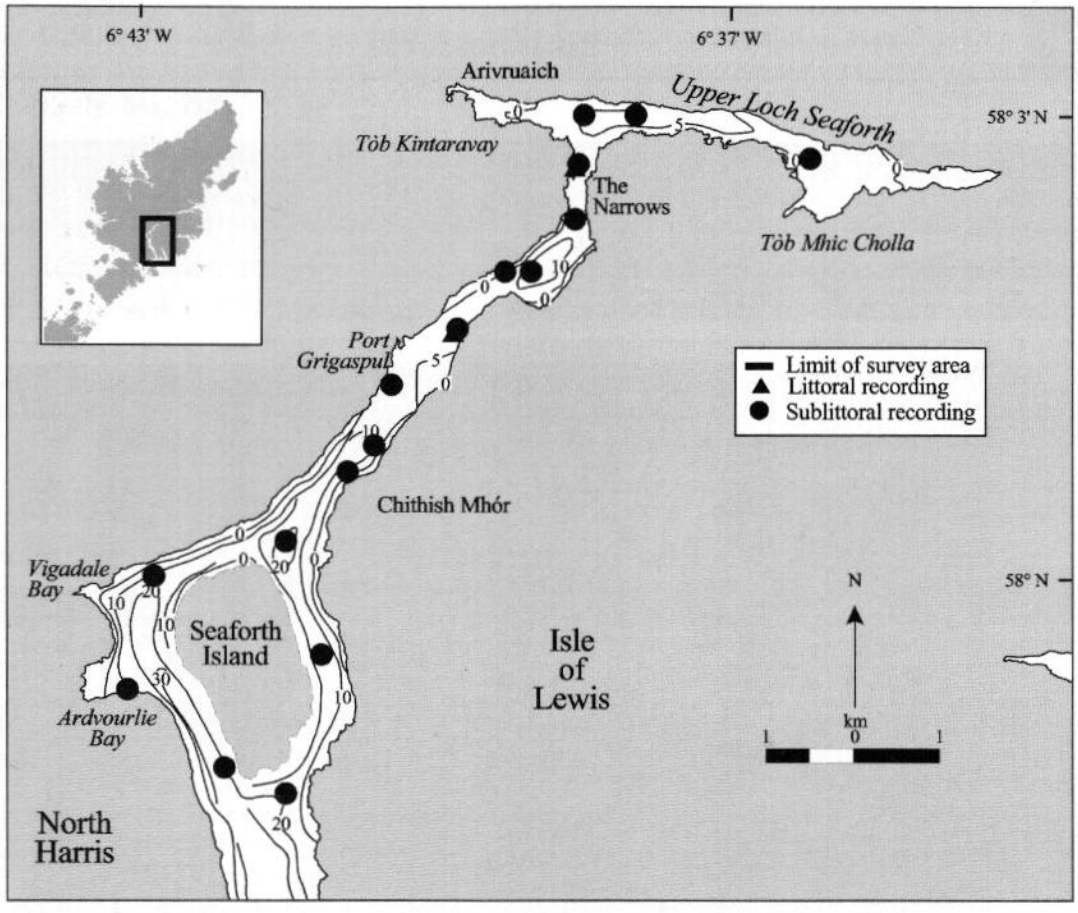

Figure 13.1b Main features of the area (northern part), showing sites surveyed.

Physical features	
Physiographic type	Fjordic sealoch with five sills
Length of coast	74.2 km (81.8 km including islands)
Length of inlet	12.6 km
Area of inlet	24.5 km^2 (22 km^2 excluding islands)
Bathymetry	Maximum depth 98 m
Wave exposure	Exposed to sheltered south of Seaforth Island; very sheltered to extremely sheltered north of Seaforth Island; extremely sheltered at entrance of Loch Maaruig
Tidal streams	Very weak to weak with exception of tidal streams across sill north of Port Grigaspul and to east of Seaforth Island which are moderately to very strong
Tidal range	4.2 m (mean springs); 1.6 m (mean neaps) (East Loch Tarbert)
Salinity	Fully marine; may be variable at head of Loch Maaruig and parts of innermost section of Loch Seaforth.

Introduction

Loch Seaforth, one of the longest and deepest sealochs in the Western Isles, lies in both Harris and Lewis. The lower section of the loch forms one of the boundaries between North Harris and Lewis, although Seaforth Island, which lies in the centre of the loch, is considered to be part of both. The loch forms the western boundary of the largely uninhabited area of mountains and moorland known as Park or Pairc, between Loch Seaforth and Loch Erisort. The Glen Ouirn/ Kinloch Ouirn River running in an east–west direction connects the head of Loch Seaforth to the head of Loch Odhairn (*Area summary* 9), forming a continuous watercourse some 37 km long.

Loch Seaforth has three distinct sections which each run along geological fault lines and are separated by glacial sills. The lower part, which runs roughly north-west, follows a major line of crush which continues to Loch Roag. The central section follows a structural line which runs north-east to south-west, whilst the uppermost section which runs east to west follows a fault line joining Loch Resort in the west and Loch Odhairn in the east. Loch Seaforth is typically fjordic, being long, narrow and deep, with five sills: one at the entrance, a second north of Port Grigaspul and a third being an intertidal sill separating the upper and middle sections. Two further sills lie to the north and east of Seaforth Island. South of the island the loch shelves steeply along both sides, reaching a maximum depth of 98 m.

The outer part of the loch is protected to some extent from wave action from the south-west by the island of Scalpay to the south and small rocks at the entrance. However, its high sides and fjordic nature mean that it is subjected to violent squalls. North of Seaforth Island the loch is extremely sheltered. There is a wide range of habitats in Loch Seaforth, with a good progression from shallow to deep and from exposed to sheltered conditions, with additional habitats in areas of strong tidal streams. Several of the habitats are unusual.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota)	5	July–August 1988	Howson (1989)
	Infaunal sampling (cores)	1	July–August 1988	Howson (1989)
Sublittoral	Recording (epibiota)	25	July–August 1988	Howson (1989)

Littoral

Only a few intertidal sites have been surveyed, all in the vicinity of Loch Maaruig and The Narrows separating the central and upper parts of the loch, but the majority of the shoreline is fairly uniform and consists of steep bedrock extending from the entrance to the south-west side of Seaforth Island. Bedrock also occurs in the outer part of Loch Maaruig and in the central section of the loch from Port Grigaspul north to The Narrows. Much of the remaining shoreline consists of boulders and shingle. There are cobbles and mudflats at the heads of Loch Maaruig and Ardvourlie Bay and the extremities of Upper Loch Seaforth contain mudbanks with shingle. The most steeply sloping shores, such as those in the outer parts of Loch Maaruig, are dominated by barnacles while the more gradually sloping shores are fucoid-dominated.

In common with other sealochs in the Outer Hebrides, the upper littoral fringe throughout Loch Seaforth is dominated by lichens with abundant *Verrucaria maura* and a variety of yellow, grey and green lichens (YG). The periwinkle *Littorina saxatilis* often extends up into this zone and the insect *Anurida maritima* may also be common here. The fucoid algae *Pelvetia canaliculata* and *Fucus spiralis* make up the adjacent bands below (Pel; Fspi).

Where the rock is not too steep or consists mainly of boulders or cobbles, such as on the south shore of Loch Maaruig, the eulittoral zone is mainly dominated by *Ascophyllum nodosum* with the epiphyte *Polysiphonia lanosa* (AscX). The littoral edges of The Narrows are, however, dominated by *Fucus vesiculosus* with a smaller amount of *A. nodosum* (FvesX; Asc.T). The diversity of fauna and understorey species is slightly higher in these tide-swept areas than on other fucoid-dominated shores, with the bryozoan *Bowerbankia imbricata*, the molluscs *Kellia suborbicularis*, *Tectura virginea* and several *Littorina* spp., and the sponge *Haliclona viscosa*. The very shallow, sublittoral part of The Narrows is described in the next section. A coralline rockpool at The Narrows, surveyed in 1988 in addition to the main shore, contains a wider range of species than are found on the adjacent open coast. Rock surfaces and a number of boulders and cobbles in the bottom of the pool are covered with coralline crusts *Lithothamnion glaciale*, other crusting algae

Cruoria pellita, *Peyssonnelia dubyi* and *Ralfsia* sp. together with the algae *Codium* sp., *Halidrys siliquosa*, *Gelidium pusillum*, *Chondrus crispus* and *Corallina officinalis* (HalXK; Cor). The periwinkle *Littorina littorea* and the urchin *Psammechinus miliaris* are frequent, while the ascidians *Ciona intestinalis*, *Ascidiella aspersa* and *Dendrodoa grossularia* are occasional to common. Sponges grow underneath the boulders, with the mussels *Modiolus modiolus* and *Mytilus edulis* and the butterfish *Pholis gunnellus* living between them.

On moderately exposed and steep shores such as those in the outer reaches of Loch Maaruig, the barnacle *Semibalanus balanoides* dominates and is superabundant across the entire mid-shore range with only small amounts of fucoids (BPat.Sem). *S. balanoides* is also frequent to common beneath the algae on fucoid-dominated shores but becomes dominant on any exposed and vertical faces. *Fucus serratus* (Fser.Fser) extends into a zone of kelp *Laminaria digitata* (Ldig.Ldig) on the lower shore at these moderately exposed sites and the diversity of sponges, molluscs and understorey algae is particularly high, probably due to increased water movement from wave action.

The bay at the head of Loch Maaruig is a gradually sloping mud shore with pebbles and boulders compacting the mud. A large stream runs across the shore creating a considerable freshwater influence over much of the area. Most of the shore is blanketed with *A. nodosum*, *F. vesiculosus* and *F. serratus* (AscX; FserX; Asc.VS). *Fucus cottonii* is found in the upper eulittoral zone (NVC SM13) followed by loose-lying *A. nodosum* ecad *mackaii* which is also abundant bordering freshwater streams (AscX.mac). The mud snail *Hydrobia ulvae* is numerous between the pebbles which are themselves covered by *S. balanoides*. *M. edulis* occurs in small clumps over much of the area and *L. littorea* and *Littorina obtusata* are occasional. The only non-fucoid algae present in any quantities are *Stictyosiphon tortilis*, *Ulva* sp. and *Enteromorpha* sp. Mud on the lower shore is colonised by the polychaetes *Arenicola marina* and *Nephtys* sp. but no other conspicuous macrofauna are found (HedMac.Are).

Sublittoral

There are extensive areas of sublittoral bedrock in lower Loch Seaforth, extending from the entrance along both sides as far north as Seaforth Island. The bedrock is vertical in places and stepped in others, with occasional outcrops from sediment slopes in deeper water. North of Loch Maaruig there is less bedrock and more boulders. The central loch north of Seaforth Island has very little bedrock and patchy boulders. Beyond The Narrows in Upper Loch Seaforth, sublittoral rock is mainly cobbles and pebbles.

Infralittoral rock

The lower loch from south of Seaforth Island to the entrance has a narrow band of *Laminaria hyperborea* kelp forest (Lhyp.Ft) above a more extensive *Laminaria saccharina* forest (Lsac.Ft). The *L. hyperborea* generally extends down to a maximum depth of 4 m, and north of Loch Maaruig it is often confined to the sublittoral fringe. Exposed rocks and islets, such as Iola Mhór in the entrance, have a more extensive *L. hyperborea* forest which may reach 20 m on stepped bedrock. Bedrock beneath the kelp is dominated by red and brown encrusting algae and foliose algae, although the latter are of a limited number of species and are more common as epiphytes on kelp stipes. The understorey is made up of *Phycodrys rubens*, *Plocamium cartilagineum*, *Delesseria sanguinea*, and *Odonthalia dentata*. Fauna are sparse on rock surfaces despite being abundant as kelp epiphytes. Dominant fauna include the featherstar *Antedon bifida*, the grey topshell *Gibbula cineraria* and the star ascidian *Botryllus schlosseri*. Kelp fronds are colonised by *Obelia geniculata*, the nudibranch *Polycera quadrilineata* which feeds on *Membranipora membranacea*, and *Electra pilosa*, while kelp stipes are colonised by the soft coral *Alcyonium digitatum*, the topshell *Calliostoma zizyphinum* and the red algae *Callophyllis laciniata*, *Ceramium nodulosum*, *Cryptopleura ramosa*, *Polysiphonia stricta* and *P. rubens*. The common urchin *Echinus esculentus* is rare at shallow depths in the lower loch, being intolerant of exposure to strong wave action.

Kelp forest dominated by *L. saccharina* occurs throughout the loch south of Seaforth Island either as a band below the narrow *L. hyperborea* zone, as described above, or as the only kelp forest biotope. North of Seaforth Island there is very little kelp at all, except in The Narrows. The Narrows, joining Upper Loch Seaforth to the central arm of the loch, is several hundred metres in length with a shallow intertidal sill about 200 m long. Tidal streams run through at speeds of up to 5 or 6 knots. The floor of the channel consists largely of bedrock with small amounts of boulders, cobbles, sand and shell gravel and is very rugged with rock ridges and large boulders providing vertical surfaces. At the edges of the rapids are very tall plants of sea-oak *Halidrys siliquosa* covered with *P. miliaris* and algal epiphytes (HalXK). Further into the tidal streams there is a dense kelp forest of *L. digitata* and *L. saccharina* with *Palmaria palmata* growing luxuriantly on the stipes (Ldig.T). The sides of the boulders are covered in massive growths of *Halichondria panicea* with abundant hydroids, especially *Obelia* sp., and with scattered horse mussels *Modiolus modiolus*. The bedrock and large boulders and cobbles support encrusting brown and red algae and a limited variety of foliose red algae. The green algae *Cladophora pygmaea* and *Derbesia marina* are common on cobbles. The *L. saccharina* forest is usually silty with a low species richness, especially in areas where heavy grazing from brittlestars or urchins occurs. Foliose algae include *Bonnemaisonia hamifera (Trailliella)*, *P. rubens* and *Dictyota dichotoma*. Encrusting red and brown algae are common and in some cases are the only species on upward-facing rock surfaces. Epifauna include *G. cineraria*, *E. esculentus*, *Clavelina lepadiformis* and *Ascidia mentula*. The featherstar *Antedon petasus* is occasional but is only found at a few sites, notably those in the lower loch region. These are more exposed to wave action and the featherstars generally increase in abundance with increasing depth.

At Creag Mhurchaidh in the lower section of the loch there is a small sublittoral cave in the infralittoral, formed out of a horizontal fissure near the base of a cliff at 10–11 m depth and extending horizontally for approximately 3–5 m. The rock-boring sponge *Cliona celata* is common at the back of the cave (CV), while *A. digitatum* and the jewel anemone *Corynactis viridis* are common on the outer walls and roof.

Circalittoral rock

Loch Seaforth contains extensive areas of sheltered circalittoral bedrock with a diverse range of habitats and species. The sea-fan *Swiftia pallida* is found on moderately exposed circalittoral stepped and sloping bedrock in the lower loch and loch entrance (ErSSwi) between about 15–35 m depth. This species is highly characteristic of the entrances to sealochs which are moderately exposed to wave action and in sounds or channels between islands subject to moderate tidal streams throughout the west coast of Scotland. It generally occurs with the cup sponge *Axinella infundibuliformis*, the hydroid *Polyplumaria frutescens*, the cup coral *Caryophyllia smithii*, the football ascidian *Diazona violacea* and ascidian *Polycarpa pomaria*. Also characteristic of this biotope, but occurring less commonly, are *A. petasus* and the bryozoan *Parasmittina trispinosa*.

Sheltered, silty circalittoral bedrock, where there is little water movement, is common throughout the loch. In the central loch, north of Seaforth Island, circalittoral rock is limited in extent and is dominated by encrusting algae, ascidians, especially *Ascidiella aspersa*, the keel worm *Pomatoceros triqueter*, and the barnacle *Balanus crenatus* (Aasp). This biotope is also present in Upper Loch Seaforth north of The Narrows, where the predominant seabed of cobble and mud in the eastern part is dominated by *A. aspersa*. The biotopes present in this area are described in more detail below. The more extensive circalittoral rock slopes and steps in the lower arm of the loch support a variety of biotopes characterised by brachiopods and solitary ascidians. Rock steps and boulder reefs north of Loch Maaruig, and the east coast south of Loch Maaruig, support large numbers of *C. smithii*, with hydroids, solitary ascidians, *Antedon* sp., and the brachiopod *Neocrania anomala* (AntAsH; CCParCar). *E. esculentus* is common and its grazing activities probably contribute to the barrenness in some areas of this zone.

Very deep, very sheltered circalittoral bedrock, with negligible currents, occurs off the headland to the east of Loch Maaruig and extends to at least 40 m depth. This is characterised by the anemone

Protanthea simplex and *N. anomala* (NeoPro). This area has plenty of overhanging and vertical surfaces, the preferred habitat of these species. Other fauna occurring there include the hydroids *Nemertesia ramosa* and *Kirchenpaueria pinnata*, *C. smithii*, the serpulid worm *Protula tubularia*, the ascidians *Ciona intestinalis* and *Corella parallelogramma* and the featherstar *A. petasus*. The long-clawed squat lobster *Munida rugosa* is common underneath boulders and crevices. The sponge *Mycale lingua*, with highly characteristic furrows on its surface, is found here at 40 m depth. This deep-water species is scarce at depths attainable by SCUBA diving and has been recorded only sporadically on the Scottish west coast.

The brittlestar *Ophiothrix fragilis* occurs in dense aggregations at Creag Mhurchaidh near the loch entrance, along the west side of Seaforth Island and along the coast south-east of Seaforth Island (Oph). The latter area is composed of boulders with sand and gravel and experiences moderate tidal streams. Here, the brittlestars form thick blankets to the exclusion of most other animals with the exception of a few hydroids *Halecium halecinum*, *K. pinnata* and *N. ramosa*, a few ascidians *C. parallelogramma*, *C. intestinalis*, *A. aspersa* and *Ascidia mentula*, and *M. rugosa* which is common underneath and between boulders. *O. fragilis* also occurs less abundantly along with *Ophiocomina nigra* and sometimes *Ophiopholis aculeata* on circalittoral bedrock throughout much of Loch Seaforth.

Sublittoral sediment

Sediment types in Loch Seaforth as a whole show a gradation associated with depth and tidal streams. Coarser muddy sand and shell gravels occur in shallower water around the edges of the lower loch, often between areas of rock, and are replaced by soft mud in deeper water where the bedrock ends. Moving northward to the central arm, the sediments contain an increasingly large proportion of coarse material, reflecting the increased water movement across The Narrows, and maerl and shell beds stretch north from Port Grigaspul to The Narrows. The seabed in Upper Loch Seaforth is different in character to the rest of the loch, consisting of compacted cobbles and mud.

Extensive maerl beds of *Lithothamnion glaciale* with some *Phymatolithon calcareum* occur in the middle arm of the loch between The Narrows and Port Grigaspul to the south, at depths of less than 7 m (Lgla). Where water flow is weakest, the maerl is sparse and muddy and underlain by anoxic muddy sand, while in areas with stronger tidal streams the cover of maerl is dense and underlain by gravel. The community supported by the maerl is not particularly diverse, with only a few algal species, including small amounts of *L. saccharina*. Mobile species are common, including the urchin *Psammechinus miliaris*, the hermit crab *Pagurus bernhardus* with the associated hydroid *Hydractinia echinata*, the whelk *Buccinum undatum* and the shore crab *Carcinus maenas*. The bivalves *P. maximus* and *Mya truncata* are occasional, as are *O. fragilis* and *C. lloydii*.

Various grades of muddy sediment extend downwards from the rock–sediment boundary in the lower loch to merge with finer deep mud. Muddy, coarse shell sand or gravel is typical of the shallower parts with mud in the deeper, more sheltered regions. These sediments, between about 9–28 m depth, are characterised by *V. mirabilis*, *C. lloydii* and the brittlestars *Ophiura albida* and *Ophiura ophiura* (VirOph). This type of sediment is also present in areas of slightly increased tidal streams around the north-west side of Seaforth Island, north to the vicinity of Chithish Mhór. Larger shells and fragments found at some of the sites provide attachments for the hydroid *N. ramosa* (VirOph.HAs). Other frequently occurring species include *T. communis*, *Pecten maximus*, the sunstar *Crossaster papposus* and the dragonet *Callionymus lyra*. This biotope is very typical of the inner regions of sealochs which are moderately exposed or sheltered from wave action with weak tidal streams.

The embayment to the south-east of The Narrows, which is outside the main tidal flow, contains soft, almost fluid mud with a high peat content (IMU). Other areas along the edges, also out of the main stream, consist of soft burrowed mud or mud with some shell gravel, fine sand and pebbles at depths between about 5–15 m. The anemone *Sagartiogeton laceratus* is typically present, sometimes in dense aggregations. Other species include the opisthobranch *Philine aperta* and *P. bernhardus* with *H. echinata* (IMU). *C. lloydii*, lugworms *Arenicola marina*, *B. undatum*,

Liocarcinus depurator and *O. albida* are found on soft, burrowed mud whereas *O. ophiura*, the molluscs *T. communis*, *Aporrhais pespelecani*, *Aequipecten opercularis* and *B. undatum* are conspicuous on coarser sediments (VirOph). However, *V. mirabilis* is not present in any numbers.

Sediments in the deep channel of the lower loch consist of fine mud between 20–40 m depth. The deepest central parts have not been surveyed but are likely to be the same. The giant sea-pen *Funiculina quadrangularis* is the characterising species, occasionally found with its associated isopod *Astacilla longicornis*, but the other two species of sea-pen, *Virgularia mirabilis* and *Pennatula phosphorea*, are also common (SpMeg.Fun). The mud is extensively burrowed by the Norway lobster *Nephrops norvegicus* and, in the area around Seaforth Island, by the mud-burrowing shrimp *Callianassa subterranea* and Fries's goby *Lesueurigobius friesii*. Other frequently occurring species include *T. communis* and the burrowing brittlestars *Amphiura filiformis* and *Amphiura chiajei*. The mud extends north around both sides of Seaforth Island as far as the shielings at Chithish Mhór, but these shallower channels do not support *F. quadrangularis* (SpMeg). Free-living cup corals *C. smithii* are found at several sites and the cerianthid anemones *Pachycerianthus multiplicatus* and *Arachnanthus sarsi* are found in the lower loch region. While the former species is known from similar habitats in Scandinavia, Ireland and mainland Scotland, most notably in Loch Fyne, the latter species is particularly rare, known only from a few locations in Norway, Ireland and the west coast of Scotland close to or in deep water. Only one individual was seen during the 1988 MNCR survey of Loch Seaforth.

Upper Loch Seaforth, which is isolated from the rest of the loch by the intertidal sill at The Narrows, is extremely sheltered and consists of consolidated pebbles, cobbles and mud at depths of 2–17 m. There is considerable freshwater input into this arm, and a marked halocline and large quantities of suspended sediment were present at the time of the July 1988 survey. This area consists of two basins at depths of 19 m and 5 m connected by a mud and pebble slope. The predominant species in the deeper western part of this arm of the loch are the sponge *Suberites ficus*, *P. miliaris* and *P. bernhardus* (SubSoAs). Scallops *A. opercularis* and *P. maximus* are recorded from the deeper site in the western section. The shallow site in the eastern section has few animals other than *Ascidiella aspersa* (Aasp) and three species of red algae, *Gracilaria verrucosa*, *Phyllophora crispa* and *Phyllophora truncata*.

Nature conservation

Conservation sites		
Site name	***Status***	***Main features***
South Lewis, Harris and North Uist	NSA	Landscape (Lower Loch Seaforth)
Loch Seaforth	MCA	Marine biological, including boundary at littoral fringe

Human influences

Coastal developments and uses

The main A859 road between Tarbert and Stornoway runs close to parts of the west shore of Loch Seaforth while minor roads run to the villages of Seaforth Head and Maaruig, and a road from Maaruig to Rhenigidale, previously the most isolated village in Harris, was built recently. The whole Park area to the east is completely uninhabited with no road access, and is used for deer and sheep grazing.

Arivruaich on Upper Loch Seaforth is the largest village on the loch with 39 buildings. There are several smaller settlements around the loch and houses are required to have septic tanks for sewage, which drain into the loch. These small inputs are likely to be insignificant in terms of impacts on the marine life in the loch. There are no harbour facilities, although there are several jetties and anchorages for local boats. There is no shore-based industry. One of the few extensive forestry plantations in the Outer Hebrides adjoins the west shore near Port Grigaspul.

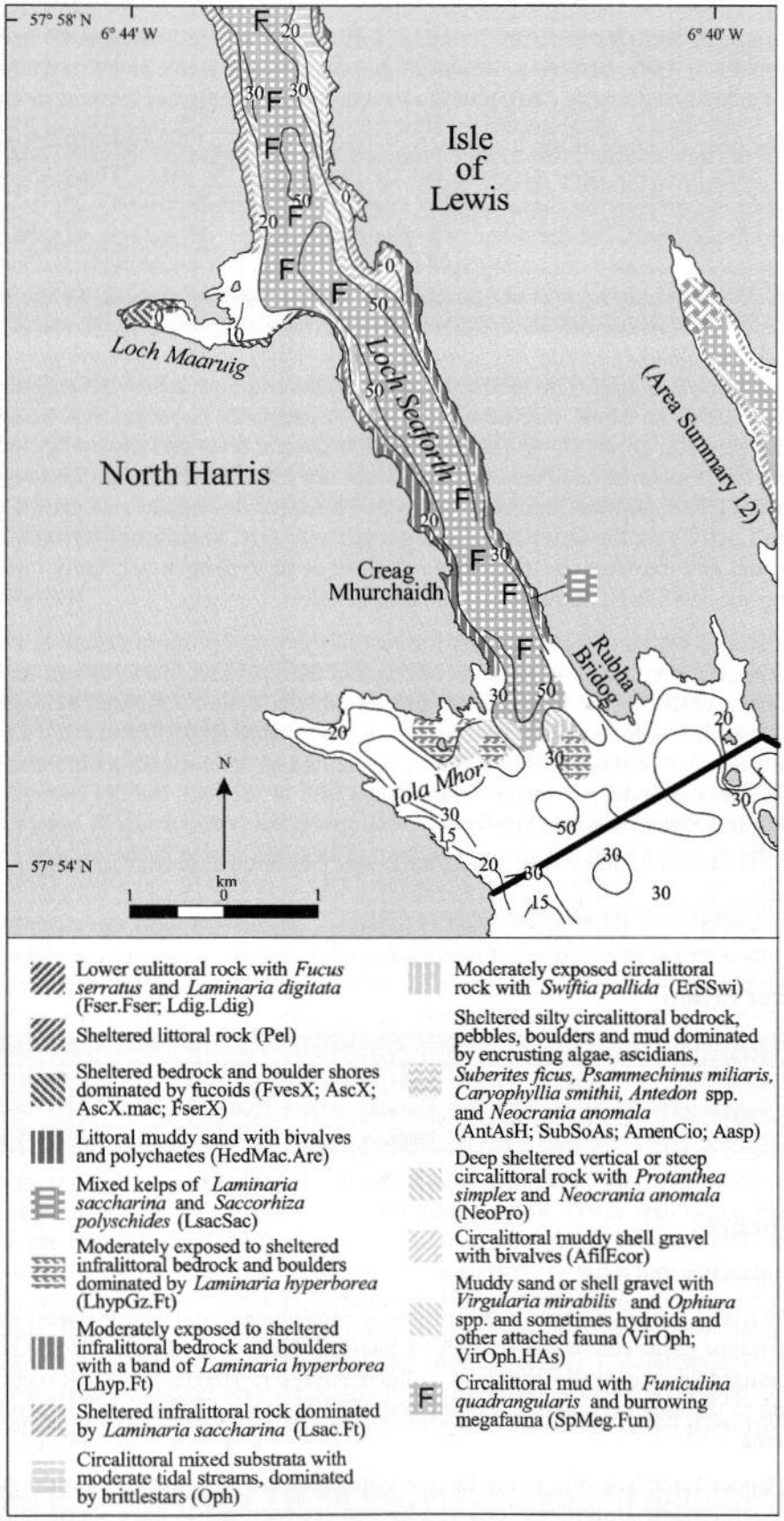

Figure 13.2a Indicative distribution of the main biotopes in the area (southern part) (based on data from survey sites shown in Figure 13.1a, cited literature and additional field observations).

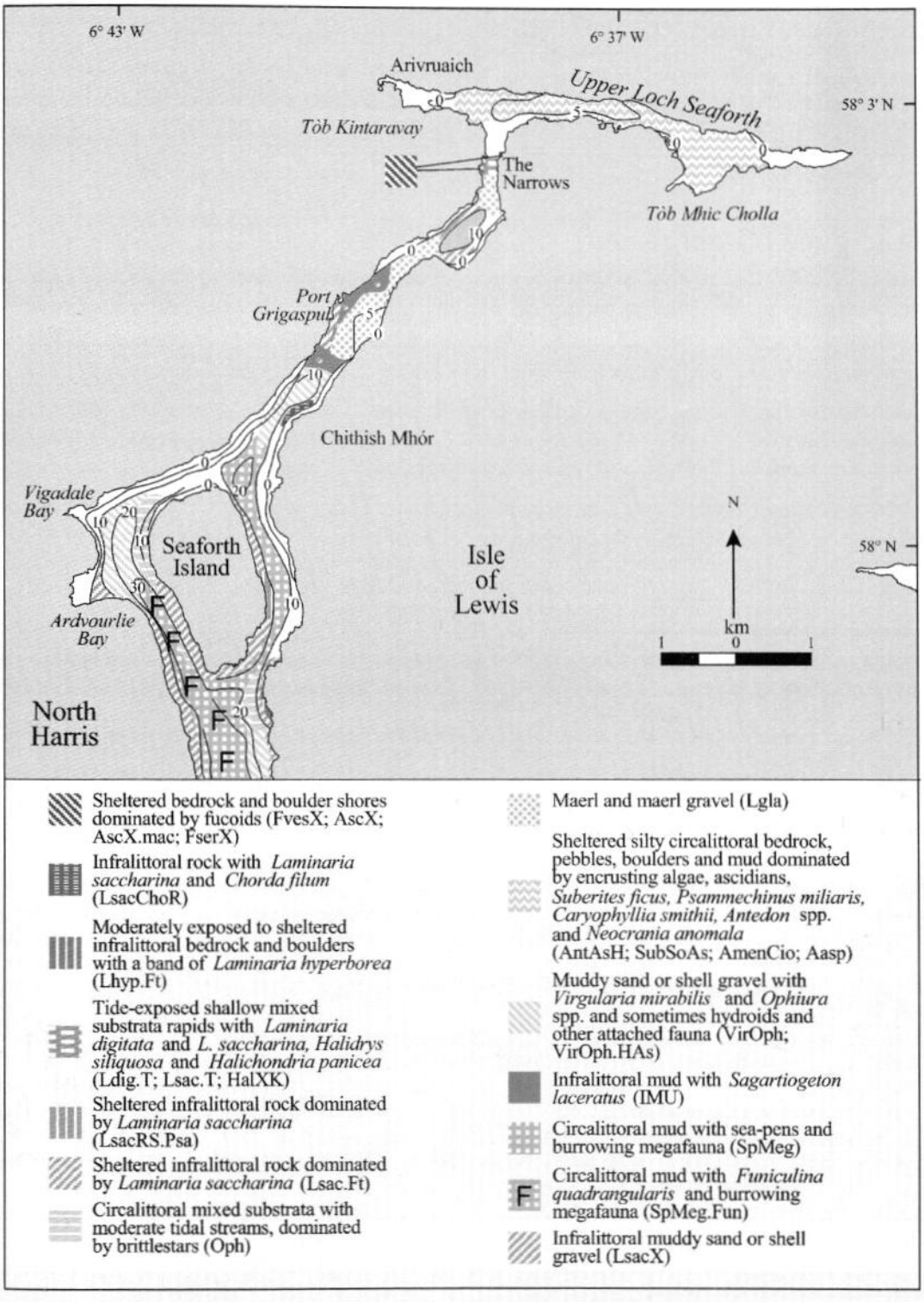

Figure 13.2b Indicative distribution of the main biotopes in the area (northern part) (based on data from survey sites shown in Figure 13.1b, cited literature and additional field observations).

Marine developments and uses

Scallops are collected by dredging and diving, while the Norway lobster *Nephrops norvegicus* is fished by creeling. There are two mussel rafts in the loch and ten sites licensed for salmon farms, not all of which are in use at any one time. Six discharge licences for fish farms have been granted since 1993.

References and further reading

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Waller, R. 1977. *Survey of marine indicator species, Sea Area Hebrides, 9.7.77–22.7.77*. SCOTFED Expedition to St. Kilda, 1977.

Walker, F.T. 1958. An ecological study of the Laminariaceae of Ailsa Craig, Holy Island, Inchmarnock, May Island and Seaforth Island. *Transactions and Proceedings of the Botanical Society of Edinburgh*, 37: 182–199.

Sites surveyed

Survey 21: 1988 UMBSM survey of sealochs of Harris and Lewis (Howson 1989).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	18	Edge of rapids, Loch Seaforth, Lewis	NB 246 164	58°03.0'N 06°40.1'W	Pel; Fspi; FvesX; AscX; Cor; Ldig.T; HalXK
21	24	Sgeir Ghlas, Loch Seaforth, Lewis	NB 232 145	58°02.0'N 06°41.4'W	Pel; Fspi; Asc.T; Fserr.T; Lgla
21	40	Head of Loch Maaruig, Loch Seaforth, Lewis	NB 195 058	57°57.1'N 06°44.5'W	Pel; Asc.VS; AscX; AscX.mac; FserX; NVC SM13; HedMac.Are
21	41	Shore near Eilean-anabuich, Loch Maaruig, Loch Seaforth, Lewis	NB 210 055	57°57.0'N 06°42.9'W	YG; Pel; Fspi; AscX; FserX
21	42	SE entrance, Loch Maaruig, Loch Seaforth, Lewis	NB 216 058	57°57.2'N 06°42.4'W	YG; BPat.Sem; Fser.Fser; Pel; Fspi; Asc.VS; Ldig.Ldig

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	14	Vigadale Bay, Loch Seaforth, Lewis	NB 198 117	58°00.3'N 06°44.6'W	IGS; Oph; VirOph; LsacX
21	15	Pit NE of Seaforth Island, Loch Seaforth, Lewis	NB 213 121	58°00.6'N 06°43.1'W	SpMeg
21	16	E of Seaforth Island, Loch Seaforth, Lewis	NB 217 108	57°59.9'N 06°42.6'W	LsacRS.Psa; AntAsH; AfilEcor; SpMeg
21	17	S of narrows, Loch Seaforth, Lewis.	NB 246 158	58°02.7'N 06°40.0'W	EchBriCC; Lgla
21	19	Arivruaich, upper loch, Loch Seaforth, Lewis	NB 247 170	58°03.4'N 06°40.0'W	SubSoAs

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	20	SW Seaforth Island, Loch Seaforth, Lewis	NB 206 095	57°59.2'N 06°43.6'W	Ldig.Ldig; Lsac.Ft; Lsac.Pk; Lsac.Pk; AntAsH; AmenCio; SpMeg.Fun
21	21	SE Seaforth Island, Loch Seaforth, Lewis	NB 213 092	57°59.0'N 06°42.9'W	Lhyp.Ft; Lsac.Ft; Oph; VirOph
21	22	Shielings, E side of loch, Loch Seaforth, Lewis	NB 220 129	58°01.1'N 06°42.5'W	LsacX; VirOph.HAs
21	23	N of Shielings, Loch Seaforth, Lewis.	NB 223 132	58°01.2'N 06°42.2'W	Aasp; VirOph.HAs
21	25	S of Port Grigaspul, Loch Seaforth, Lewis	NB 225 139	58°01.6'N 06°42.0'W	IMU; IMX; Lsac.Pk; Lgla
21	26	N of Chithish Bheag, Loch Seaforth, Lewis	NB 238 152	58°02.4'N 06°40.8'W	LsacRS.Psa; Lgla
21	27	W of Loch Shròmois, Loch Seaforth, Lewis	NB 241 152	58°02.4'N 06°40.5'W	SpMeg
21	28	W of central channel, Loch Seaforth, Lewis	NB 253 170	58°03.4'N 06°39.4'W	SubSoAs
21	29	Entrance to eastern arm, upper loch, Loch Seaforth, Lewis	NB 273 165	58°03.2'N 06°37.3'W	Aasp
21	31	Ardvourlie Bay, Loch Seaforth, Lewis.	NB 195 104	57°59.6'N 06°44.8'W	Aasp; VirOph; LsacX
21	32	SW of Trilleachan-mór, Loch Seaforth, Lewis	NB 207 075	57°58.1'N 06°43.4'W	AntAsH; VirOph.Has; SpMeg.Fun
21	33	Point N of Tòb a Tuath na Ceannamhoire, Loch Seaforth, Lewis	NB 216 073	57°58.0'N 06°42.5'W	AntAsH; VirOph; SpMeg.Fun
21	34	S end of Kenmore, Loch Seaforth, Lewis	NB 221 063	57°57.5'N 06°41.9'W	Lhyp.Ft; Lsac.Ft; CCParCar; AfilEcor
21	35	Rubh Eilean-anabuich, Loch Seaforth, Lewis	NB 215 058	57°57.2'N 06°42.5'W	NeoPro; SpMeg.Fun; FaSwV
21	36	E shore near Aodan Gràndа, Loch Seaforth, Lewis	NB 229 049	57°56.8'N 06°41.0'W	Lhyp.Ft; CCParCar; SpMeg.Fun
21	37	Creag Mhurchaid, Loch Seaforth, Lewis	NB 230 032	57°55.9'N 06°40.8'W	Oph; Lsac.Ft; Ant; Cv
21	38	Opposite Geàrraidh Mhurchaidh, Loch Seaforth, Lewis	NB 239 027	57°55.6'N 06°39.8'W	LsacSac; Lhyp.Ft; ErSSwi; SpMeg.Fun
21	39	S of Rubh Eilean-anabuich, Loch Seaforth, Lewis	NB 217 053	57°57.0'N 06°42.2'W	Lhyp.Ft; Lsac.Pk; ErSSwi; VirOph.HAs
21	49	Sgeir Hal, mouth of loch, Loch Seaforth Lewis	NB 243 013	57°54.9'N 06°39.3'W	ErSSwi; VirOph

Compiled by: Ruth Beaver and Frances Dipper

14 East Loch Tarbert

Location		
Position (centre)	NG 180 960	57°52'N 06°45'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

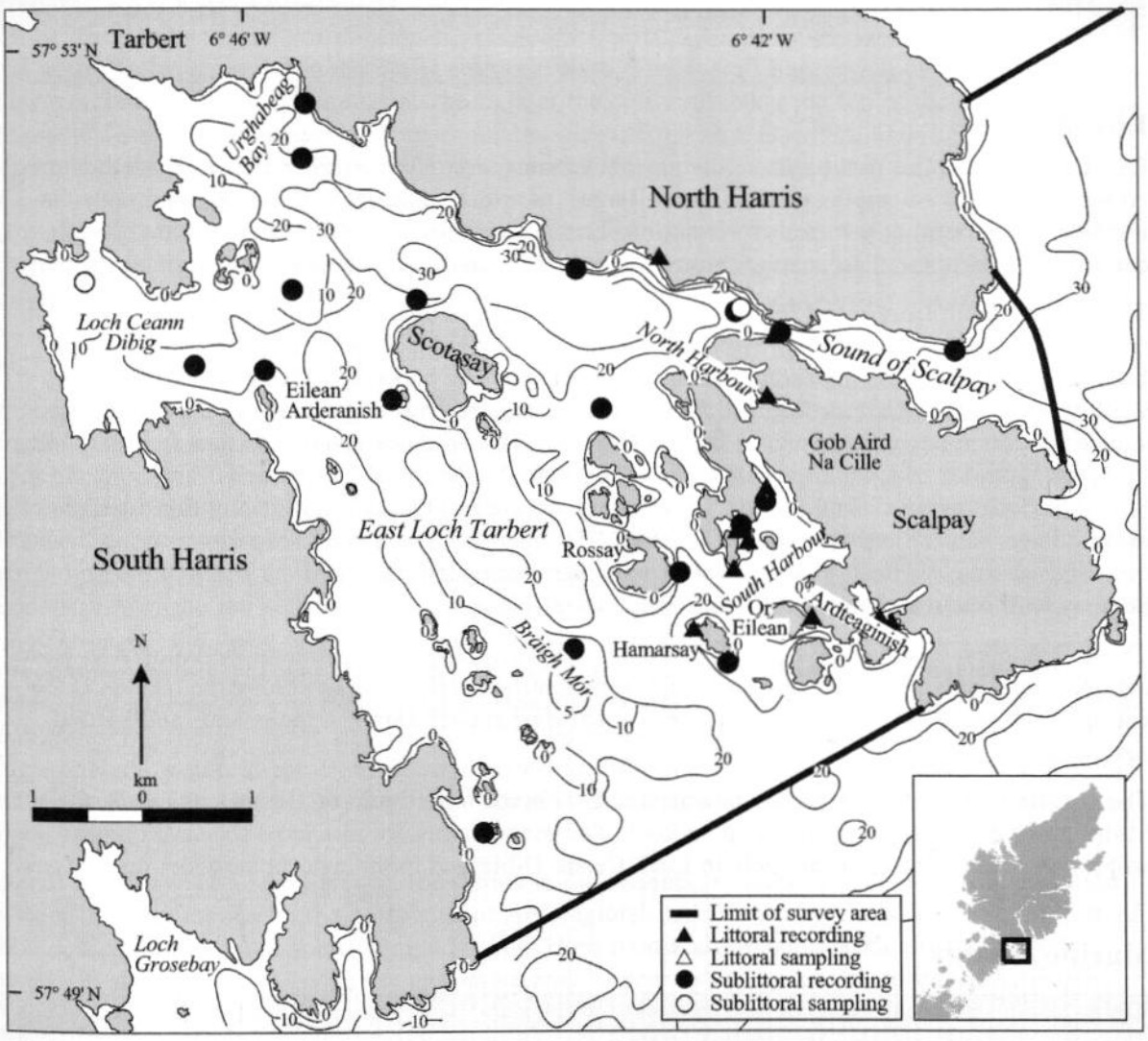


Figure 14.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Fjardic sealoch with two sills
Length of coast	58.7 km (86.9 km including islands)
Length of inlet	9.1 km
Area of inlet	31.7 km^2 (30.4 km^2 excluding islands)
Bathymetry	Maximum depth 66 m
Wave exposure	Moderately exposed in Sound of Scalpay and Bràigh Mór; extremely or very sheltered in Loch Ceann Dibig and South and North Harbours; rest of East Loch Tarbet sheltered.
Tidal streams	Moderately strong through Sound of Scalpay and narrows north of Eilean Ardteaginish; very weak to weak in rest of loch.
Tidal range	4.2 m (mean springs); 1.6 m (mean neaps)
Salinity	Fully marine; variable at Gob Aird na Cille and Ardteaginish on Scalpay

Introduction

East Loch Tarbert lies to the east of the narrow isthmus separating North Harris and South Harris. At the entrance is a complex of islands, the largest of which is Scalpay. This island protects the northern shores of the loch from wave action. The smaller island of Scotasay is situated in the centre of the loch and there are numerous other small islands and skerries dotted around the loch.

The loch has both fjordic and fjardic characteristics, and has one sill at 17 m that joins Scalpay to the north and south east to south Harris. However, its triangular shape with a narrow head and broad entrance gives the appearance of an open sealoch. The bathymetry is complex with many shallow areas, channels and deeper basins. The deepest area, reaching 66 m, is in the inner basin situated to the north of Scotasay. In Bràigh Mór, the main entrance channel to East Loch Tarbert, there is a complex of submarine hills and holes where the depth varies between 7 and 65 m. In the Sound of Scalpay the seabed rises to 17 m in mid-channel and moderately strong tidal streams of up to 2 knots run through this narrow channel. The tide floods in a clockwise direction, in through the wider channel of Bràigh Mór, where tidal streams are negligible, and out through the Sound of Scalpay, with the reverse anticlockwise flow on the ebb.

The loch is open to the south-east and the outer areas are exposed or moderately exposed to wave action. Inner parts of the loch are sheltered from south-easterly wave action by the islands at the entrance and there are many localised areas of extreme shelter amongst the islands and natural harbours.

The coastline of the loch is highly indented and, as in the other lochs of Harris and Lewis, the littoral zone consists mainly of steep bedrock. Sediment shores are restricted to small muddy embayments at the head of the loch, in Loch Ceann Dibig and in the natural harbours on Scalpay.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota)	6	August 1990	Holt (1991)
	Recording (epibiota)	2	August–Sept 1988	Howson (1989)
	Recording (epibiota)	2	May 1978	Powell *et al.* (1979)
	Infaunal sampling (core)	1	August 1990	Holt (1991)
Sublittoral	Recording (epibiota)	18	August 1990	Holt (1991)
	Recording (epibiota)	2	Sept–August 1988	Howson (1989)
	Infaunal sampling (suction sample)	2	August 1990	Holt(1991)

Littoral

The majority of the complex and indented coastline of East Loch Tarbert is rocky and many of the shores are short and steep. Most of the loch is sheltered in the littoral zone, which is dominated by fucoid algae. Only a relatively small number of shores have been studied in detail.

Moderately exposed to exposed bedrock shores, typical of many at the entrances to sealochs on the east coasts of the Western Isles, are found on Hamarsay and at Gob Aird na Cille on Scalpay. Other seaward-facing shores in the entrance are likely to have similar shores. The upper littoral fringe of broken bedrock is dominated by lichens, in particular *Verrucaria maura* (Ver.Ver). The periwinkle *Littorina saxatilis* is occasional here but increases in abundance further down the shore. The fucoid alga *Pelvetia canaliculata* and *V. maura* dominate the lower littoral fringe (Pel) but both species peter out in the upper eulittoral zone. The overall impression of these shores is, however, one of barnacle domination throughout the eulittoral. Near the top of the shore, the barnacle *Semibalanus balanoides* predominates with the red alga *Porphyra umbilicalis* and sometimes the green alga *Cladophora rupestris* (BPat). In the mid-eulittoral the bladder wrack *Fucus vesiculosus* grows in patches amongst the barnacles and common limpets *Patella vulgata* (FvesB). Near the bottom of the shore, foliose algae grow amongst and over the barnacles, with the red algae *Mastocarpus stellatus*, *Chondrus crispus*, *Membranoptera alata* and *Himanthalia elongata* frequent, with only a small amount of the serrated wrack *Fucus serratus* (Him). The sublittoral fringe is dominated by kelp *Laminaria digitata* with a dense understorey of foliose algae and bryozoans (Ldig.Ldig).

In contrast to these more exposed shores, extremely sheltered bedrock shores dominated by fucoids are found nearby in the South Harbour on Scalpay, and in the tidal lagoon on the west side of Ardteaginish. Shores in the north part of South Harbour are rocky and rugged with typical littoral fringe communities of lichens *Verrucaria* spp., *P. canaliculata*, and *L. saxatilis* (Pel). Whilst the steep upper eulittoral may be dominated by barnacles and limpets (BPat.Sem), the main part of the shore has a dense cover of fucoids, in particular *Ascophyllum nodosum*, with an understorey of the red alga *Plumaria elegans*, the sponge *Halichondria panicea* and *S. balanoides* (Asc.Asc). On the lower shore, *F. serratus* replaces *A. nodosum* with an understorey predominantly of bryozoans (Fser.Fser). Bedrock in the sublittoral fringe is dominated by kelp *Laminaria saccharina* with thongweed *H. elongata*, bootlace weed *Chorda filum*, *Bonnemaisonia hamifera (Trailliella)* and *P. elegans* (Lsac.Ft). Fauna colonising vertical rock surfaces beneath the algae include the ascidians *Dendrodoa grossularia*, *Botryllus schlosseri* and *Ascidia mentula*, the anemone *Sagartia elegans*, the bryozoan *Scrupocellaria reptans* and the barnacle *Balanus crenatus*.

In the south part of South harbour, the shores in the channel between Or Eilean and Scalpay and within the tidal lagoon on the north side of Ardteaginish are also rocky, consisting of a mixture of boulders, cobbles and pebbles on muddy sand. Here fucoid algae again predominate, with *A. nodosum* and *F. vesiculosus* on the mid-shore and *F. serratus* on the lower shore (AscX; FvesX; FserX). The narrow channel leading into the lagoon experiences increased tidal flow and, in addition to the blanket of fucoid algae, has a rich underboulder fauna, especially of ascidians and bryozoans (Asc.T; Fserr.T; Ldig.T). Moderately strong tidal streams also run through the Sound of Scalpay and result in an increased faunal diversity on the shores. Vertical and overhanging rock faces with a north-facing aspect are shaded for much of the time, and provide ideal conditions for several normally sublittoral species to colonise the rock faces. The soft coral *Alcyonium digitatum*, the hydroids *Sarsia eximia* and *Tubularia larynx* and the anemones *Corynactis viridis* and *S. elegans* are frequent on the lower shore rock (SByAs). A variety of encrusting bryozoans including *Umbonula littoralis* also colonise the rock surface, with a scattering of algae including *M. alata* and *Alaria esculenta*. Additional species present include the saddle oyster *Pododesmus patelliformis* and the barnacle *Balanus balanus*. Large numbers of the nudibranch *Onchidoris bilamellata* were recorded at the time of the survey in 1992.

The North Harbour on Scalpay provides one of the few examples of sediment shores in this loch, consisting of a mixture of muddy sand and muddy shell-gravel overlain in places by pebbles.

The sediment contains terebellid mounds, *Lanice conchilega* tubes and *Arenicola marina* casts (MacAre). The harbour is very sheltered and, as with other sheltered sites, hard substrata, including pebbles on the upper shore, are colonised by zones of fucoid algae with a blanket covering of *A. nodosum* over the middle shore (Asc.VS) and *F. serratus* mixed in with the sediment of the lower shore (FserX). A small freshwater stream running onto the shore also has some influence on the species composition. Barnacles including *B. balanus*, *S. balanoides*, *B. crenatus* and small patches of the Australasian barnacle *Elminius modestus* are present.

Sublittoral

The complex nature of East Loch Tarbert, with numerous islets and submerged rocks, results in a varied sublittoral topography; the depth of the boundary between rock and sediment is also very varied. The deepest areas are along the sheltered northern coast where steep bedrock extends into the circalittoral to at least 16 m depth. Towards the head of the loch bedrock is replaced by sediment slopes at depths of 6–9 m. Sheltered circalittoral rock is also found as outcrops from a sediment plain at the entrance to Loch Ceann Dibig. Such outcrops are likely to be common throughout the loch. Moderately exposed circalittoral rock occurs in Bràigh Mór near the entrance to East Loch Tarbert.

Infralittoral rock

The majority of infralittoral rock in East Loch Tarbert is covered by silty and heavily grazed kelp forests of both *Laminaria hyperborea* and *L. saccharina* with a generally poor species diversity. However, moderately exposed kelp forests of *L. hyperborea* occur in Bràigh Mór around Hamarsay and submerged rocks in the channel which have a rich and varied understorey of foliose and filamentous algae (Lhyp.Ft; Lhyp.Pk). These are some of the best examples of these biotopes in any of the lochs on the east of Harris and Lewis. In contrast, the *L. hyperborea* forest on the east side of Rossay is heavily grazed with very few algae and a fauna of robust encrusting species such as the keel worm *Pomatoceros triqueter* and *B. crenatus*. Well developed *L. hyperborea* forest is also found in the tide-swept Sound of Scalpay where there is a good understorey of foliose algae along with dense bryozoans, hydroids and *S. elegans* (Lhyp.TFt).

Kelp forest dominated by *L. saccharina* occurs in the extreme shelter of South Harbour, and on rocky slopes and bedrock outcrops towards the head of the loch. These silted forests are mostly heavily grazed with extensive algal crusts and few foliose algae (Lsac.Ft, Lsac.Pk). In the central sections of the loch and on headlands, the *L. saccharina* forest often occurs below a band of *L. hyperborea* or at some sites there may be a mixed kelp forest (LhypLsac.Ft; LhypGz.Ft; Lsac.Ft). Again at most sites there is heavy grazing by urchins and rock surfaces are colonised by red encrusting algae and a typical fauna of *P. triqueter*, the grey topshell *Gibbula cineraria*, the saddle oyster *Pododesmus patelliformis*, the ascidians *Ascidia mentula* and *B. schlosseri*, the featherstar *Antedon bifida*, *Echinus esculentus* and the cup coral *Caryophyllia smithii*.

Circalittoral rock

Circalittoral bedrock at the entrance to East Loch Tarbert is moderately exposed to wave action and supports a biotope characterised by the northern sea-fan *Swiftia pallida* (ErSSwi). The substratum in this area is mainly smooth upward-facing silty bedrock at depths of 21–24 m. *C. smithii* is also present in particularly large numbers, along with patches of jewel anemones *Corynactis viridis* and *A. bifida*. Other species present in moderate numbers include the large colonial ascidian *Diazona violacea*, the bryozoans *Parasmittina trispinosa* and *Porella compressa*, the brachiopod *Neocrania anomala* and the hydroid *Nemertesia antennina*. The sponge *Phakellia ventilabrum* is also present; this is considered to be a predominantly offshore species and has only been recorded inshore in a few Scottish sealochs.

Sheltered circalittoral bedrock at 10–24 m depth is present at the head of East Loch Tarbert and on the lee (west) sides of inner loch islands. The rock is mostly steep and silty and is dominated by

solitary ascidians, in particular *A. mentula* and *Ciona intestinalis*, coralline crusts and *P. triqueter* (AmenCio).

Circalittoral rock and sediments subject to moderate tidal streams, such as in the Sound of Scalpay and around Eilean Arderanish at the entrance to Loch Ceann Dibig, tend to be dominated by the brittlestars *Ophiothrix fragilis* and *Ophiocomina nigra*, with fewer ascidians (Oph). The brittlestars occur in high densities and they often exclude most other fauna except those tolerant of smothering such as the barnacle *B. crenatus*, *A. bifida*, the hydroids *N. antennina* and *Rhizocaulus verticillatus*, the soft coral *Alcyonium digitatum*, the anemone *Metridium senile* and the dahlia anemone *Urticina felina*. Red encrusting coralline algae cover the rock faces beneath the brittlestars. The scallop *Pecten maximus* is common at sites with a larger proportion of sediment.

Sublittoral sediment

Sediments within East Loch Tarbert generally consist of either muddy shell gravel with sand in moderately exposed or sheltered areas, or of fine mud with shell debris in areas of extreme shelter such as in Loch Ceann Dibig and inside South Harbour. Coarse sediments are only present in the exposed entrance to the loch.

Areas of clean coarse shell gravel and sand are found south-east of Hamarsay at a depth of 26 m. Few species are present due to the high mobility of the sediments, with *P. maximus* and the dragonet *Callionymus lyra* the only common species (Ven).

Muddy shell gravel with sand generally extends from the rock–sediment boundary at depths of between 4 and 28 m throughout much of East Loch Tarbert, excluding the very sheltered North and South Harbours and Loch Ceann Dibig. The proportions of the different sediments vary, tending to grade from coarse to fine material with an increase in depth and a reduction in exposure to wave action or tidal streams. These differences in substrata are reflected in the species assemblages at each site. The very shallowest sediments which have a proportion of coarse material are algal dominated and are characterised by the presence of kelp *L. saccharina* and a variety of foliose algae, much of which is unattached (LsacX). Such a habitat is found at Urghabbeag Bay in the north of the loch and to the north and west of Scapasay. The red algae *Bonnemaisonia asparagoides*, *Scinaia turgida* and *Phycodrys rubens* and the brown algae *Chorda filum* and *Dictyota dichotoma* are occasional to common, as is the green alga *Ulva* sp. Circalittoral sediments below about 15 m are animal-dominated, but some may have a diatom film on the sediment surface. Those sediments within sheltered or moderately exposed areas of East Loch Tarbert are characterised by the sea-pen *Virgularia mirabilis* and by brittlestars including *Ophiura* spp. and *Amphiura* spp. (VirOph). Other common species include the burrowing anemone *Cerianthus lloydii*, the polychaetes *Lanice conchilega*, *Chaetopterus variopedatus* and *Protula tubularia* and the turret shell *Turritella communis*. *P. maximus* and the whelk *Buccinum undatum* are also typical but occur less frequently. Sites with a surface layer of shells and pebbles tend to have a greater diversity of sessile epibenthic species since they provide attachment sites for a range of ascidians, including *A. mentula* and *Molgula manhattensis*, and hydroids such as *Nemertesia ramosa* and *R. verticillatus* (VirOph.HAs). Such sediments are found at the wave-exposed eastern end of the Sound of Scalpay.

South Harbour on Scalpay, which is extremely sheltered from wave action, consists of soft mud with a scattering of shells and extends from the sublittoral fringe to 10 m depth. An extensive diatom film covers much of the sediment surface in summer (IMU). The infaunal community has not been sampled, whilst the epifaunal species richness is low and includes large specimens of the scallop *P. maximus*, which are frequent, along with juvenile plaice *Pleuronectes platessa*, gobies *Pomatoschistus* sp. and the edible crab *Cancer pagurus*. Other species present in smaller numbers include the anemone *Sagartiogeton undatus*, the hermit crab *Pagurus prideaux*, the swimming crabs *Liocarcinus depurator* and *Liocarcinus puber* and the dragonet *Callionymus reticulatus*. Sediments in Loch Ceann Dibig, another very sheltered bay with negligible tidal streams, consist of soft mud at depths of 13–26 m and show evidence of extensive burrowing but a generally low epifaunal species richness. Characteristic species include the opisthobranch *Philine aperta*, the

anemones *S. undatus*, *Sagartiogeton laceratus* and *C. lloydii*, occasional Norway lobsters *Nephrops norvegicus* and the brittlestar *Ophiura ophiura* (SpMeg). The communities in these muds have characteristics in common with both the infralittoral PhiVir biotope and the circalittoral SpMeg biotope. The deep areas on the north side near the head of the loch have not been surveyed but are likely to consist of similar soft burrowed muds (SpMeg).

There are two tidal lagoons on Scalpay, at Ardteaginish and Gob Aird na Cille, and both have entrance channels with moderately strong tidal streams. The floors of the two lagoons, which are extremely sheltered from wave action and experience only very weak tidal streams, consist of muddy sand-plains with some shell and algal debris supporting algal communities typical of such undisturbed conditions (LsacX; Tra). Flora and fauna are sparse at Ardteaginish, consisting mainly of *L. saccharina*, bootlace weed *C. filum*, and the polychaetes *L. conchilega* and *Arenicola marina* (LsacX). In Aird na Cille, in contrast, there is a large population of the daisy anemone *Cereus pedunculatus*, a southern species near its northern recorded limit. *S. laceratus* and *P. maximus* are also present. There are many species of algae, either loose-lying or attached to stones and shells with *Spermatochnus paradoxus*, *C. filum* and *Ulva* sp. common. *L. saccharina*, *Asperococcus fistulosus* and *Gracilaria verrucosa* are frequent, with smaller amounts of *Polyides rotundus* and *Furcellaria lumbricalis*. The *Trailliella* phase of *Bonnemaisonia hamifera* and *Audouinella floridula* form mats in places on the sediment surface, beneath which are some anaerobic patches (Tra).

Nature conservation

Conservation sites

Site name	*Status*	*Main features*
South Lewis, Harris and North Uist	NSA	Landscape

Human influences

Coastal developments and uses

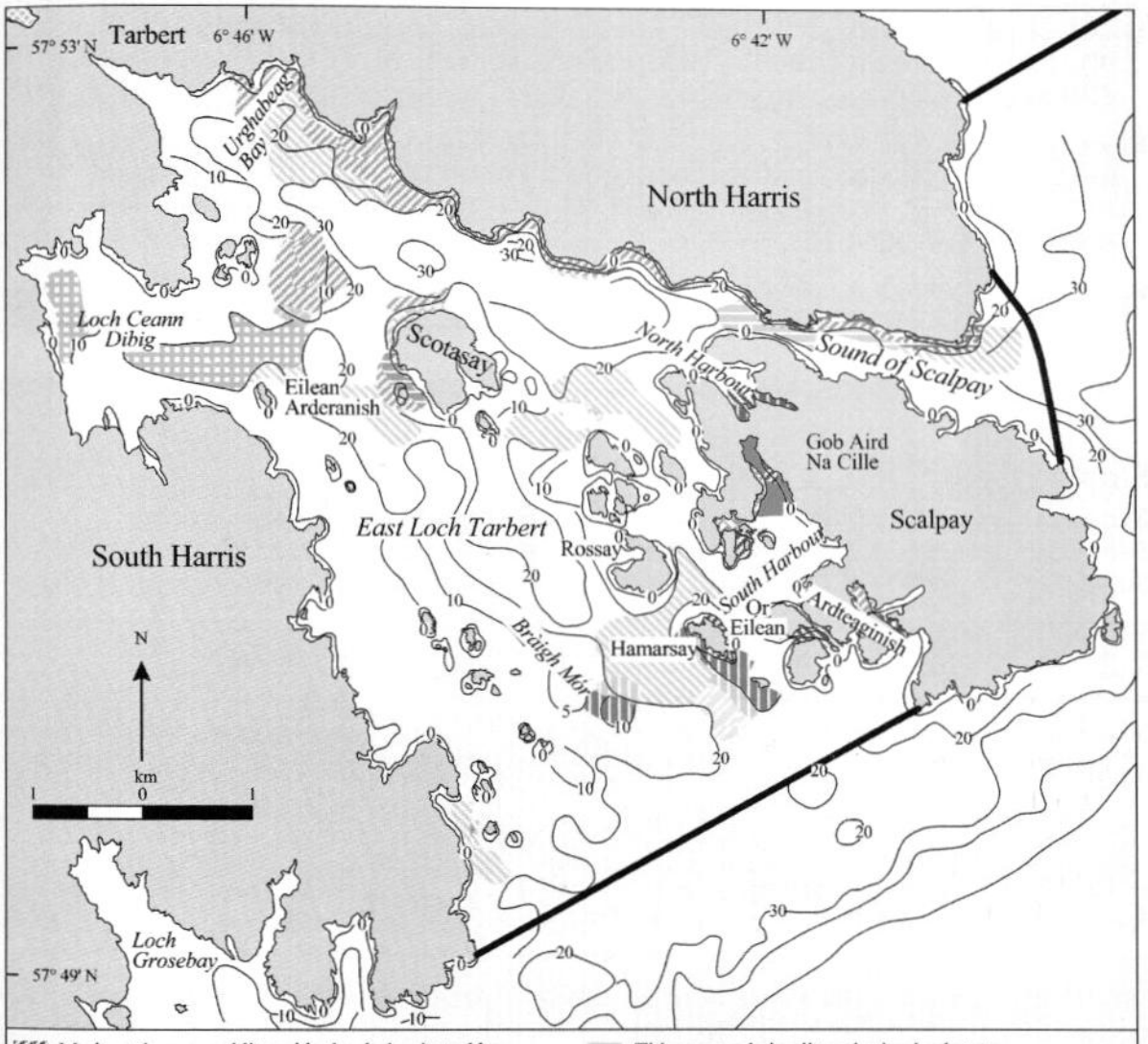
The area is relatively populous. Tarbert, the largest town on Harris, is situated on the isthmus at the head of East Loch Tarbert and is a major terminal for Caledonian MacBrayne ferries from Skye, the mainland and other parts of the Outer Hebrides, which use the Bràigh Mór channel. The A859 and minor roads serve scattered linear communities all around the shores of the loch and on Scalpay. A ferry across the Sound of Scalpay formerly served the island but has been replaced by a bridge. Sewage effluent from Tarbert is partially treated in the town, although outlying settlements and Scalpay use septic tanks. There are two slipways used by fish farmers, and several moorings in the upper loch near Tarbert.

Marine developments and uses

There have been six leases granted for Atlantic salmon *Salmo salar* farms and five leases granted for mussel rafts, although not all sites are occupied. Fish and shellfish farms tend to be clustered in the shelter of Loch Ceann Dibig, with the rest of the sites on the north coast of Scotasay and to the east of Rossay. A fish-processing plant has been established on Scalpay to handle the farmed fish. Scalpay's most important industry continues to be fishing, mainly for Norway lobster *Nephrops norvegicus*, but the industry has declined in recent years. The variety of habitats and large number of islands and sheltered locations means the area is increasingly popular for sub-aqua diving.

References and further reading

Holt, R 1991. Surveys of Scottish sealochs. Sealochs of the Islands of Harris and Lewis. Part II. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 4.



- Moderately exposed littoral bedrock dominated by *Semibalanus balanoides, Fucus* sp. and *Himanthalia* (FvesB)
- Sheltered littoral rock dominated by fucoid algae (Fser.Fser; Pel; Fspi; Asc.Asc)
- Sheltered bedrock and boulder shores dominated by fucoids (FvesX; AscX; FserX)
- Tide-exposed littoral channel with fucoid algae and rich underboulder fauna (Asc.T; Fserr.T; SByAs; Ldig.T)
- Muddy sand and shell gravel (MacAre)
- Tide-exposed infralittoral rock with *Laminaria hyperborea* forest and dense undergrowth of algae, hydroids and bryozoans (Lhyp.TFt)
- Moderately exposed to sheltered infralittoral bedrock and boulders dominated by *Laminaria hyperborea* forest and few foliose algae (LhypGz.Ft; LhypGz.Pk)
- Moderately exposed infralittoral bedrock and boulders dominated by *Laminaria hyperborea* with understorey of foliose algae (Lhyp.Ft)
- Moderately exposed to sheltered infralittoral bedrock and boulders dominated by grazed *Laminaria saccharina* with a band of grazed *L. hyperborea* above or mixed kelp forests (LhypGz.Ft; LhypLsac.Ft; Lsac.Ft)
- Sheltered infralittoral rock dominated by silty *Laminaria saccharina* forest (Lsac.Ft)
- Tide-exposed circalittoral mixed substrata dominated by brittlestars (Oph)
- Moderately exposed circalittoral rock with *Swiftia pallida* and *Porella compressa* (ErSSwi)
- Steep circalittoral bedrock with encrusting flora and fauna, hydroids, ascidians and *Antedon* spp. (AntAsH; *AmenCio)*
- Sheltered firm shelly mud with *Modiolus modiolus* clumps and other bivalves (ModHAs)
- Circalittoral shell gravel with occasional *Pecten maximus* (Ven)
- Muddy sand or shell gravel with *Virgularia mirabilis* and *Ophiura* spp. or *Amphiura* spp. and sometimes hydroids and other attached fauna (VirOph; VirOph.HAs)
- Very sheltered, very soft infralittoral mud with sparse fauna (IMU)
- Circalittoral mud with sparse *Nephrops norvegicus, Ophiura* spp. and *Philine aperta* (SpMeg)
- Sheltered infralittoral mud with *Laminaria saccharina* and other algae (LsacX)
- Sheltered infralittoral mud with *Laminaria saccharina* and other algae and sometimes mats of filamentous algae (Tra)

Figure 14.2 Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 14.1, cited literature and additional field observations).

Howson, C.M. 1989. Surveys of Scottish sealochs. Sealochs on the Isles of Harris and Lewis. (Contractor: University Marine Biological Station, Millport.) *Nature Conservancy Council, CSD Report*, No. 982.

Howson, C.M., Connor, D.W. & Holt, R.H.F. 1994. The Scottish sealochs. An account of surveys undertaken for the Marine Nature Conservation Review. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 164. (Marine Nature Conservation Review Report, No. MNCR/SR/27.)

Powell, H.T., Holme, N.A., Knight, S.J.T., Harvey, R., Bishop, G. & Bartrop, J. 1979. Survey of the littoral zone of the coast of Great Britain. 3. Shores of the Outer Hebrides. (Contractor: Scottish Marine Biological Association/Marine Biological Association Intertidal Survey Unit, Oban/Plymouth.) *Nature Conservancy Council, CSD Report*, No. 272.

Sites surveyed

Survey 21: 1988 UMBSM survey of sealochs of Harris and Lewis (Howson 1989).
Survey 31: 1990 UMBSM survey of sealochs of Harris and Lewis (Holt 1991).
Survey 265: 1970–1980 SMBA/MBA intertidal survey of Great Britain (Powell *et al.* 1979).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	3	Aird na Cille, Scalpay, East Loch Tarbert, Harris	NG 213 957	57°51.8'N 06°41.9'W	BPat.Cht; Pel; Fspi; Asc.Asc; Lsac.T
21	4	Ardteaginish, Scalpay, East Loch Tarbert, Harris	NG 226 949	57°51.4'N 06°40.6'W	YG; Ver.Ver; Pel; Fspi; Asc.Asc; Fserr; AscX; SR; Lsac.Ft; Lsac.T; Lcon; LsacX
31	13	Channel between Ardteaginish and Or Eilean, Scalpay, East Loch Tarbert, Harris	NG 219 949	57°51.4'N 06°41.2'W	Pel; Fspi; AscX; FvesX; FserX
31	14	Ardteaginish Ob narrows, Scalpay, East Loch Tarbert, Harris	NG 227 948	57°51.4'N 06°40.5'W	Pel; Fspi; Asc.T; Fserr.T; Ldig.T
31	15	E of Aird na Cille, South Harbour, Scalpay, East Loch Tarbert, Harris	NG 215 960	57°52.0'N 06°41.7'W	Ver.Ver; BPat.Sem; Fser.Fser; Pel; Fspi; Asc.Asc; Lsac.Ft
31	17	Shore, Gobaird na Cille, Scalpay, East Loch Tarbert, Harris	NG 212 953	57°51.6'N 06°42.0'W	YG; Ver.Ver; BPat.Sem; Him; FvesB; Pel; SR; Ldig.Ldig
31	29	North Harbour, Scalpay, East Loch Tarbert, Harris	NG 215 969	57°52.5'N 06°41.8'W	Ver.Ver; Pel; Fspi; Asc.VS; FserX; MacAre
265	144	Hamarsay W, East Loch Tarbert, Harris	NG 209 948	57°51.3'N 06°42.3'W	YG; Ver.Por; Cor; FK
265	185	South Harbour, Scalpay, East Loch Tarbert, Harris	NG 214 956	57°51.7'N 06°41.8'W	YG; Ver.Ver; Pel; Asc.T; Fserr.T

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
21	3	Aird na Cille, Scalpay, East Loch Tarbert, Harris	NG 213 957	57°51.8'N 06°41.9'W	Lsac.X; Tra
21	4	Ardteaginish, Scalpay, East Loch Tarbert, Harris	NG 226 949	57°51.4'N 06°40.6'W	Lsac.Ft; Lsac.T; Lcon; LsacX
31	10	W of Eilean na Gearrabreach, East Loch Tarbert, Harris	NG 189 929	57°50.2'N 06°44.1'W	AmenCio; VirOph; VirOph.HAs; Tra
31	11	Bràigh Mór, East Loch Tarbert, Harris	NG 198 946	57°51.1'N 06°43.4'W	Lhyp.Pk; ErSSwi; VirOph
31	12	SE Hamarsay, East Loch Tarbert, Harris	NG 212 944	57°51.1'N 06°42.0'W	Lhyp.Ft; Lhyp.Pk; ErSSwi; Ven.Neo
31	16	N of Raarem, South Harbour, Scalpay, East Loch Tarbert, Harris	NG 215 959	57°51.9'N 06°41.7'W	IMU; Lsac.Ft; Lsac.Pk

Sublittoral sites – continued

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
31	18	E Rossay, East Loch Tarbert, Harris	NG 207 953	57°51.6'N 06°42.5'W	LhypGz.Ft; LhypGz.Pk; AmenCio; VirOph; SpMeg
31	19	W Sgeir Ghlas, Scotasay, East Loch Tarbert, Harris	NG 181 968	57°52.3'N 06°45.2'W	LhypLsac.Ft; LhypGz.Ft; VirOph.HAs; LsacX
31	20	NE of Eilean Arderanish, East Loch Tarbert, Harris	NG 169 971	57°52.4'N 06°46.4'W	Oph; VirOph
31	21	Central Loch Ceann Dibig, East Loch Tarbert, Harris	NG 163 972	57°52.4'N 06°47.1'W	Oph; SpMeg
31	22	Head of Loch Ceann Dibig, East Loch Tarbert, Harris	NG 152 979	57°52.8'N 06°48.2'W	SpMeg
31	23	SW of Cuidsgeir, East Loch Tarbert, Harris	NG 172 978	57°52.8'N 06°46.2'W	IMX; Lsac.Ft; ModHAs
31	24	NE tip of Scotasay, East Loch Tarbert, Harris	NG 183 978	57°52.8'N 06°45.1'W	CMX; AmenCio; VirOph.HAs; LsacX
31	25	SE of Urghabeag Bay, East Loch Tarbert, Harris	NG 173 995	57°53.7'N 06°46.2'W	LsacX; Lsac.Ft; Lsac.Pk; VirOph.HAs
31	26	Ard Caol Urgha, East Loch Tarbert, Harris	NG 173 990	57°53.5'N 06°46.2'W	LhypGz.Ft; Lsac.Ft; AmenCio; VirOph
31	27	W of Mas na Garra, East Loch Tarbert, Harris	NG 198 980	57°53.0'N 06°43.6'W	Lhyp.Ft; Lsac.Pk; AmenCio; VirOph
31	28	Sgeir Reamhar, East Loch Tarbert, Harris	NG 200 968	57°52.3'N 06°43.3'W	AmenCio; VirOph.HAs
31	30	W Sound of Scalpay, East Loch Tarbert, Harris	NG 212 976	57°52.9'N 06°42.1'W	Oph
31	31	Sound of Scalpay narrows, East Loch Tarbert, Harris	NG 216 974	57°52.8'N 06°41.7'W	Lhyp.TFt; SByAs; Oph; AntAsH
31	32	S Rubha Crago, Sound of Scalpay, East Loch Tarbert, Harris	NG 232 973	57°52.7'N 06°40.1'W	LhypGz.Ft; Lhyp.TPk; CorMetAlc; Ven; VirOph.HAs

Compiled by: Ruth Beaver and Frances Dipper

15 Loch Stockinish

Location		
Position (centre)	NG 180 960	57°52'N 06°45'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

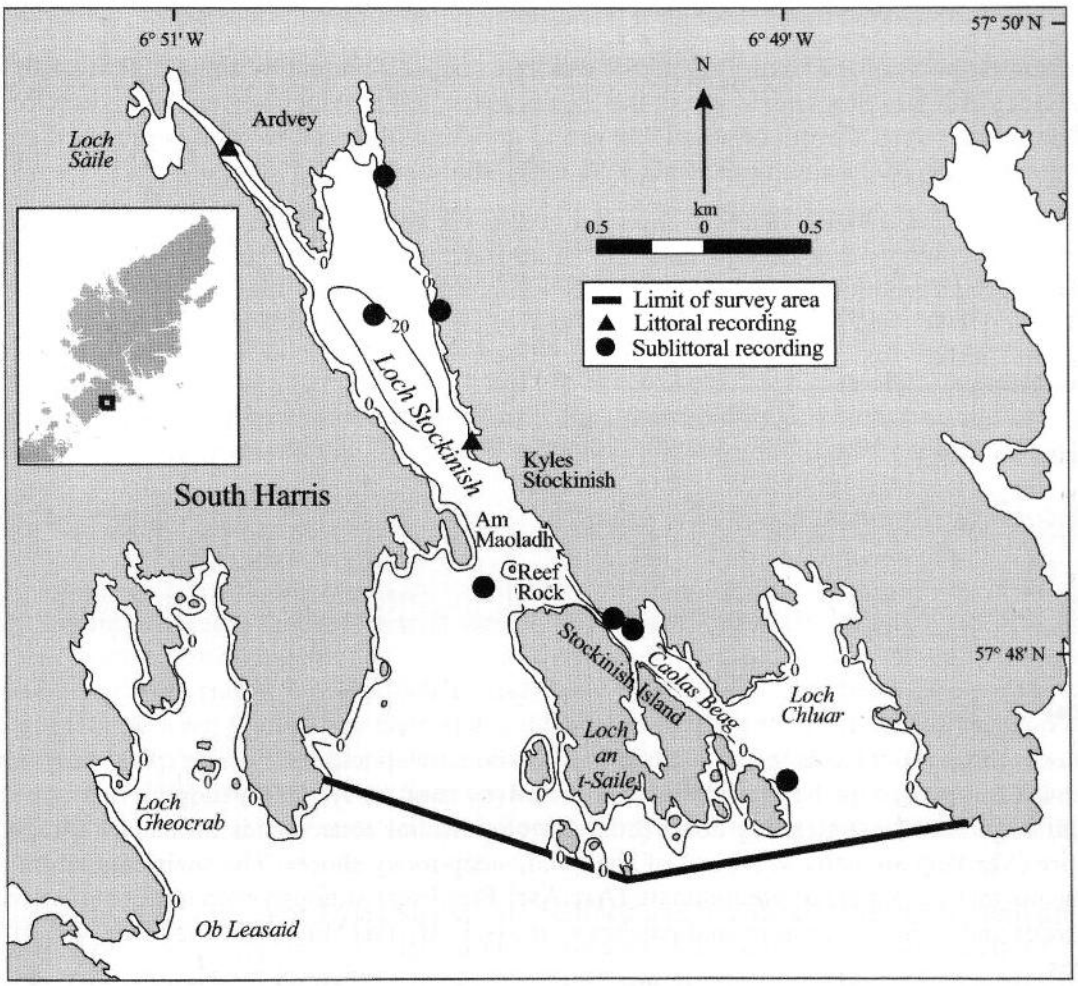


Figure 15.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Fjordic sealoch with one sill
Length of coast	19.5 km (27.8 km including islands)
Length of inlet	0.35 km
Area of inlet	4.2 km^2 (3.6 km^2 excluding islands)
Bathymetry	Maximum depth 40 m
Wave exposure	Ultra-sheltered in Loch an t-Saile; extremely sheltered at head of Loch Stockinish; moderately exposed on south-east side of Stockinish Island
Tidal streams	Moderately strong in Caolas Beag; weak in channel between Am Maoladh and Reef Rock; very weak elsewhere throughout loch
Tidal range	4.2 m (mean springs); 1.6 m (mean neaps) (East Loch Tarbert)
Salinity	Fully marine; variable in Loch an t-Saile

Introduction

Loch Stockinish is a small sealoch on the east coast of South Harris in the region known as Bays. In this area the bare gneiss rock forming the coastline is dotted with numerous small islands and indented with many tiny inlets and lochs, of which Loch Stockinish is one. The ground is very rocky with thin soils and little peat. The loch is narrow and fjordic in nature, with an entrance sill and a deep basin reaching a maximum depth of 40 m. Stockinish Island takes up a large part of the entrance to the loch and restricts inward and outward passage to two narrow, shallow straits either side of the island. The eastern channel, Caolas Beag, has a minimum width of just 27 m and is 4 m deep, giving rise to moderately strong tidal streams. The western entrance is wider and deeper, but has many submerged rocks, making it less easily navigable than Caolas Beag.

The narrowest point of the basin beyond the entrance channels and sill is about 500 m north of Caolas Beag at Kyles Stockinish, where the loch is about 300 m wide. Beyond Kyles Stockinish, the basin opens out to a width of about 750 m and divides at the head to form two narrow bays which are separated by a small peninsula with rocky shores.

The majority of Loch Stockinish is sheltered to extremely sheltered from wave action due to the protection provided by Stockinish Island and, as a result, there are a large number of fish and shellfish farms. The littoral zone makes up only a small proportion of the total area of the loch as the shores are steep and rocky, a characteristic shared by the majority of the sealochs of east Harris and Lewis.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota)	2	August 1990	Holt (1991)
Sublittoral	Recording (epibiota)	7	August 1990	Holt (1991)

Littoral

The shores throughout Loch Stockinish are mostly short, steep and rocky and typical of fjordic sealochs. The shore at the head of the loch near Ardvey is of fairly steeply sloping bedrock at the top with large boulders extending down to the lower eulittoral zone. Bands of lichens at the top of the shore (Ver.Ver) are narrow, typical of sheltered, steep rocky shores. The sheltered nature of the loch means that fucoid algae predominate (Asc.Asc; Fser.Fser) although barnacles *Semibalanus balanoides* and *Balanus crenatus* and patches of mussels *Mytilus edulis* are abundant on vertical surfaces.

The shore on the headland just north of Kyles Stockinish is moderately exposed and typical of shores at the entrances to sealochs where islands often afford some protection from the severe wave action experienced on open coasts. The smooth bedrock and boulders of this headland are dominated by barnacles, limpets *Patella* sp. and red algae, with less fucoid cover than on the sheltered shores towards the loch head. The littoral fringe is colonised by the rough periwinkle *Littorina saxatilis*, the barnacle *Chthamalus montagui* and superabundant black lichen *Verrucaria maura* (Ver.Ver). Channel wrack *Pelvetia canaliculata* can be found occasionally colonising cracks and crevices (Pel). *S. balanoides* and the limpet *Patella vulgata* predominate throughout the shore, giving it a white appearance. The bladderless form of bladder wrack *Fucus vesiculosus* f. *linearis* occurs patchily in this zone but becomes more common further down the shore, where it forms a dense cover and is itself colonised by the red alga *Palmaria palmata* (BPat.Fvesl). Serrated wrack *Fucus serratus* dominates the lower eulittoral (Fser.Fser), with the occasional thongweed *Himanthalia elongata*, while the red algae *Osmundea pinnatifida* and *Mastocarpus stellatus* are frequent in the understorey. A wider variety of animal species are found on vertical and overhanging rock, including the bryozoan *Umbonula littoralis*, the ascidians *Botryllus*

schlosseri and *Polyclinum aurantium*, and the sponge *Grantia compressa*. *Laminaria digitata* forms a kelp forest in the sublittoral fringe (Ldig.Ldig).

Shores exposed to tidal streams are found in the narrows at the north end of Caolas Beag. The rocky shores here are almost vertical with narrow ledges. There is a distinct zonation of algae and kelp *Laminaria hyperborea* grows in the sublittoral fringe. The molluscs of this area were investigated in 1977 (Smith 1982) and the opisthobranch *Elysia viridis*, the horse mussel *Modiolus modiolus* and the saddle oyster *Pododesmus squamula* were notable inhabitants, but in general there was a low diversity of mollusc species compared to other sites in Harris and Lewis due to the steep and hard nature of the shore. The small periwinkle *Melarhaphe neritoides*, characteristic of moderately exposed to exposed shores, was absent.

Sublittoral

Infralittoral rock

Infralittoral rock throughout the loch is dominated by kelp forest extending at most sites to the interface with sediment slopes or plains. The type of kelp forest varies with the wave exposure. In the mouth of the loch, conditions are moderately exposed and *L. hyperborea* predominates (Lhyp.Ft). Bedrock on the south-east side of Stockinish Island, which is vertical in places but mostly upward-facing and silt-covered, is dominated by a kelp forest of *L. hyperborea* with smaller amounts of *Laminaria saccharina* (Lhyp.Ft). Mixed kelp forests are often found at sites intermediate between the inner sheltered loch which is dominated by *L. saccharina* and the open coast dominated by *L. hyperborea*. The kelp is quite silty and covered in epiphytes including *Membranipora membranacea*, the bryozoans *Electra pilosa* and *Scrupocellaria reptans* and the hydroid *Obelia geniculata*. Foliose red algae occur frequently in the shallower regions and include *Compsothamnion thuyoides*, *Bonnemaisonia hamifera (Trailliella)*, *Callophyllis laciniata*, *Plocamium cartilagineum*, *Phycodrys rubens* and *Dictyota dichotoma*. The most abundant sessile animals are the jewel anemone *Corynactis viridis* colonising the vertical, silt-free surfaces, the keel worm *Pomatoceros triqueter* and the ascidian *Ascidiella scabra*. Similar mixed kelp forests are found at the west entrance to the loch at Reef Rock. Here silt-covered bedrock outcrops from a sediment plain between 9 and 13 m deep and is dominated by the cape form of *L. hyperborea*. A thick carpet of the *Trailliella* phase of *Bonnemaisonia hamifera* and pink coralline crusts make up the understorey (LhypLsac.Ft). Kelp stipes are bare, probably through intense grazing by the common urchin *Echinus esculentus*, and are colonised only by the occasional dead men's fingers *Alcyonium digitatum*.

In the upper loch area north of Kyles Stockinish, bedrock and boulders in the infralittoral are dominated by a dense kelp forest of cape-form *L. saccharina* down to a maximum depth of 8 m (Lsac.Ft). This occurs both on rocky slopes extending from the shore and on rock outcrops from plains of muddy algal-covered sediment. Upward-facing rock surfaces are very silty and colonised by few flora and fauna except for algal crusts, barnacles *B. crenatus* and ascidians.

Circalittoral rock

There is very little in the way of circalittoral rock in Loch Stockinish. At the entrance to the loch on the east side of Stockinish Island, short vertical cliff faces are dominated by algal crusts, *A. digitatum* and *C. viridis* (AlcC). Bedrock outcrops at the west entrance near Reef Rock are dominated by ascidians and *Antedon* spp. (AmenCio). Sheltered circalittoral rock dominated by ascidians also outcrops from muddy sediment in deep water in the main basin (AmenCio.Met).

Sublittoral sediment

Infralittoral shelly, fine sand is found around the edges of Loch Stockinish in shallow water down to about 7 m. Small shells and stones provide attachment for algae and there is often fairly dense cover of kelp *L. saccharina*, *Asperococcus turneri*, filamentous algae and scattered red algae including *Scinaia turgida* and *Bonnemaisonia asparagoides* (LsacX). In some areas filamentous

algae predominate as algal mats (Tra). The sea-pen *Virgularia mirabilis*, the turban topshell *Gibbula magus*, the burrowing anemone *Cerianthus lloydii*, the sand mason worm *Lanice conchilega* and the scallop *Pecten maximus* may also be present. Where tidal streams are strong, such as in the channel between Stockinish Island and the mainland, infralittoral sediments are coarser with a greater proportion of shell. Algal species are similar, with perhaps a greater preponderance of kelp *L. saccharina* and *Saccorhiza polyschides* along with bootlace weed *Chorda filum* and *Ulva* sp. (Lsac.T). The faster-flowing water favours filter feeders, including the bivalves *P. maximus* and *Ensis ensis* and the polychaetes *Sabella pavonina* and *L. conchilega*. There are a number of molluscan grazers including the topshells *Gibbula cineraria* and *G. magus*; however echinoderms are rare in this habitat.

The sediment in the shallows at the head of Loch Stockinish is much softer and consists of mud and empty shells with an anoxic surface layer and growth of the bacteria *Beggiatoa* sp. (Beg). Fauna are very sparse and include the scavenging *Pagurus bernhardus*, *Liocarcinus depurator* and *Carcinus maenas*. In slightly deeper water to 8 m the crabs *Necora puber* and *Macropodia rostrata* and the bivalve *Mya truncata* are found and several fish species, especially *Gobius niger*, *Callionymus lyra* and *Pomatoschistus* sp., are common.

The seabed in the deepest part of the loch at depths of 37–40 m consists of soft brown mud with occasional large boulders. Only a few scavenging species, *P. bernhardus*, *L. depurator* and the starfish *Asterias rubens* live on the mud surface. The mud is also devoid of burrows or casts, indicating a low number of infauna. The scarcity of deep mud species such as sea-pens and brittlestars inside Loch Stockinish is not typical of natural sealoch habitats, which usually have a larger diversity of deep mud fauna. Poor water circulation and seasonal anoxia in the deep central area could be responsible.

More usual circalittoral muddy sediments with characteristic species are found at the entrance on the south-east side of Stockinish Island. Here the sediment between 8 and 12 m depth consists of shelly mud characterised by *V. mirabilis* and *C. lloydii* (VirOph), progressing to softer mud in deeper water. Sediments at greater depths are inhabited by the burrowing brittlestars *Amphiura chiajei* and *Amphiura filiformis*, the turret shell *Turritella communis* and the Norway lobster *Nephrops norvegicus* (SpMeg).

Loch an t-Saile is a saline tidal pool on the east side of Stockinish Island. A wall across the seaward entrance was built to create a pool for holding lobsters *Homarus gammarus* caught in the area. Seawater exchanges freely through the stone wall and there is evidence of freshwater inflow which would presumably cause conditions to become brackish during wet weather. The pool is 5 m deep with a tidal range of about 20 cm. The narrow littoral zone has bands of the fucoid algae *P. canaliculata* and *Fucus spiralis*, and the green alga *Cladophora rupestris*. In the sublittoral, bedrock and boulders are dominated by *L. saccharina* and sea-oak *H. siliquosa* which has many attached ascidians including *A. scabra* and *Diplosoma listerianum* (Lsac.Ft). The green alga *Codium* sp. is found occasionally with the opisthobranch *Elysia viridis* grazing on it. *C. filum* is attached to pebbles and cobbles in the sediment (LsacX). The phoronid *Phoronis hippocrepia*, a species not often recorded on the west coast of Scotland, can be found just above the *L. saccharina* band in small groups living in encrusting coralline algae. Other red algae present include *Furcellaria lumbricalis*, *Ceramium nodulosum* and *Griffithsia corallinoides*.

Nature conservation

Conservation sites		
Site name	***Status***	***Main features***
South Lewis, Harris and North Uist	NSA	Landscape

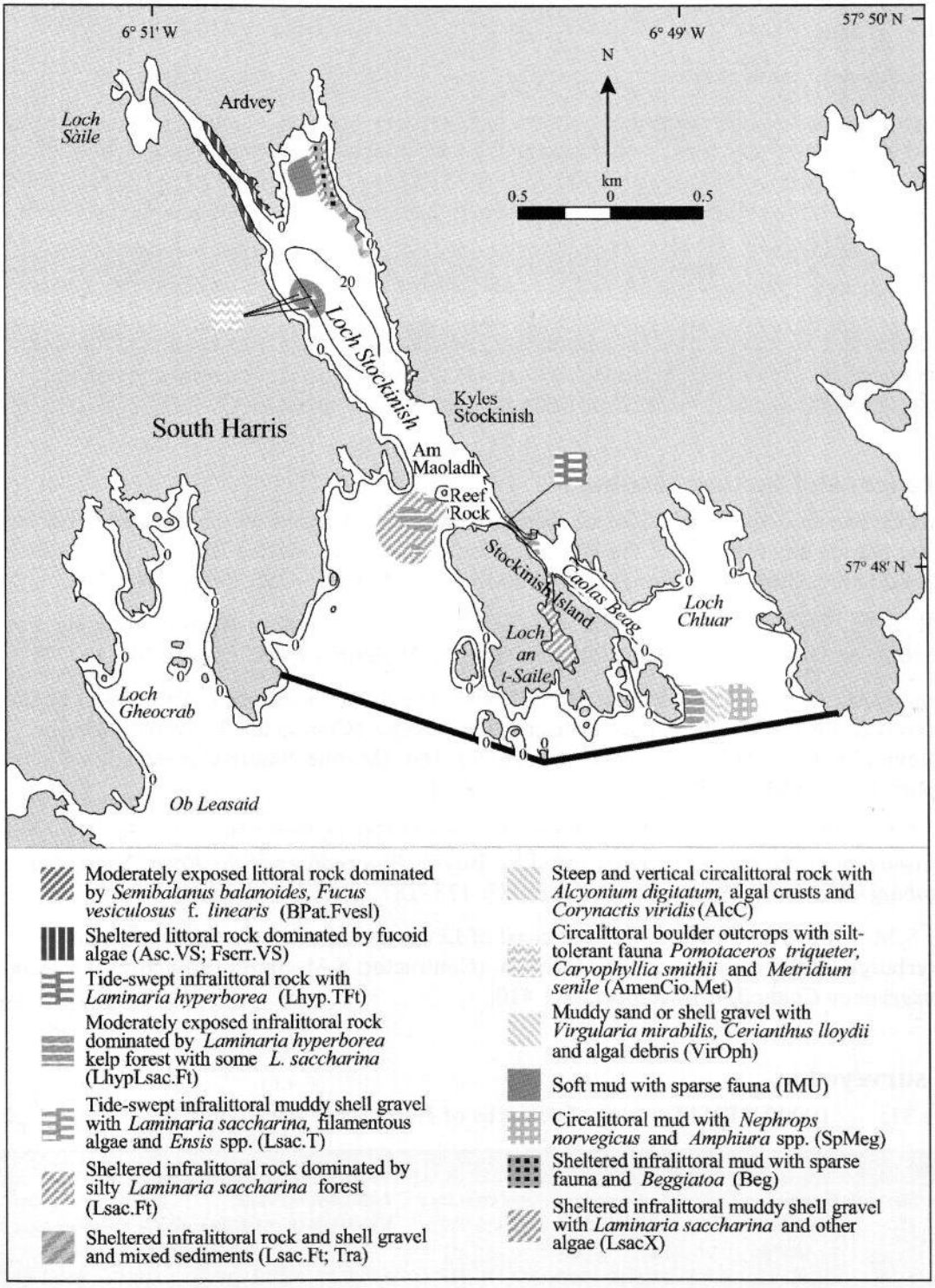


Figure 15.2 Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 15.1, cited literature and additional field observations).

Human influences

Coastal developments and uses

The Bays region of Harris is reached by a narrow, winding minor road which closely follows the coast, skirting the eastern and northern sides of Loch Stockinish, passing through the settlements of Kyles Stockinish in the outer loch and Ardvey at its head. A small number of houses, a post office and a youth hostel are scattered along the road on the north-eastern shore. The south-western side of the loch has no road access.

Marine developments and uses

Loch Stockinish is heavily used for salmon and shellfish farming. There are leases for seven salmon farms and five shellfish farms, most of which are situated on the west coast. The anchorage near the head of the loch is used mainly by fish-farmers.

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Smith, S.M. 1982. The shores of the east coast of Lewis and Harris between Lochs and Leverburgh, with emphasis on the Mollusca. (Contractor: S.M. Smith, Edinburgh.) *Nature Conservancy Council, CSD Report*, No. 410.

Sites surveyed

Survey 31: 1990 UMBSM survey of sealochs of Harris and Lewis (Holt 1991).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
31	1	Head of loch, Loch Stockinish, Harris	NG 119 927	57°49.9'N 06°51.2'W	Ver.Ver; Fspi; Asc.Asc; Fser.Fser; Pel
31	5	SE of loch, Loch Stockinish, Harris	NG 130 913	57°49.2'N 06°50.0'W	YG; Ver.Ver; Fser.Fser; Ldig.Ldig; SR; Pel; BPat.Fvesl

Sublittoral sites					
Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
31	2	SE of Ardvey, Loch Stockinish, Harris	NG 126 926	57°49.8'N 06°50.5'W	IMU; Lsac.Ft; Beg;
31	3	Central Basin, Loch Stockinish, Harris	NG 125 919	57°49.5'N 06°50.5'W	IMU; AmenCio.Met
31	4	Mid E side, Loch Stockinish, Harris	NG 129 920	57°49.5'N 06°50.1'W	Lsac.Ft; LsacX; Tra
31	6	SE of Am Maoladh, Loch Stockinish, Harris	NG 131 907	57°48.8'N 06°49.9'W	Lhyp.Ft; AmenCio; VirOph.Has; LsacX
31	7	NW Caolas Beg, Loch Stockinish, Harris	NG 138 905	57°48.7'N 06°49.1'W	Lsac.T
31	8	Stockinish Island, Loch an t-Saile, Loch Stockinish, Harris	NG 138 905	57°48.7'N 06°49.1'W	FaSwV; LsacX; Lsac.Ft
31	9	SE Stockinish Island, Loch Stockinish, Harris	NG 145 897	57°48.4'N 06°48.4'W	LhypLsac.Ft; AlcC VirOph; SpMeg

Compiled by: Ruth Beaver and Frances Dipper

16 Loch Finsbay

Location		
Position (centre)	NG 085 865	57°46'N 06°54'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

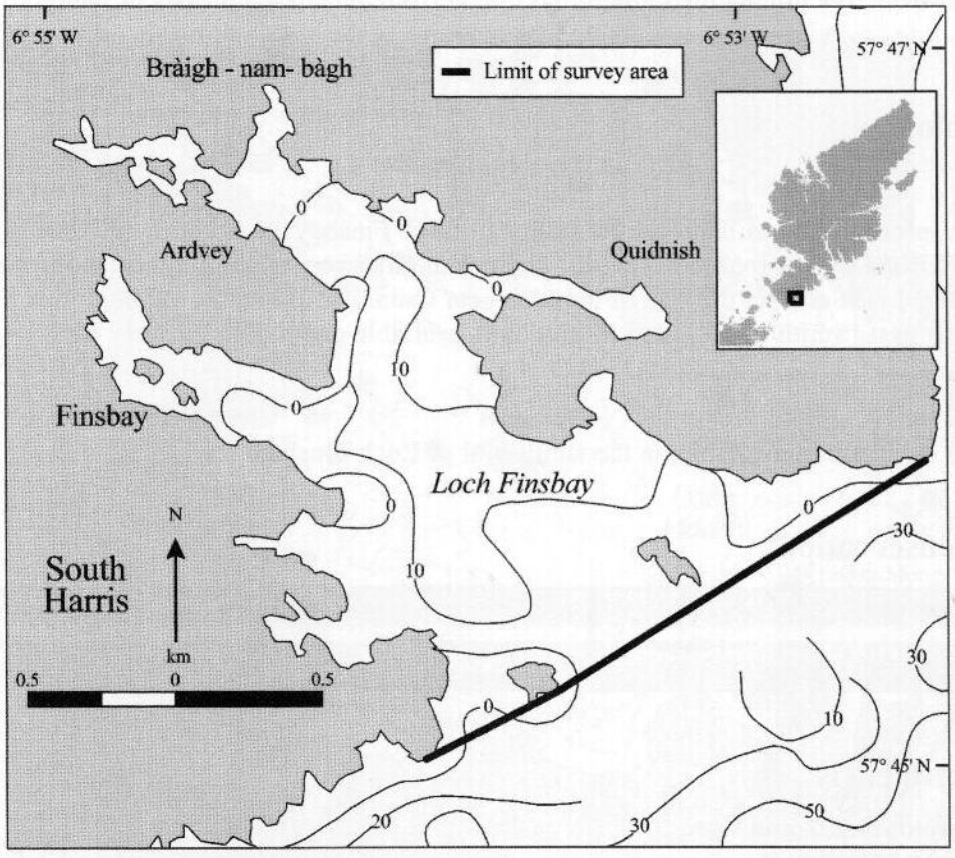


Figure 16.1 Main features of the area.

Physical features	
Physiographic type	Open sealoch
Length of coast	15.4 km (17.5 km including islands)
Length of inlet	2.67 km
Area of inlet	2.1 km^2 (2.0 km^2 excluding islands)
Bathymetry	Maximum depth 14 m at entrance
Wave exposure	No data available
Tidal streams	No data available
Tidal range	4.2 m (mean springs); 1.6 m (mean neaps) (East Loch Tarbert)
Salinity	Fully marine; variable in Ardvey tidal pond and inlets at the head

Introduction

Loch Finsbay is a small open sealoch, around 2.5 km long, situated in the south-east corner of Harris in the district known as Bays. It has a wide entrance channel relative to its length, such that the majority of the loch, with the exception of the sheltered branch on the east side leading to Quidnish, is likely to be moderately exposed to wave action. The shore of the loch is indented and irregular with several inlets, most of which end in small areas of intertidal mud. At the head of the loch at Ardvey is a tidal pond separated from the main body of the loch by a shallow sill (Thorpe *et al.* 1998).

Bràigh-nam-bàgh, the uninhabited hinterland inland from the coast, consists of hundreds of tiny interconnecting freshwater lochans, rising to mountains in the west and north.

Marine biology

Littoral

There is no information available for the shores of Loch Finsbay except from the tidal pond at Ardvey, described by Thorpe *et al.* (1998). There is another very shallow brackish inlet at the head of the sheltered side arm on the east of the loch near Quidnish. However, although this has been visited in the past (Smith 1984), no information is available on its biology.

Sublittoral

There is no information available on the sublittoral of Loch Finsbay.

Nature conservation

Conservation sites

Site name	*Status*	*Main features*
South Lewis, Harris & North Uist	NSA	Landscape

Human influences

Coastal developments and uses

One of the few minor roads in Harris runs partly around inner Loch Finsbay, connecting the tiny settlements of Quidnish, Ardvey and Finsbay. There are no shore-based industries around the loch, but Lingarabay, a short distance to the south-west, is the proposed site for a coastal superquarry. At the time of writing, a final decision is currently subject to a public inquiry.

Marine developments and uses

There are no salmon farms in Loch Finsbay; however, three leases for four shellfish farms have been granted (data correct at 10 March 1997).

References and further reading

Smith, S.M. 1984. Scottish saline lagoons with emphasis on the Mollusca. (Contractor: S.M. Smith, Edinburgh.) *Nature Conservancy Council, CSD Report*, No. 526.

Thorpe, K., Dalkin, M., Fortune, F., & Nichols, D. 1998. *Marine Nature Conservation Review Sector 14. Lagoons in the Outer Hebrides: area summaries*. Peterborough, Joint Nature Conservation Committee. (Coasts and seas of the United Kingdom. MNCR series.)

Compiled by: Ruth Beaver and Frances Dipper

17 Loch Maddy (Loch nam Madadh)

Location		
Position (centre)	NF 930 680	57°36'N 07°08'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

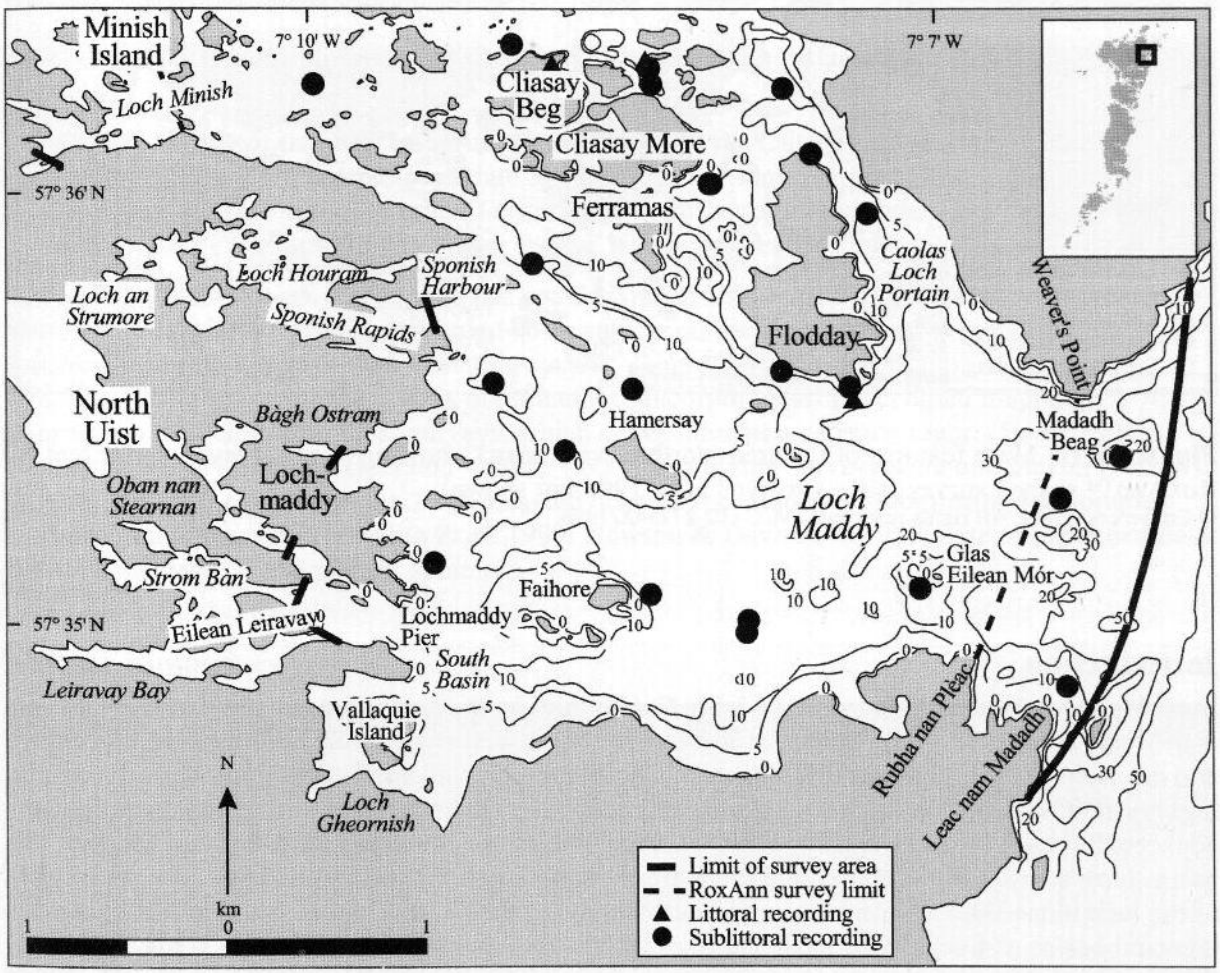


Figure 17.1a Main features of the area (south-eastern part), showing sites surveyed and extent of RoxAnn™ seabed survey (sites surveyed after 1994 not shown).

Physical features	
Physiographic type	Fjardic sealoch
Length of coast	48.5 km (85.9 km including islands)
Length of inlet	8 km
Area of inlet	17.8 km^2 (15.8 km^2 excluding islands)
Bathymetry	Maximum depth 38 m at mouth; mostly less than 20 m
Wave exposure	Exposed to extremely sheltered
Tidal streams	Strong to very weak
Tidal range	4.1 m (mean springs); 1.7 m (mean neaps)
Salinity	Fully marine; variable in inlets near head

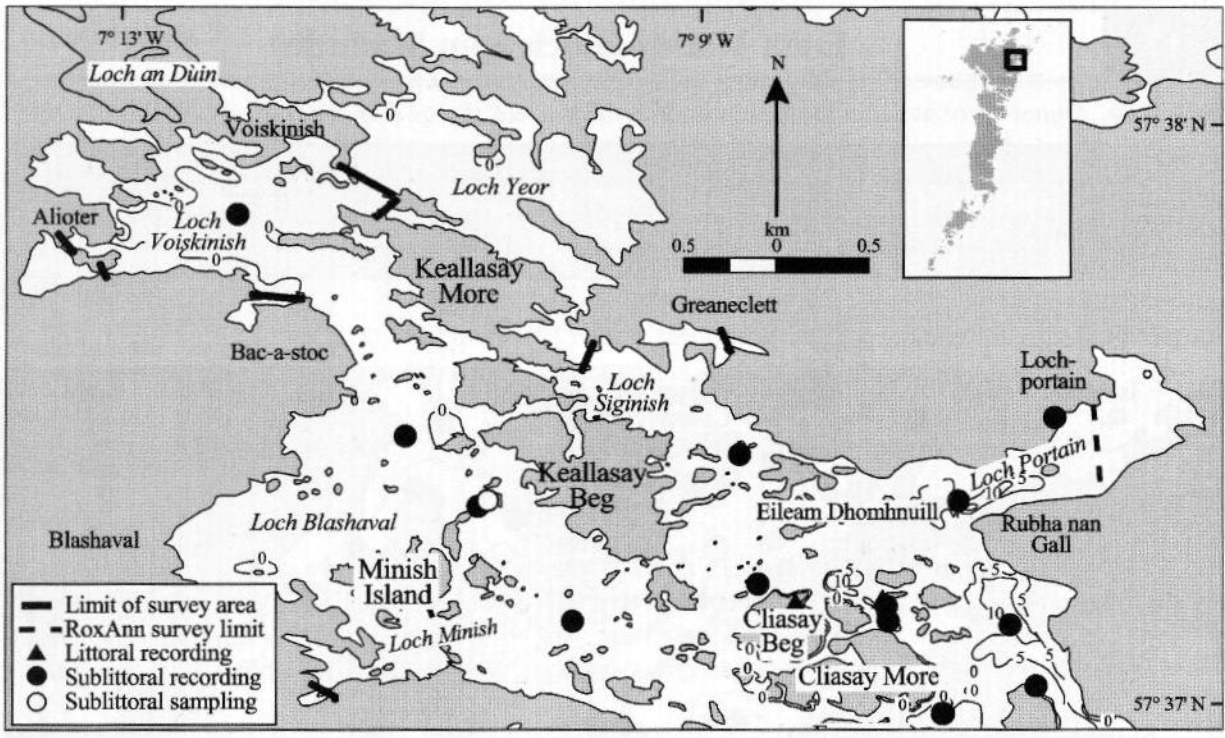


Figure 17.1b Main features of the area (north-western part), showing sites surveyed and extent of RoxAnn™ seabed survey (sites surveyed after 1994 not shown).

Introduction

Loch Maddy (Loch nam Madadh) is a large fjardic inlet on the north-east coast of North Uist and is the most complex fjard in Europe. The island of North Uist is generally low-lying with complex and extensive fresh and brackish water systems and a heavily indented eastern coastline. It has a highly irregular coastline and numerous islands and wide, shallow basins in the upper reaches connected to each other by narrow, often intertidal channels with strong tidal streams. Many of the basins have a sill at the entrance, and there are at least 22 sills and basins in the fully marine part of the loch alone. The innermost part of Loch Maddy comprises the extremely sheltered, shallow lagoonal basins of Lochs Voiskinish and Siginish which have maximum depths of between 2–6 m. South of Loch Voiskinish lies the equally sheltered Loch Blashaval with a maximum depth of 20 m. Lochs Minish and Houram lie south-east of these on the west side and Lochs Siginish and Portain lie on the east side of Loch Maddy. Central Loch Maddy comprises a complex array of shallow channels, islands and rocks between the inner areas and outer Loch Maddy, which are subject to very strong tidal streams. Most of the channels dividing the basins appear to be between 3 and 10 m deep with sills ranging from 4 m depth to some which are exposed at low water. The outer, more exposed part of the loch is also studded with islands and has a maximum depth of 38 m at the entrance.

The bathymetry of the central and inner loch was surveyed in the mid-1990s and the complex hydrography of Loch Maddy has yet to be fully documented (Entec 1996). Tidal streams in the outer part of the loch are generally weak, with the exception of the headlands at the entrance where there is a strong flow at some states of the tide. Within the middle and inner parts of the loch, there is a perceptible flow through all the channels and fast-flowing, shallow rapids at Sponish and the entrances to Harbour Bay, Leiravay and Loch Yeor and Loch Blashaval. The loch is highly unusual in that several of these rapids form marine waterfalls and 'rivers', created as the ebb tide flows out of the outer basins faster than the inner basins. The tidal range of some inner

basins is thus restricted compared with the main part of the loch. The wide, shallow nature of many of the basins means that the tidal flow may be negligible only a short distance from such rapids. The sequence of sills which separate the many basins are of particular importance in creating conditions which give rise to a full transition from fresh and brackish to marine communities in the system. The lagoonal basins (Lochs Yeor, Strumore, Houram, Loch an Dùin, Leiravay Bay, and several smaller inlets) are described by Thorpe *et al.* (1998); only the fully marine basins are described here.

Loch Maddy faces east and consequently is sheltered from the prevailing south-westerly winds, resulting in a limited wave exposure gradient, with many of the basins being extremely sheltered. A variety of shallow, sheltered habitats therefore characterise the loch, many of which are subject to varying tidal streams in the narrow connecting channels. A substantial area of the loch is intertidal.

Loch Maddy is one of the most important marine areas in the Outer Hebrides. It is a Marine Consultation Area (MCA) and a candidate Special Area of Conservation (cSAC), qualifying for the latter status by meeting the Annex I criteria for both 'large shallow inlets and bays' and for 'coastal lagoons', a priority habitat under the EC Habitats Directive.

Since 1995, Scottish Natural Heritage has commissioned both a detailed littoral mapping survey based on aerial photographs, and a broad-scale sublittoral habitat mapping survey using the RoxAnn™ acoustic ground discrimination system, supplemented by remote video and grab sampling. The present summary does not attempt to incorporate all the detailed mapping information available from these surveys, which is available as a separate report (Entec 1996). Further acoustic, Remotely Operated Vehicle (ROV) and diving surveys were undertaken for SNH in 1998 and 1999 to build on the 1996 data and develop techniques for monitoring the complex marine communities (Foster-Smith *et al.* 1999; Howson & Davison 1999). These unpublished data are not considered in the present summary.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (biotopes)	243*	Aug–Oct 1995	Entec (1996)
	Recording (epibiota)	3	May 1990	Howson (1991)
Sublittoral	Recording (video)	145*	Oct 1995 and Feb 1996	Entec (1996)
	Recording (epibiota)	22	May 1990	Howson (1991)
	Recording (epibiota)	7	July 1984	Rostron (1984)
	Infaunal sampling (suction sampling)	1	May 1990	Howson (1991)
	Infaunal sampling (grab)	26*	Oct 1995 and Feb 1996	Entec (1996)
	Habitat mapping (RoxAnn)	–	Oct 1995 and Feb 1996	Entec (1996)

*These sites are not shown in Figures 17.1a and 17.1b, nor listed in the site tables at the end of this chapter, but the information has been used to describe and map the habitats.

Littoral

The majority of the littoral zone throughout Loch Maddy consists of sheltered boulder slopes with some areas of bedrock. Many of these slopes are steep, consisting of large angular blocks, often with silt trapped between them. Steep littoral bedrock occurs mainly in the entrance to the loch and on the eastern side of the outer islands of Flodday, Hamersay, Faihore, Vallaquie and Ferramas. As would be expected, the most exposed shores are on the headlands of Weaver's Point and Rubha nan Plèac on the north and south sides of the entrance. These areas consist of steep

rock dominated by barnacles, with dabberlocks *Alaria esculenta* in the sublittoral fringe. *A. esculenta* is only found at these exposed sites and peters out a short way into the loch. The large island of Flodday lies a short distance into the loch. The south shores consist of rugged bedrock and are moderately exposed. This slight reduction in severity of wave action allows some brown algal growth, and the mid-shore, although dominated by barnacles *Semibalanus balanoides* and limpets *Patella vulgata*, also supports patches of *Fucus vesiculosus*, much of it the bladderless form (FvesB). The upper shore supports fairly dense patches of the fucoid algae *Pelvetia canaliculata* and *Fucus spiralis* and lichens *Verrucaria* spp. (PelB; Ver.Ver). The periwinkle *Melaraphe neritoides* can be found sheltering in crevices here but is not found on sheltered shores further into the loch. The lower shore supports dense growths of thongweed *Himanthalia elongata*, the serrated wrack *Fucus serratus* and red algae (Him). Shores with some degree of exposure, supporting *F. vesiculosus* on the mid-shore and *F. serratus* and red algae on the lower shore, are present on rocky islands and headlands facing the mouth of the loch as far west as Faihore Island and headlands near to Lochmaddy pier and Vallaquie Island.

Shores on the western, lee sides of the outer islands and throughout much of the remainder of the fully marine part of the loch exhibit the typical zonation of a sheltered shore and are dominated by dense beds of knotted wrack *Ascophyllum nodosum* (Asc.Asc). These shores generally have a very low diversity of flora and fauna. However, in the central and inner areas of Loch Maddy there are many channels between islands, leading from one basin to another, where there are strong tidal streams. In such areas, rich and diverse communities of algae and animals occur in the mid to lower shore zones. Species assemblages vary with the physical conditions in the many different rapids. Algae, ascidians, sponges, bryozoans, hydroids and polychaete worms are typically present in greater abundance and diversity than similar nearby shores where tidal flow is negligible. Typical examples are the shore north of Cliasay Beg and the shore west of Eileanan Dhomhnuill. These shores are steep boulder slopes dominated by a thick blanket of *A. nodosum* (Asc.T) with a narrow lichen zone at the top of the shore (YG; Ver.Ver) and a band of *F. serratus* at the bottom (Fserr.T), with *H. elongata* and kelp *Laminaria digitata* (Ldig.T) or *Laminaria saccharina* (Lsac.T). The fauna under boulders and algae in the mid and lower eulittoral is abundant and diverse and includes the sponges *Grantia compressa*, *Scypha ciliata* and *Halichondria panicea* and the ascidians *Dendrodoa grossularia*, *Ascidiella scabra*, *Ascidia conchilega* and *Botrylloides leachi*. The fucoid algae are covered in hydroids including *Dynamena pumila*, *Clava multicornis* and *Sarsia* sp. Gastropod molluscs are also numerous.

Rapids are also present at the entrances to the small Lochs Leiravay and Houram (Sponish Rapids) on the west side near Lochmaddy town. These two rapids have a long history of study as they were first identified as being of biological interest by Lewis (1957). Powell *et al.* (1979) considered the rapids at Leiravay to be one of the richest in the Hebrides. The shores here are similar to those described above and also support several species normally found in the sublittoral, including the cup coral *Caryophyllia smithii*, the soft coral *Alcyonium digitatum* and the red algae *Delesseria sanguinea* and *Cryptopleura ramosa* (see Thorpe *et al.* 1998).

There are few sediment shores within Loch Maddy and those that are present consist mainly of soft mud in the more sheltered areas. The extent of these muddy areas varies from just a few metres to stretches several hundred metres in length, which normally continue into the sublittoral. No sites have been surveyed in detail.

Sublittoral

Deep water is restricted to the loch entrance and the transition from rock to sediment varies from around 18 m at the headland of Leac nam Madadh to a maximum of 30 m off the island of Madadh Beag. This boundary shallows rapidly with distance into the loch, rising to 11 m near Flodday. West of this point bedrock is mainly restricted to depths of 3–6 m in the form of shallow slopes or outcrops from sediment plains in the channels and basins. However, steep boulder slopes may extend to around 17 m in the deeper basins.

Infralittoral rock

The types of kelp forest predominating in different areas of Loch Maddy are mainly influenced by exposure to wave action. However, within the tide-swept channels of the central and inner areas, the pattern is modified and it becomes difficult to predict which types will be present.

Infralittoral bedrock in the entrance to Loch Maddy is dominated by dense *Laminaria hyperborea* kelp forest down to around 10 m depth, followed by kelp park to a maximum depth of around 18 m (Lhyp.Ft; Lsac.Pk). There is a well-developed algal understorey and stipe flora, showing little sign of grazing. The fauna is reasonably diverse and includes species such as the ascidians *Ascidia mentula* and *Clavelina lepadiformis*, *C. smithii* and a variety of grazing molluscs, all of which are also common within the shelter of the loch. Other species such as *Porella compressa*, *Myxilla incrustans*, *A. digitatum* and *Marthasterias glacialis* are rarely found further into the loch. The sea cucumbers *Pawsonia saxicola* and *Aslia lefevrei*, and the brittlestar *Ophiopholis aculeata* are common in crevices. Heavily grazed *L. hyperborea* kelp forest is present under slightly more sheltered conditions further into the loch, for example around Glas Eilean Mór and the island of Faihore (LhypGz.Ft). Here the rock slope is of silty large boulders covered in encrusting coralline and brown algae with only sparse foliose algae. Fauna are restricted to species resistant to grazing such as *C. smithii* or living in crevices such as *P. saxicola*.

Sheltered stable bedrock and boulder slopes such as the headlands around Lochmaddy town are also dominated by *L. hyperborea* kelp forest but of a silty and less diverse type. The kelp is often of the cape form and may be mixed in with other sugar kelp *L. saccharina* and, in shallow areas, *L. digitata* (LhypLsac.Ft). Shallow, sheltered and very sheltered infralittoral rock within the central and inner parts of the loch is dominated by silty *L. saccharina* kelp forest (Lsac.Ft).

Infralittoral tide-swept channels and tidal rapids

One of the most interesting features of Loch Maddy is the large number of tidal channels and rapids present, especially in the central area. Some of the channels are intertidal, drying at low water, whilst others have a shallow sublittoral element, most being less than 5 m deep. The channel floors are mainly mixed stones, small boulders and coarse sediment, with bedrock and boulders forming the edges. In channels with sufficient hard, stable substrata, dense *L. hyperborea* kelp forest is present (Lhyp.TFt). A particularly good example of this lies amongst a group of small islands to the south-east of Minish Island at the entrance to Loch Minish. The kelp plants at this site are enormous, often more than 4 m in length, with large masses of epiphytes, including the hydroid *Tubularia indivisa*, the sponge *Leucosolenia botryoides* and the ascidian *Ascidiella scabra*. The channel floor is gravelly with patches of live maerl. Maerl is common in many of these channels and is mainly *Lithothamnion glaciale* (Lgla) occurring both as substantial round rhodoliths ('hedgehog stones') and as twiggy growths. *Phymatolithon calcareum* is also present, for example at the entrance to Loch Blashaval, north-east of Minish Island (Phy.R). Kelp at the latter site is also huge and includes both *L. hyperborea* and *Saccorhiza polyschides* with profuse and large growths of sponges *H. panicea* and *Leucosolenia* sp. (XKScrR). A very well developed maerl bed is present in the channel to the north of Cliasay More (Lgla). Foliose red algae are usually well developed within the maerl areas. In some channels there is insufficient stable rock present to support *L. hyperborea*, and *L. saccharina* is likely to be the main kelp present. Larger cobbles in these channels support sea-oak *Halidrys siliquosa* which, along with the kelp, supports a wide variety of epiphytes. A particularly interesting channel exhibiting these biotopes at the entrance to Loch Yeor, where very strong tidal streams occur. Tidal rapids with kelp forest are also present in the outer loch on the west side in the Lochmaddy area at the entrances to many small side lochs and inlets. These include Lochs Leiravay, Houram (Sponish Rapids) and Gheornish (Vallaquie Island) (see Thorpe *et al.* 1998).

Circalittoral rock

There is little circalittoral rock within Loch Maddy since it is a predominantly shallow loch. Steep, ledged bedrock occurs around the island of Madadh Beag at the loch entrance, extending

down to 30 m depth. The biotope is characterised by the northern sea-fan *Swiftia pallida*, the ascidian *Diazona violacea* and various erect sponges, including the nationally scarce *Phakellia ventilabrum* and *Mycale lingua* (ErSSwi). This biotope is typical of the moderately exposed conditions found at loch entrances and is present in the mouths of all the major sealochs on the east coast of the Uists and Benbecula. At a few sites within the loch, sheltered boulder slopes extend down into the circalittoral to a maximum depth of around 17 m. A typical example is found between Cliasay More and Flodday where the silty rock is dominated by ascidians, particularly *A. mentula* and to a lesser extent *C. lepadiformis*, along with *C. smithii* (AmenCio). A silt-binding turf of the filamentous alga *Trailliella* is also often present. These species also extend up into the infralittoral kelp forest as part of the understorey.

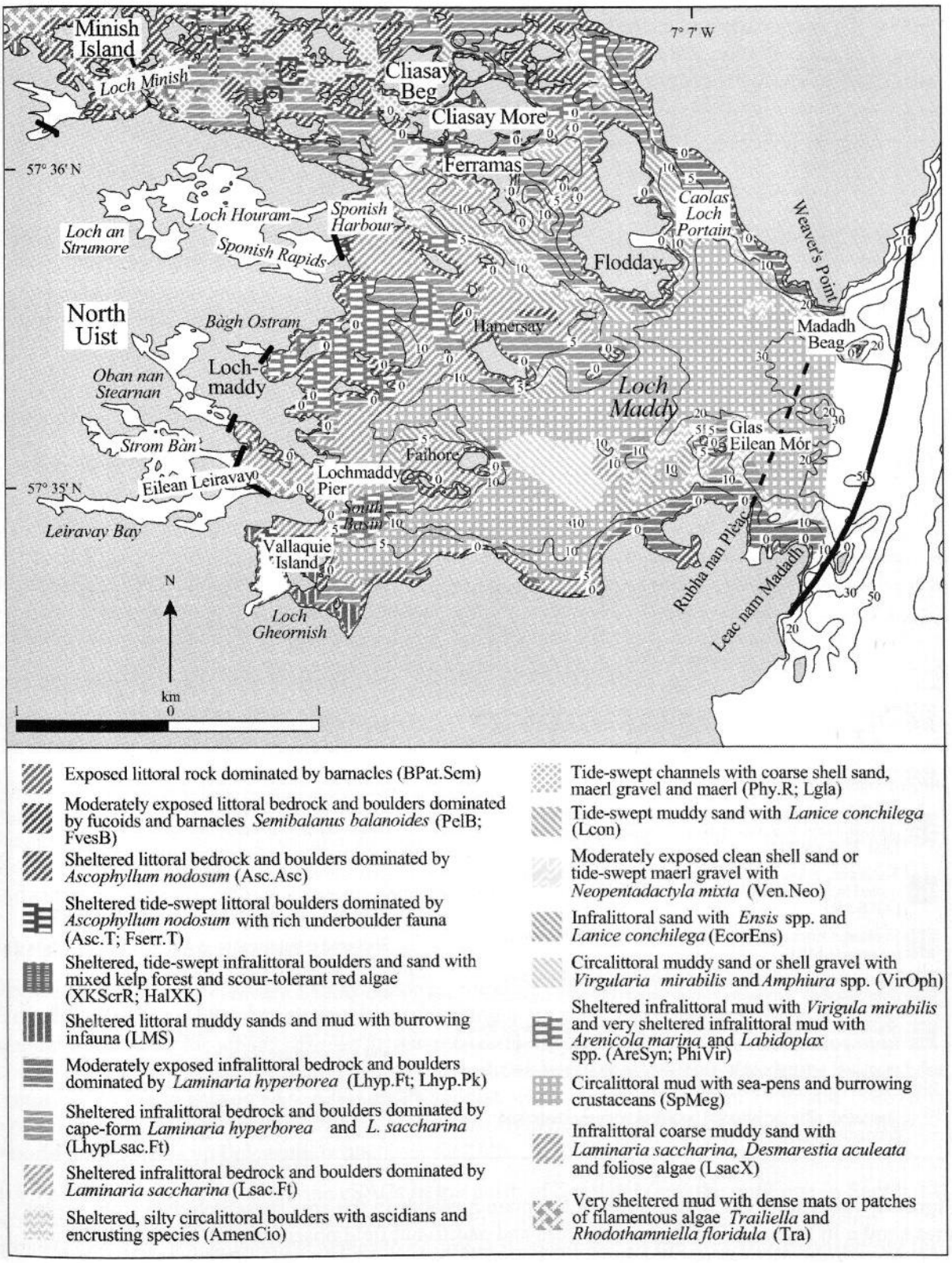
In the extremely sheltered conditions of the innermost basins of the loch, silted rock outcrops occur in very shallow water between 2–5 m depth, rising from muddy plains. Each site supports one or two predominant species. In Loch Blashaval the rock outcrops are covered with a layer of flocculent silt and support large numbers of the anemone *Sagartia elegans*, along with coralline crusts. These inner areas are probably subject to variable salinity and temperature.

Sublittoral sediment

The sheltered nature of Loch Maddy and the lack of shallow sediments at the wave-exposed entrance results in a predominance of muddy sediments throughout the loch. However, clean, shelly sand is present on the southern side of the entrance at Leac nam Madadh at about 18 m depth. This coarse sediment supports few conspicuous species apart from occasional holothurians *Neopentadactyla mixta*, the anemone *Peachia cylindrica* and some tube-dwelling polychaete worms (Ven.Neo, Lcon). Shallow infralittoral sediments in the outer part of the loch are only found close to the shore and around some of the islands. These sediments are exposed to some wave action and so are also fairly coarse, consisting of shelly sand, and are present to the north and west of Hamersay, to the south of Glas Eilean Mór and probably elsewhere in the outer loch. The sediment is characterised by a range of scour-tolerant foliose and filamentous algae such as *Desmarestia aculeata* and *Gracilaria verrucosa*, as well as *L. saccharina*, the peacock worm *Sabella pavonina* and the razor clam *Ensis arcuatus* (LsacX). Within the shelter of the middle and inner parts of the loch, coarse sediments and maerl are only present in tide-swept channels (described above).

The majority of the seabed in outer Loch Maddy consists of circalittoral muds and muddy sands. In the entrance, deep water provides shelter and there is an extensive mud plain heavily burrowed by crustaceans, mainly *Calocaris macandreae* and to a lesser extent Norway lobsters *Nephrops norvegicus* (SpMeg). The sea-pen *Pennatula phosphorea* and the gastropods *Turritella communis* and *Aporrhais pespelecani* are common. In the south basin of the outer loch, inside the entrance, the seabed lies mainly between 12–25 m. These slightly shallower sediments consist mainly of mud or shelly and sandy mud with many burrowing brittlestars *Amphiura* spp., the anemone *Cerianthus lloydii* and the sea-pen *Virgularia mirabilis* (VirOph; PhiVir).

The shallow, extremely sheltered basins of the inner loch, including Lochs Voiskinish, Portain and Blashaval, hold very soft, flocculent mud undisturbed by tidal streams or wave action but potentially exposed to changes in salinity. The mud is mounded by the burrowing activities of lugworm *Arenicola marina* and terebellid worms and often has a diatom film over the surface in summer (AreSyn). An unusual feature of these sediments in Loch Maddy is the presence of dense populations of the holothurian *Labidoplax media*. This species is relatively rare around Great Britain and not usually found in such large numbers. Acoustic surveys and drop-down video footage indicates the presence of vast areas of dense algal mats over the muds in these inner basins (Entec 1996). The densest mats occur at less than 2 m depth, with increasingly patchy cover below this (?Tra). Thus the shallowest areas (around 2 m) are probably mainly algal-dominated and the deeper areas (2–5 m) are inhabited by polychaete worms and burrowing holothurians. Similar soft mud is also found in slightly deeper water (9–10 m) at the entrance to Loch Portain, but here there are few holothurians and there are dense stands of *V. mirabilis*



- Exposed littoral rock dominated by barnacles (BPat.Scm)
- Moderately exposed littoral bedrock and boulders dominated by fucoids and barnacles *Semibalanus balanoides* (PelB; FvesB)
- Sheltered littoral bedrock and boulders dominated by *Ascophyllum nodosum* (Asc.Asc)
- Sheltered tide-swept littoral boulders dominated by *Ascophyllum nodosum* with rich underboulder fauna (Asc.T; Fserr.T)
- Sheltered, tide-swept infralittoral boulders and sand with mixed kelp forest and scour-tolerant red algae (XKScrR; HalXK)
- Sheltered littoral muddy sands and mud with burrowing infauna (LMS)
- Moderately exposed infralittoral bedrock and boulders dominated by *Laminaria hyperborea* (Lhyp.Ft; Lhyp.Pk)
- Sheltered infralittoral bedrock and boulders dominated by cape-form *Laminaria hyperborea* and *L. saccharina* (LhypLsac.Ft)
- Sheltered infralittoral bedrock and boulders dominated by *Laminaria saccharina* (Lsac.Ft)
- Sheltered, silty circalittoral boulders with ascidians and encrusting species (AmenCio)
- Tide-swept channels with coarse shell sand, maerl gravel and maerl (Phy.R; Lgla)
- Tide-swept muddy sand with *Lanice conchilega* (Lcon)
- Moderately exposed clean shell sand or tide-swept maerl gravel with *Neopentadactyla mixta* (Ven.Neo)
- Infralittoral sand with *Ensis* spp. and *Lanice conchilega* (EcorEns)
- Circalittoral muddy sand or shell gravel with *Virgularia mirabilis* and *Amphiura* spp. (VirOph)
- Sheltered infralittoral mud with *Virigula mirabilis* and very sheltered infralittoral mud with *Arenicola marina* and *Labidoplax* spp. (AreSyn; PhiVir)
- Circalittoral mud with sea-pens and burrowing crustaceans (SpMeg)
- Infralittoral coarse muddy sand with *Laminaria saccharina, Desmarestia aculeata* and foliose algae (LsacX)
- Very sheltered mud with dense mats or patches of filamentous algae *Trailiella* and *Rhodothamniella floridula* (Tra)

Figure 17.2a Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 17.1a, cited literature and additional field observations).

(PhiVir). The nationally scarce fireworks anenome *Pachycerianthus multiplicatus* has been recorded in Loch Portain. Patches of drift and moribund algae, including *Trailliella intricata*, are often found in these areas. Other sheltered areas in the outer loch, including Leiravay Bay and Loch Houram, are floored with mud (see Thorpe *et al.* 1998).

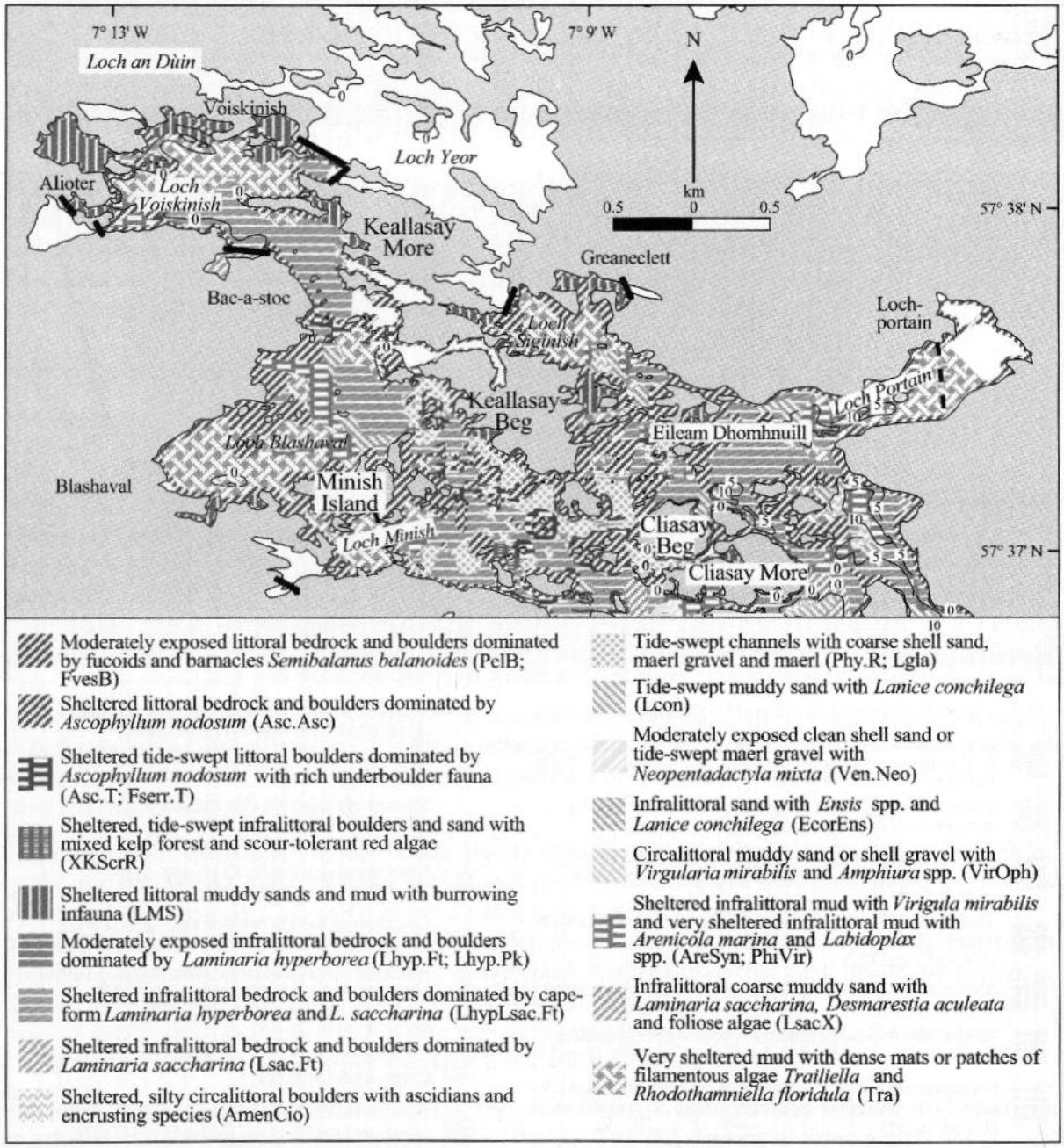


Figure 17.2b Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 17.1b, cited literature and additional field observations).

Nature conservation

Conservation sites

Site name	*Status*	*Main features*
Loch nam Madadh/Loch Maddy	cSAC	Coastal lagoons; large shallow inlets and bays
Loch Maddy and Loch an Duin	MCA	Marine biological
South Lewis, Harris and North Uist	NSA	Landscape
Loch an Duin	Ramsar	Ornithology
Loch Scadavay	Ramsar	Ornithology
Loch Scadavay	SSSI	
Loch an Duin	SSSI	Biological (transition from freshwater to brackish and fully marine conditions, and high diversity of associated habitats and communities) (Includes much of the inner part of Loch Maddy).
Machairs Robach & Newton	SSSI; GCR	

Human influences

Coastal developments and uses

The town of Lochmaddy, situated on the south side of Loch Maddy, is the main centre of population in North Uist and domestic sewage is discharged into the loch from here. There is a pier with associated facilities, which acts as a terminal for Caledonian MacBrayne ferries from Skye and Tarbert in Harris. A number of fishing boats also use the small harbour. There is another pier at Lochportain on the opposite northern shore. The A865 road runs along the southern shore to Lochmaddy, and a minor road along the northern shore to Lochportain. The outer parts of Loch Maddy have no roads or settlements. Since the seaweed processing factory at Sponish closed in 1986, there are no longer any land-based industries of any size along the coast of the loch, but tourism is of growing importance to the area. Lochmaddy has an arts centre and museum, Taigh Chearsabhagh.

Away from the town of Lochmaddy, the area remains relatively undeveloped, with minimal human impacts on the Loch Maddy system, although there are a few scattered houses in places. Most of the surrounding saltmarsh, grassland and moorland is used for sheep and cattle grazing. However, the shores of Loch Maddy have been modified in several places by the construction of causeways and culverts for roads. Shores close to roads and around Lochmaddy suffer from litter.

Marine developments and uses

Shellfish and salmon farms are located amongst the outer islands and channels of Loch Maddy. Eleven leases for shellfish farming and two for salmon are shown in Howson (1991). A small amount of creeling for lobsters *Homarus gammarus* takes place and some fish are landed at Lochmaddy. Knotted wrack *Ascophyllum nodosum* has been harvested from the shores by hand for centuries. Formerly processed at a factory at Sponish which operated between 1956 and 1986, it is now taken to Girvan in Ayrshire for processing into alginates. Some of the smaller basins offer moorings for yachts and pleasure boats.

Loch Maddy is one of three marine cSACs in the north of Scotland (and the only one in Sector 14) which form part of an EU LIFE-funded initiative. The initiative developed pilot partnership projects and SAC management schemes to ensure sustainable use of the area while conserving the environment, and was led by Western Isles Council with support from Scottish Natural Heritage.

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Sites surveyed

Excludes sites surveyed after 1994.
Survey 29: 1990 UMBSM survey of sealochs on Harris and Lewis (Howson 1991).
Survey 58: 1984 OPRU Western Isles sealochs survey (Rostron 1984).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes present*
29	52	Shore N of Cliasay Beg, Loch Maddy, North Uist	NF 928 707	57°37.2'N 07°08.7'W	YG; Ver.Ver; Fspi; Asc.T; Fserr.T; Lsac.Ft; Pel
29	54	Shore W Eileanan Dhomhnuill, Loch Maddy, North Uist	NF 932 707	57°37.3'N 07°08.3'W	YG; Ver.Ver; Asc.T; Fserr.T; Ldig.T; Pel
29	61	Shore on S Point of Flodday, Loch Maddy, North Uist	NF 943 690	57°36.4'N 07°07.1'W	Him; Cor; YG; Ver.Ver; FvesB; Fspi; Ldig.Ldig; PelB

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes present*
29	46	Basin E of Alioter, Loch Maddy, North Uist	NF 898 728	57°38.2'N 07°11.9'W	AreSyn
29	47	Middle of Loch Blashaval, Loch Maddy, North Uist	NF 907 716	57°37.6'N 07°10.9'W	IMS; AreSyn; Lsac.Ft; Beg
29	48	NE of Rifagan Minish, Loch Blashaval, Loch Maddy, North Uist	NF 910 712	57°37.5'N 07°10.5'W	Phy.R; XKScrR; Lgla
29	49	SE of Rifagan Minish, Loch Maddy, North Uist	NF 916 706	57°37.1'N 07°09.9'W	XKScrR; Lgla; Lhyp.TFt
29	50	Upper Loch Portain, Loch Maddy, North Uist	NF 942 717	57°37.8'N 07°07.4'W	AreSyn; Lsac.Ft
29	51	NW of Rubha nan Gall, Loch Portain, Loch Maddy, North Uist	NF 936 712	57°37.6'N 07°07.9'W	PhiVir; SubSoAs; LhypLsac.Pk
29	53	Channel N of Cliasay More, Loch Maddy, North Uist	NF 932 706	57°37.3'N 07°08.2'W	Lgla
29	55	E Eileanan Dhomhnuill, Loch Maddy, North Uist	NF 939 705	57°37.2'N 07°07.6'W	AmenCio; VirOph.HAs; LhypLsac; LhypLsac.Ft; Lhyp.Pk
29	56	Channel N of Flodday Point, Loch Maddy, North Uist	NF 941 702	57°37.1'N 07°07.4'W	Lsac.T; LsacChoR
29	57	S of Flodday Point, Loch Maddy, North Uist	NF 943 699	57°36.9'N 07°07.1'W	EcorEns
29	58	Between Flodday and Cliasay More, Loch Maddy, North Uist	NF 935 701	57°37.0'N 07°07.9'W	AmenCio; Lcon; Lsac.Ft
29	59	W of Ferramas, Loch Maddy, North Uist	NF 942 690	57°36.4'N 07°07.1'W	Ven.Neo; Lsac.Ft; Lsac.Pk
29	60	S Flodday, entrance to Sponish Harbour, Loch Maddy, North Uist	NF 939 691	57°36.5'N 07°07.5'W	AmenCio; Lcon; Lhyp.Ft
29	62	Middle of Charles Harbour, Loch Maddy, North Uist	NF 928 687	57°36.2'N 07°08.5'W	VirOph; LsacX; Lsac
29	63	E of Sgeir na Cuishag, Loch Maddy, North Uist	NF 932 690	57°36.4'N 07°08.2'W	LhypLsac.Ft; LsacX
29	64	South basin, Loch Maddy, North Uist	NF 937 679	57°35.8'N 07°07.5'W	PhiVir
29	65	E of Faihore, Loch Maddy, North Uist	NF 932 680	57°35.8'N 07°08.0'W	VirOph; LhypGz.Ft
29	66	N of Bàgh Aird nam Madadh, Loch Maddy, North Uist	NF 937 678	57°35.8'N 07°07.6'W	VirOph; Lsac.Pk
29	67	SW Glas Eilean Mór, Loch Maddy, North Uist	NF 946 680	57°35.9'N 07°06.7'W	LhypGz.Ft; LsacX

Sublittoral sites – continued

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes present*
29	68	SW of Madadh Beag, Loch Maddy, North Uist	NF 953 685	57°36.2'N 07°06.0'W	SpMeg
29	69	Madadh Beag, Loch Maddy, North Uist	NF 956 687	57°36.3'N 07°05.8'W	ErSSwi; Lhyp.Ft; Lsac.Pk
29	70	N Leac nam Madadh, Loch Maddy, North Uist	NF 943 676	57°35.7'N 07°06.9'W	Ven.Neo; Lcon; Lhyp.Ft; Lhyp.Pk
58	3/1	Sponish Harbour, Loch Maddy, North Uist	NF 927 697	57°36.7'N 07°08.8'W	IMX; LhypLsac.Pk
58	3/2	W of Ferramas, Loch Maddy, North Uist	NF 936 701	57°37.0'N 07°07.9'W	AmenCio; LhypLsac; Lcon; LhypLsac.Ft; Lhyp.Pk
58	3/3	N Cliassay Mhór, Loch Maddy, North Uist	NF 933 706	57°37.2'N 07°08.2'W	SIR
58	3/4	Righe Dubh Loch Portain, Loch Maddy, North Uist	NF 926 708	57°37.3'N 07°08.9'W	SIR; IMU
58	3/5	Loch Siginish, Loch Maddy, North Uist	NF 925 715	57°37.7'N 07°09.1'W	Beg
58	3/6	Cnap Ruigh Dubh, Loch Maddy, North Uist	NF 925 691	57°36.4'N 07°08.9'W	LsacX; PhiVir; Beg
58	3/8	Near pier, S of Lochmaddy, Loch Maddy, North Uist	NF 922 682	57°35.9'N 07°09.2'W	Ldig.Ldig; Lhyp.Ft

Compiled by: Ruth Beaver and Frances Dipper

18 Loch Eport

Location		
Position (centre)	NF 880 635	57°33'N 07°13'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

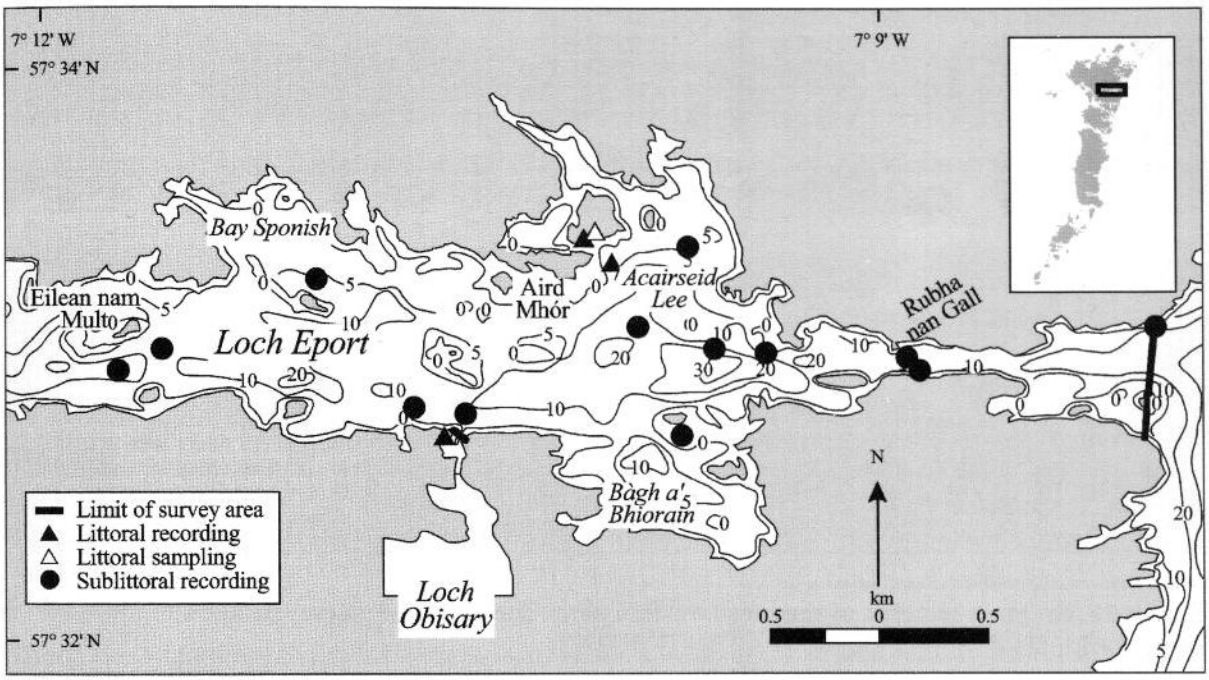

Figure 18.1a Main features of the area (eastern part), showing sites surveyed.

Physical features	
Physiographic type	Fjardic sealoch with eight sills
Length of coast	61.7 km (68.7 km including islands)
Length of inlet	10 km
Area of inlet	8.3 km^2 (8.1 km^2 excluding islands)
Bathymetry	Maximum depth 31 m
Wave exposure	Loch entrance and islands in centre of loch moderately exposed; Bay Sponish, Acairseid Lee and Bàgh a' Bhiorain extremely sheltered to sheltered; Loch Langass ultra-sheltered to extremely sheltered
Tidal streams	Strong through the entrance channel, through Loch Langass narrows and around Steisay; very weak to weak elsewhere
Tidal range	4.1 m (mean springs); 1.7 m (mean neaps) (Loch Maddy)
Salinity	Mostly fully marine; may be localised variable salinity towards head of the loch

Introduction

Loch Eport lies on the east coast of North Uist about 5 km south of the entrance to Loch Maddy (*Area summary* 17). The surrounding land is mainly low-lying and dotted with freshwater lochs. Loch Eport itself is long and narrow, and spans almost the entire width of North Uist, with only a narrow isthmus separating it from a lagoonal inlet (Oban á Chlachain) on the sandy, gently

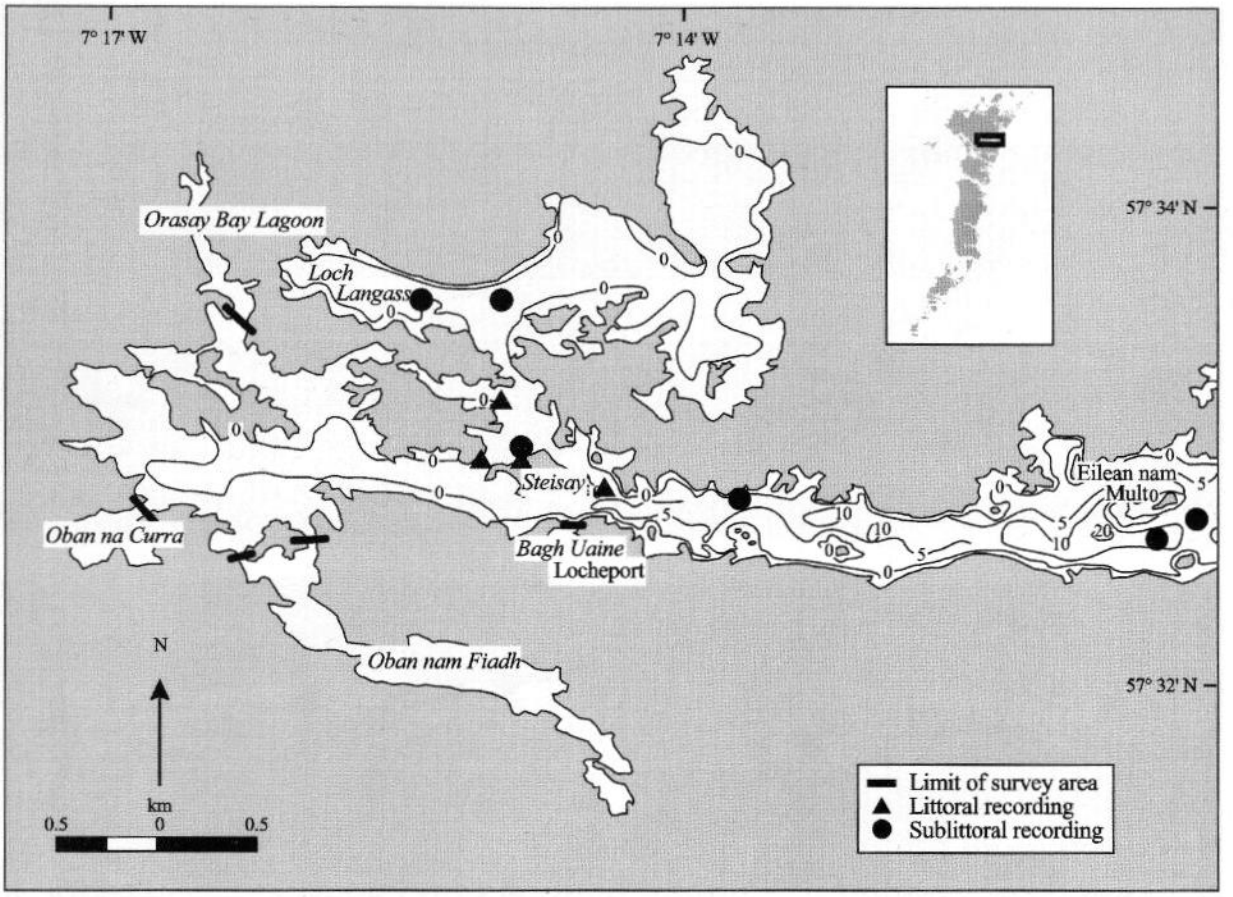

Figure 18.1b Main features of the area (western part), showing sites surveyed.

shelving west coast. The view from the top of Eaval, the highest mountain on North Uist at 347 m, south of the loch, is of a wilderness landscape with as much water as land.

Loch Eport has some fjordic features, namely a long, narrow shape and an entrance sill, but it also has several lateral basins giving it a highly irregular outline. The most noticeable and ecologically interesting feature of the loch is the long, narrow entrance channel which is rock-bound and steep-sided. Tides flow through the 15 m deep channel at up to 3 knots. Behind the entrance sill and channel lies the main basin with a maximum depth of 31 m. The side basins of Bàgh a' Bhiorain and Acairseid Lee each have one sill and there are five other sills in the main part of the loch; the first of these spans the loch north of the entrance channel to Loch Obisary. There is no charted information for Loch Langass, another large side branch off the north-west corner of Loch Eport, but it is shallow, being no more than 5 m deep. It is connected to the main loch by a broad rocky channel that dries at low tide.

Loch Eport, like Loch Maddy, has a number of lagoonal inlets surrounding the main loch (Bay Sponish, Orasay Bay lagoon, Oban na Curra, Oban nam Fiadh, Bàgh Uaine, and the large Loch Obisary) giving a complex loch system; these are described by Thorpe *et al.* (1998).

Marine biology

Marine biological surveys				
	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota)	5	May 1990	Howson (1991)
	Recording (epibiota)	1	July 1984	Rostron (1984)
	Recording (epibiota)	1	May 1979	Dipper (1980)
	Infaunal sampling (cores)	1	May 1990	Howson (1991)
Sublittoral	Recording (epibiota)	7	May 1990	Howson (1991)
	Recording (epibiota)	8	July 1984	Rostron (1984)
	Recording (epibiota)	2	May 1979	Dipper and Mitchell (1980)
	Recording (epibiota)	1	May 1978	Dipper (1980)

Littoral

The majority of the shores throughout Loch Eport are rocky, consisting of either bedrock or boulder slopes. There are small areas of muddy sediment in the side arms and bays around the loch.

Shores in the shelter of side arms such as Acairseid Lee are mainly boulders and cobbles with the eulittoral typically dominated by the knotted wrack *Ascophyllum nodosum* with the red alga *Catenella caespitosa* (Asc.Asc). The east side of Aird Mhór in Acairseid Lee has a steep boulder slope on the lower shore, again dominated by fucoid algae, with the ascidian *Polyclinum aurantium* frequent on the undersides of boulders (Fser.Fser.Bo). Shores dominated by *A. nodosum* are also present on the south side at the entrance to Loch Obisary and are likely to be widespread throughout the sheltered areas of Loch Eport.

Strong tides run through Loch Langass narrows and the channels around Steisay towards the head of Loch Eport. The shores around Steisay consist of steep boulder slopes with small amounts of bedrock, while Langass Narrows is a wide, gradually sloping shore. These sheltered shores are also dominated by *A. nodosum* but support a much wider variety of under-boulder fauna as a result of the strong tidal streams (Asc.T). The effects of strong tidal streams are most marked in the lower eulittoral zone since higher up the shore the strength of the flow is attenuated as the channel widens. Here, the shore is characterised by zones of channelled wrack *Pelvetia canaliculata* (Pel) and spiral wrack *Fucus spiralis* (Fspi). The lower eulittoral is dominated by serrated wrack *Fucus serratus* with some *A. nodosum* (Fserr.T). The algae are covered with hydroids *Dynamena pumila*, *Clava multicornis* and *Sarsia* sp., which flourish in strong tidal streams, while the red algae *Gelidium pusillum* and *Rhodothamniella floridula* are both common as silt-binding mats on rock surfaces. Animal communities are diverse in the mid and lower eulittoral zones, with many species found on the sides and beneath the boulders. Unusually large examples of the sponges *Grantia compressa* and *Halichondria panicea* and the ascidians *P. aurantium*, *Dendrodoa grossularia*, *Ascidiella scabra* and *Ascidia conchilega* are common here, while the barnacle *Semibalanus balanoides* is sparse. The sublittoral fringe is dominated by kelp *Laminaria digitata* with a diverse associated flora and fauna (Ldig.T). A variety of red and green algae grow with the kelp, including *Mastocarpus stellatus*, *Palmaria palmata*, *Dilsea carnosa*, *Cryptopleura ramosa* and *Polysiphonia stricta*. Saddle oysters are abundant beneath the boulders and the dahlia anemone *Urticina felina* occurs on gravel patches.

The narrows at the entrance to Loch Obisary are also subject to strong tidal streams but are dominated by the fucoid *Fucus ceranoides* which is typically found in intertidal areas with lowered salinity (Fcer) (see Thorpe *et al.* 1998).

Two small, sediment-filled embayments are found in Loch Eport. The island of Steisay has a small bay on the east side containing soft, black mud (MacAre). The west part of Acairseid Lee, which

dries at low tide, contains poorly sorted sediment which is soft and brown on the surface and gravelly and grey beneath. The only visible life at both sites are lugworms *Arenicola marina*.

Sublittoral

Extensive bedrock and boulder slopes extend into the circalittoral in the loch entrance and within the narrows area of Rubha nan Gall leading into the loch. In these areas the rock–sediment boundary lies at 20–25 m depth. Throughout the rest of Loch Eport the rock extends only to 3–10 m depth. Sediments vary from coarse sands in tide-swept channels to fine muds in sheltered embayments. As a result of the constricted entrance to Loch Eport, shelly mud and sand, which supports the sea-pen *Virgularia mirabilis*, the anemone *Cerianthus lloydii* and burrowing brittlestars *Amphiura* spp., and is widespread at moderate depths in the outer parts of most sealochs in Sector 14, is absent.

Infralittoral rock

A dense *Laminaria hyperborea* kelp forest grows at the moderately wave-exposed entrance to Loch Eport to a depth of around 9 m (Lhyp.Ft), followed by a kelp park down to around 17 m (Lhyp.Pk). Most rock surfaces have some silt covering but there is a reasonable understorey of foliose algae, typically including the red algae *Phycodrys rubens*, *Brongniartella byssoides*, *C. ramosa*, *Bonnemaisonia hamifera (Trailliella)* and *Delesseria sanguinea*. Conspicuous epifauna include the cup coral *Caryophyllia smithii* and the ascidian *Ascidia mentula*. The common urchin *Echinus esculentus* is also common. *L. hyperborea* is also predominant on the rocky sides and boulder outcrops of the tide-swept entrance channel.

Within the shelter of the main loch, the kelp forests are either dominated by *Laminaria saccharina* or by a mixture of *L. hyperborea* and *L. saccharina*. Silty kelp forest, dominated by cape-form *L. hyperborea* with *L. saccharina*, is widespread around the islands in the main basin, for example, at Eilean nam Mult, at the entrance to Bay Sponish and on outcrops in Bàgh a' Bhiorain (LhypLsac.Ft). Associated foliose algae include *P. rubens*, *Desmarestia viridis*, *Bonnemaisonia asparagoides*, *Dictyota dichotoma* and bootlace weed *Chorda filum* in the shallow areas. Fauna in these sheltered kelp forests are typically dominated by ascidians, in particular *A. mentula*, *Dendrodoa grossularia* and *Clavelina lepadiformis*, with the grey topshell *Gibbula cineraria* and *E. esculentus* also common. A species-poor kelp forest of *L. hyperborea* with a sparse understorey of *Heterosiphonia plumosa*, *D. dichotoma* and solitary ascidians is present in Loch Langass, where it may be subject to salinity temperature changes (LhypLsac.Ft). At Rubha nan Gall, kelp forest dominated by *L. saccharina* is also widespread, for example, west of the entrance to Loch Eport, and in the channel at Locheport down to a depth of 6–8 m (Lsac.Ft). This supports a varied understorey with the red algae *Porphyropsis coccinea*, *B. asparagoides*, *Callophyllis laciniata*, *Polysiphonia elongata* and brown alga *D. dichotoma*. Fauna includes *C. smithii*, the hydroid *Nemertesia antennina*, *E. esculentus* and *A. mentula*. A small rock outcrop at 9 m adjacent to the Loch Obisary entrance is characterised by *L. saccharina* with *E. esculentus*.

Circalittoral rock

Circalittoral rock in the loch entrance is moderately exposed and characterised by the northern sea-fan *Swiftia pallida* (ErSSwi). Other species present at this site, and which are usually found in association with *S. pallida*, include the erect sponges *Axinella infundibuliformis* and *Stelligera stuposa*, the brachiopod *Neocrania anomala*, the bryozoan *Porella compressa* and the ascidian *Polycarpa pomaria*. Circalittoral tide-swept bedrock and boulders are found in the entrance channel. At Rubha nan Gall the hydroid *Tubularia larynx* dominates vertical bedrock along with the jewel anemone *Corynactis viridis* and the rock-boring sponge *Cliona celata*, interspersed with the bryozoan *Securiflustra securifrons* and various didemnid ascidians, creating a very scenic biotope (AlcTub). Huge boulders in the narrowest part of the entrance channel also support this biotope.

In the narrow tide-swept entrance channel there is an extensive area of cobbles and pebbles lying on coarse shell gravel at 14–21 m depth. The cobbles are dominated by bryozoans and a range of hydroids including *Rhizocaulus verticillatus*, *Sertularia argentea*, *Abietinaria abietina* and *N. antennina*, all of which are characteristic of scoured and unstable substrata. The bryozoans *Parasmittina trispinosa* and *Eucratea loricata* are frequent, the former as a scour-tolerant crust and the latter in a flexible branching form. Grazing animals are numerous, including the chiton *Leptochiton asellus*, the topshell *Gibbula tumida*, and the sea urchins *Psammechinus miliaris* and *E. esculentus*. A small amphipod *Dyopedos porrectus*, which builds sediment whips in strong tidal streams, is also common. Small foliose algae cover all but the deepest stones with species such as *Pterosiphonia parasitica*, *D. sanguinea*, *Rhodophyllis divaricata*, *Calliblepharis ciliata* and *Porphyra miniata* (EphR). There is very little circalittoral rock within Loch Eport. On the west side of Eilean nam Mult, silty boulders extend down to 11 m depth. Surfaces are colonised predominantly by the ascidians *Ascidia mentula* and *Clavelina lepadiformis*, the hydroids *Halecium halecinum*, *N. antennina* and *Nemertesia ramosa*, and the sponges *Polymastia mamillaris* and *Polymastia boletiformis* (SubSoAs).

Sublittoral sediments

Coarse sediments are restricted to areas exposed to tidal streams in the entrance channel. A number of infaunal species characteristic of coarse sediments are also present, including the holothurian *Neopentadactyla mixta*, the polychaete *Chaetopterus variopedatus* and the bivalves *Clausinella fasciata* and *Tapes rhomboides* (Ven.Neo).

Fine muddy shell-gravel and sand is found in the middle of the basin west of the entrance channel, since this area is still scoured to some extent by tidal flow through the narrows. The elegant tubes of the sand mason worm *Lanice conchilega* and the feathery tentacles of *N. mixta* characterise these sediments (Ven.Neo). The influence of tidal streams continues for some distance along the loch and shallow sediments as far west as Eilean nan Mult consist of coarse muddy shell gravel or muddy fine sand characterised by *L. conchilega* and *C. lloydii* with smaller numbers of the scallop *Pecten maximus* and razor shell *Ensis* spp. (Lcon). Maerl is found just inside Loch Langass and just south of the tide-swept channel joining this arm with the main loch (Mrl, Phy.R). Small amounts of maerl are also present at other sites with some tidal flow. Species associated with the maerl include the peacock fan worm *Sabella pavonina*, the foliose algae *H. plumosa* and *Cystoclonium purpureum* and the snakelocks anemone *Anemonia viridis*.

The seabed in sheltered embayments including Acairseid Lee, Bàgh a' Bhiorain, Bay Sponish and Loch Langass consists of soft mud with occasional pebbles at depths down to 12 m. Depending on the consistency of the mud and the depth, these sediments may be dominated by algae or be fairly barren. The mud in Bàgh a' Bhiorain has few algae and is characterised by lugworms *A. marina*, the crab *Liocarcinus depurator*, the ascidian *A. mentula* and various terebellids (AreSyn). In Bay Sponish and around the entrance to Loch Obisary, the sea-pen *Virgularia mirabilis* also occurs in the mud (PhiVir). The rarely recorded nudibranch *Armina loveni* was observed feeding on *V. mirabilis* at the entrance to Loch Obisary during an early Nature Conservancy Council survey (Dipper 1980). It has also been recorded more recently from one site in Loch Uiskevagh (*Area summary* 19) (Howson 1991). Algal-dominated muds occur in Acairseid Lee, where mats of filamentous algae cover the mud surface (Tra), and in Loch Langass, although the latter has not been surveyed in detail (IMU). Where pebbles provide stable attachment surfaces in Bagh a' Bhiorain, the algae *L. saccharina*, *C. filum*, *Furcellaria lumbricalis*, *Cladophora rupestris*, *Ulva* sp. and *Halidrys siliquosa* occur (LsacX). The green opisthobranch *Elysia viridis* is also found at several sites feeding on green algae such as *Ulva* sp. and *C. rupestris*.

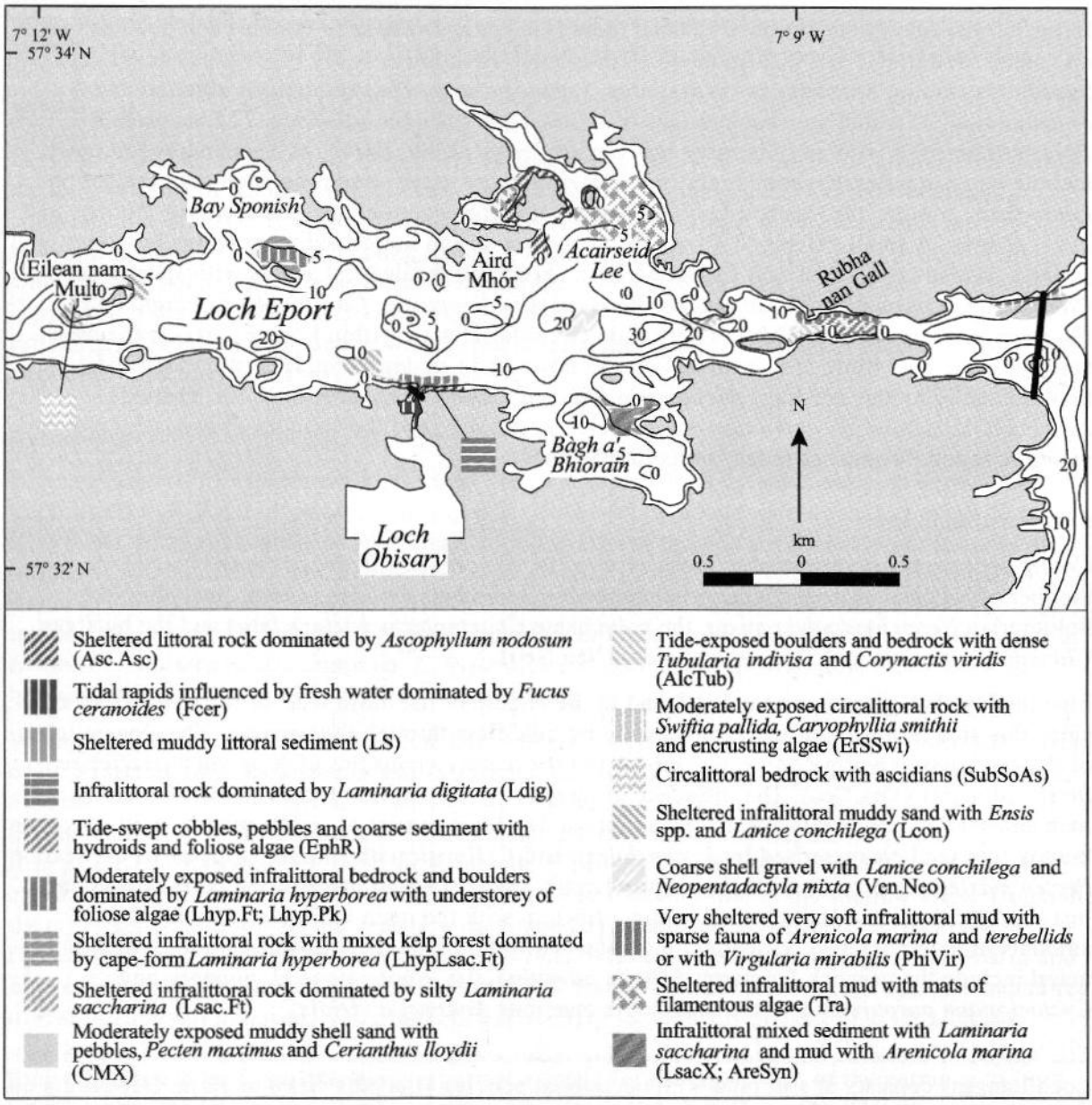

Figure 18.2a Indicative distribution of the main biotopes in the area (eastern part) (based on data from survey sites shown in Figure 18.1a, cited literature and additional field observations).

Nature conservation

Conservation sites

Site name	*Status*	*Main features*
Obain Loch Euphoirt	cSAC	Coastal lagoons
Obain Loch Euphoirt	SSSI	Coastal lagoons; marine flora and fauna
Loch Obisary	SSSI	Lagoons; marine flora and fauna
South Lewis, Harris and North Uist	NSA	Landscape

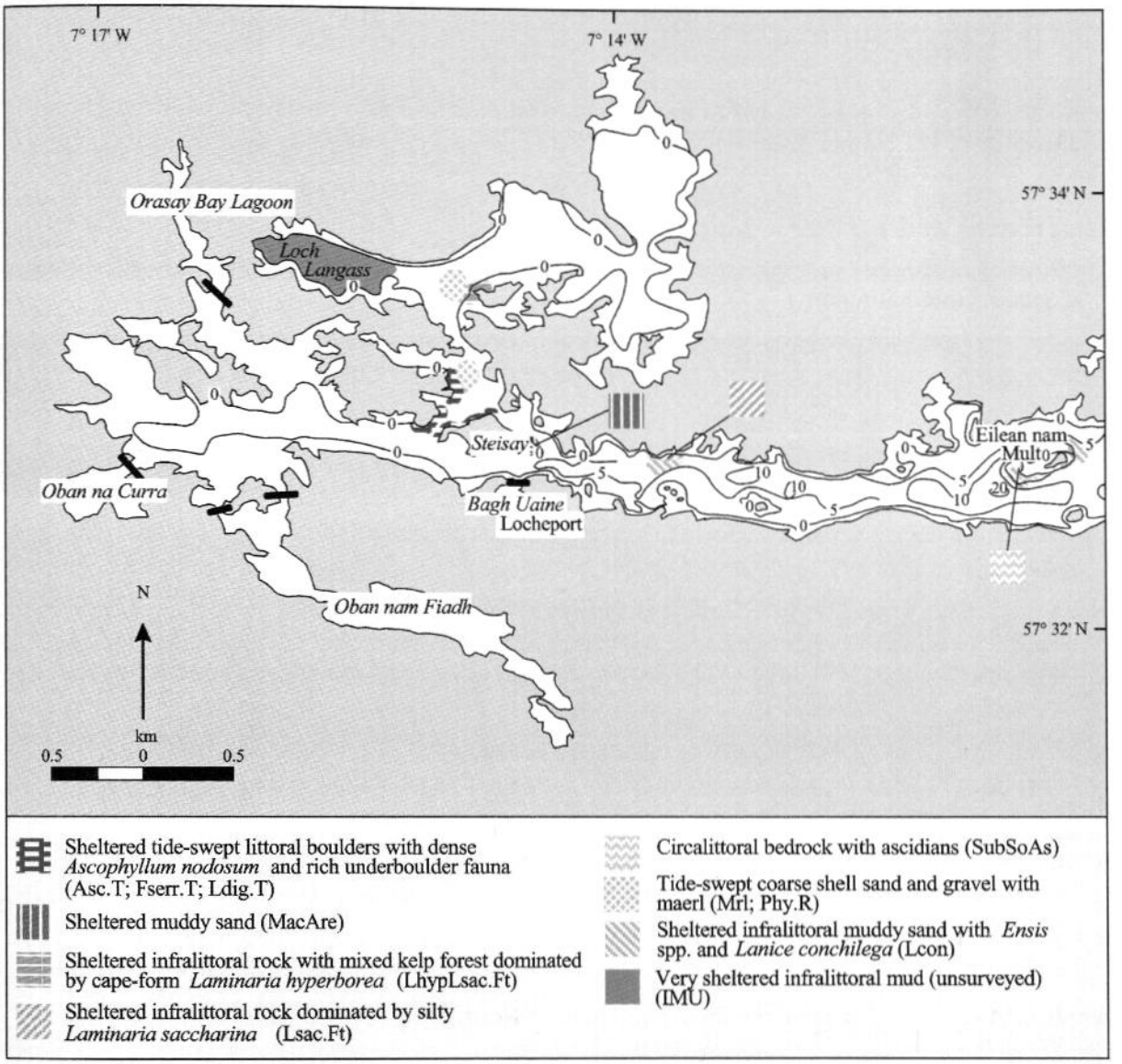

Figure 18.2b Indicative distribution of the main biotopes in the area (western part) (based on data from survey sites shown in Figure 18.1b, cited literature and additional field observations).

Human influences

Coastal developments and uses

A minor road runs close along the southern shore of Loch Eport, ending at Drim-Sidinish opposite Bay Sponish. There are a number of crofts scattered along its length and a pier just off the road at the head of the loch. In contrast, the northern shore of the loch has no road access and is almost completely uninhabited except for a few buildings at Langass. Outer parts of the loch are inaccessible by land.

Marine developments and uses

There has been one lease granted for a salmon farm and three leases for shellfish rafts, all on the northern side of the loch between Roisinish Bay, west of Eilean nam Mult, and Acairseid Lee. In addition, there is a salmon hatchery which discharges effluent directly into Loch Langass.

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Sites surveyed

Survey 29: 1990 UMBSM survey of sealochs of North and South Uist and Benbecula (Howson 1991).
Survey 58: 1984 OPRU Western Isles sealochs survey (Rostron 1984).
Survey 59: 1979 NCC Uists & Outer Hebrides sublittoral survey (Dipper & Mitchell 1980).
Survey 200: 1978 NCC preliminary survey of Loch Obisary (Dipper 1980).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
29	33	Shore on headland W of Steisay, Loch Eport, North Uist	NF 847 638	57°33.2'N 07°16.3'W	YG; Ver.Ver; Pel; Fspi; Asc.T; Fserr.T
29	34	Shore in Langass Narrows, Loch Eport, North Uist	NF 849 640	57°33.3'N 07°16.1'W	Pel; Fspi; Asc.T; Fserr.T; Ldig.T
29	35	Shore at E end of Steisay, Loch Eport, North Uist	NF 854 637	57°33.2'N 07°15.6'W	YG; Ver.Ver; Fspi; Asc.T; Fserr.T; MacAre

Littoral sites – continued

Survey	Site	Place	Grid reference	Latitude/longitude	Biotopes recorded
29	38	Inner shore W of Acairseid Lee, Loch Eport, North Uist	NF 903 641	57°33.6'N 07°10.7'W	LS; Asc
29	39	Shore W of Acairseid Lee, Loch Eport, North Uist	NF 904 640	57°33.6'N 07°10.5'W	Fser.Fser.Bo; Pel; Asc.Asc
58	2/3	N Steisay, Loch Langass, Loch Eport, North Uist	NF 850 640	57°33.3'N 07°16.0'W	HalXK
200	11	N connection between lochs, Loch Obisary, North Uist	NF 897 632	57°33.1'N 07°11.3'W	F

Sublittoral sites

Survey	Site	Place	Grid reference	Latitude/longitude	Biotopes recorded
29	36	N of Treanay, Loch Eport, North Uist	NF 891 639	57°33.5'N 07°11.9'W	LhypLsac; PhiVir
29	37	W of entrance to Loch Obisary, Loch Eport, North Uist	NF 895 633	57°33.2'N 07°11.4'W	Lsac.Ft; Lsac.Pk; Lcon
29	40	Acairseid Lee, Loch Eport, North Uist	NF 908 640	57°33.6'N 07°10.2'W	Tra
29	41	SW of Rubha nan Gall, Loch Eport, North Uist	NF 911 635	57°33.4'N 07°09.8'W	Lsac.Ft; AlcTub; FaSwV
29	42	NE Bagh a' Bhiorain, Loch Eport, North Uist	NF 909 636	57°33.4'N 07°10.0'W	LhypLsac.Ft; AreSyn
29	43	Entrance Channel, Loch Eport, North Uist	NF 918 635	57°33.4'N 07°09.2'W	EphR; AlcTub; Ven.Neo
29	44	S Buaile Caragarry, Loch Eport, North Uist	NF 929 637	57°33.5'N 07°08.0'W	CMX; Lhyp.Ft; Lhyp.Pk; ErSSwi
58	2/1	Loch Langlass, Loch Eport, North Uist	NF 845 647	57°33.7'N 07°16.6'W	IMU
58	2/2	S Loch Langass, Loch Eport, North Uist	NF 849 647	57°33.7'N 07°16.2'W	LhypLsac.Ft; Lcon; Mrl
58	2/3	N Steisay, Loch Langass, Loch Eport, North Uist	NF 850 640	57°33.3'N 07°16.0'W	XKScrR; Phy.R
58	2/4	Loch Eport, Loch Eport, North Uist	NF 882 635	57°33.2'N 07°12.8'W	SubSoAs; Lcon
58	2/5	N of Sheilings, Loch Eport, North Uist	NF 884 636	57°33.3'N 07°12.6'W	LhypLsac.Ft; Lcon
58	2/6	Riffag Mhor, Loch Eport, North Uist	NF 908 632	57°33.1'N 07°10.2'W	AreSyn; LsacX
58	2/7	E Aird Mhor, Loch Eport, North Uist	NF 906 637	57°33.4'N 07°10.4'W	Ven.Neo
58	2/8	Inner loch, Loch Eport, North Uist	NF 861 637	57°33.2'N 07°14.9'W	Lsac.Ft; Phy.R; Lcon
59	13	S inner entrance (the Hole), Loch Eport, North Uist	NF 919 635	57°33.3'N 07°09.1'W	LsacSac; FaAlC
200	15	N of connection with Loch Eport, Loch Obisary, North Uist	NF 898 633	57°33.1'N 07°11.2'W	Ldig; Lsac.Pk; PhiVir

Compiled by: Ruth Beaver and Frances Dipper

19 Loch Uiskevagh

Location		
Position (centre)	NF 855 510	57°26'N 07°15'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

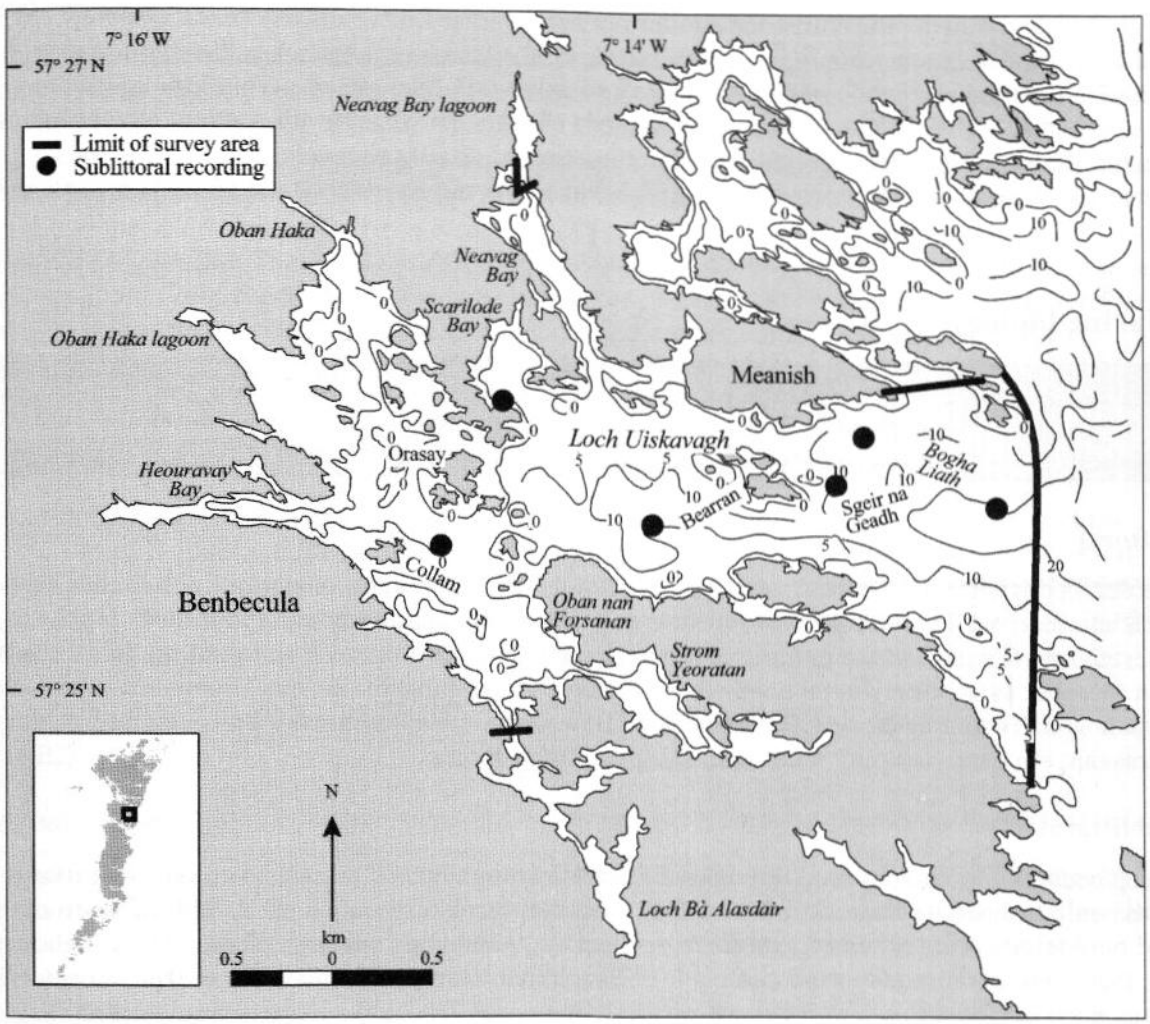

Figure 19.1 Main features of the area, showing sites surveyed.

Physical features	
Physiographic type	Fjardic sealoch with one sill
Length of coast	33.6 km (42.6 km including islands)
Length of inlet	4.65 km
Area of inlet	5.1 km^2 (4.9 km^2 excluding islands)
Bathymetry	Maximum 25 m at entrance; central loch and inner basin mostly less than 10 m
Wave exposure	Moderately exposed at entrance; sheltered to extremely sheltered throughout most of loch
Tidal streams	Weak to very weak but probably slightly stronger through channels
Tidal range	4.1 m (mean springs); 1.7 m (mean neaps) (Loch Maddy)
Salinity	Fully marine

Introduction

Loch Uiskevagh is situated on the east coast of Benbecula, a large island sandwiched between North and South Uist and separated from them by shallow sublittoral sand-flats. Most of Benbecula is low-lying, flat and peat-covered with stretches of bare rock and many fresh and brackish-water lochans that teem with wildlife in summer. In contrast to the fjordic sealochs of Harris and Lewis, which cut deep into the interior and have steep sides and deep basins, the sealochs in the Uists and Benbecula are shallow, fjardic systems. They have highly irregular outlines and many small islands, sills and side basins. Generally, a high proportion of these lochs is intertidal, and in Loch Uiskevagh almost half the loch area is above chart datum, whilst 89% is shallower than 5 m depth. Whilst the similar but much larger Loch Boisdale (*Area summary* 25) and Loch Maddy (*Area summary* 17) have strong tidal streams between islets and in channels, Loch Uiskevagh has a less complex structure and only weak tidal streams. This results in a lower diversity of habitats. The loch has a long entrance channel and a single sill south of Orasay island. Behind the sill is an extensive shallow area consisting of smaller channels, inlets and islands. Three silled saline lagoon inlets off Loch Uiskevagh (Neavag Bay lagoon, Oban Haka lagoon and Loch Bà Alasdair) are described by Thorpe *et al.* (1998).

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Sublittoral	Recording (epibiota)	6	May 1990	Howson (1991)

Littoral

No detailed studies have been made of the shores in Loch Uiskevagh. Steep bedrock occurs in the loch entrance, whilst more gradual bedrock slopes are common throughout the loch. Extensive intertidal reefs surround the majority of islands and islets. The sheltered nature of the loch means that these areas are likely to be dominated by fucoid algae. Most of the small bays in the inner and middle loch, including Neavag Bay, Scarilode Bay, Oban Haka, Heouravay Bay and Oban nan Forsanan, are gently sloping with sand, shingle or mud shores.

Sublittoral

Steep bedrock slopes are found throughout Loch Uiskevagh but only extend into the circalittoral at the entrance, where bedrock meets muddy sand at a depth of about 24 m. Sublittoral bedrock and boulder areas are all silted except for vertical or overhanging surfaces. Sediment throughout the loch consists of muddy sand and mud. The sediments are sandier in the more exposed outer parts, becoming increasingly finer and muddier westwards, where the effect of wave action is diminished. Behind the sill south of Orasay, in channels between rocky slopes in the littoral and infralittoral, there are areas of coarser sediments of shelly sand and maerl resulting from slightly increased tidal streams. However, most of the sediment in the inner basin is soft mud.

Infralittoral rock

Infralittoral bedrock in Loch Uiskevagh supports silty kelp forests that have characteristics of several different kelp biotopes. Even at the mouth this loch is fairly sheltered, and clean *Laminaria hyperborea* kelp forests characteristic of exposed conditions are not found. Instead, in the area south of Meanish, a silty *L. hyperborea* forest with scattered plants of *Laminaria saccharina* and *Saccorhiza polyschides* predominates (Lhyp.Ft), whilst at Bogha Liath and Sgeir na Geadh both kelps occur either mixed together or in bands, often in the cape form (LhypLsac.Ft). At Meanish understorey fauna and flora are sparse, probably due to grazing by the common urchin *Echinus esculentus*. Rock surfaces are silty with a cover of algal crusts and patches of foliose algae, although not in any great abundance. The red algae *Phycodrys rubens*,

Cryptopleura ramosa and *Polysiphonia stricta* are found growing sparsely on kelp stipes. Animal species tend to be those which are silt-tolerant and resistant to grazing and are therefore common to many habitat types. They include the keel worm *Pomatoceros triqueter*, the featherstar *Antedon bifida*, the cup-coral *Caryophyllia smithii* and a variety of solitary ascidians. The sea hare *Aplysia punctata* feeds on red foliose algae in the understorey, while the dahlia anemone *Urticina felina* is common in rock crevices and the anemone *Sagartia elegans* is found on steep bedrock. The areas of mixed kelp forest support a richer understorey of foliose algae, although the assemblage of species is very similar. There are greater numbers of *C. smithii*, *U. felina*, *S. elegans* and the grazing topshells *Gibbula cineraria* and *Calliostoma zizyphinum*, but there are fewer solitary ascidians.

Infralittoral rock in the sheltered inner loch south and west of Orasay generally extends down to around 6 m depth, with the exception of the channel between Orasay and Collam. Here a bedrock outcrop extends down to 14 m depth. This site is sheltered and the upper 9 m of rock is dominated by a forest of cape-form *L. hyperborea* which thins out with increasing depth (LhypLsac.Ft). Rock surfaces beneath the kelp are encrusted with coralline algae and a reasonably diverse understorey of foliose species including *Dictyota dichotoma*, *Desmarestia aculeata*, and *Bonnemaisonia hamifera (Trailliella)*. The red algae *Porphyropsis coccinea*, *Delesseria sanguinea* and *C. ramosa* are common on kelp stipes. As well as the algae, large numbers of the ascidians *Ascidiella aspersa* and *Ciona intestinalis* characterise the understorey and are particularly common on vertical surfaces. Below 9 m the bedrock breaks up to form a silty boulder slope interspersed with thick sediment underneath the boulders, and the density of ascidians increases (AmenCio).

Circalittoral rock

Circalittoral rock is only present in the moderately exposed outer parts of the loch. Around the rocky islet of Bogha Liath in the entrance, steep bedrock below the kelp-dominated infralittoral zone is characterised by the northern sea-fan *Swiftia pallida*, the cup-coral *C. smithii* and patches of the jewel anemone *Corynactis viridis* (ErSSwi). Large fissures in the bedrock provide suitable environments for the squat lobster *Munida rugosa*, the brachiopod *Neocrania anomala* and the holothurian *Pawsonia saxicola*. Vertical bedrock to the south of Sgeir na Geadh in the entrance channel, is dominated by soft corals *Alcyonium digitatum, C. smithii* and featherstars *Antedon* spp. (FaAIC).

Sublittoral sediments

Fine to coarse burrowed sand is found in outer Loch Uiskevagh to the south-east of Meanish at depths between 5–9 m. Shells provide attachment for patches of foliose and filamentous algae and occasionally for kelp *Laminaria saccharina*, especially at shallower depths (LsacX). Infauna include numerous razor clams *Ensis arcuatus*, as well as lugworm *Arenicola marina*, the polychaetes *Chaetopterus variopedatus*, the anemone *Cerianthus lloydii* and the holothurian *Labidoplax digitata*. Surface fauna include the starfish *Asterias rubens*, the topshell *Gibbula magus* and the sand mason worm *Lanice conchilega*.

Circalittoral muddy and shelly sand below about 10 m depth in the central basin and out through the entrance channel is dominated by the sea-pen *Virgularia mirabilis* and the brittlestars *Ophiura ophiura* and *Ophiura albida* (VirOph). Other burrowing brittlestars *Amphiura* spp. are also characteristic of this habitat and are extremely abundant west of Bearran. *C. variopedatus* and *L. conchilega* are also found in this habitat along with *C. lloydii*. There can be small amounts of foliose red algae, including *Bonnemaisonia hamifera (Trailliella)* and *D. sanguinea*, at the shallower depths. This sediment biotope is extremely common in the outer parts of Scottish sealochs.

The more enclosed, remote parts of Loch Uiskevagh behind the sill, including Oban nan Forsanan and Strom Yeoratan, are sheltered to extremely sheltered with weak to very weak tidal streams. Sediments in these areas, which range in depth from 1–6 m, are of soft, easily penetrable mud with few shells. Algal mats predominate with areas of fine filamentous red turfs (Tra) or a variety

of predominantly brown foliose algae. These include *Asperococcus turneri*, *Desmarestia viridis*, *Bonnemaisonia asparagoides*, *D. dichotoma*, *Gracilaria verrucosa* and *Enteromorpha* sp. with some cape-form *L. saccharina* and bootlace weed *Chorda filum*. Fauna include *A. marina*, the ascidians *A. aspersa* and *Diplosoma listerianum* and the burrowing holothurians *Labidoplax media* and *Thyone fusus*.

In some parts of the inner loch there are outcrops of bedrock from the mud with a covering of red coralline crusts and some *L. saccharina* in the shallowest parts. Animal species found on the rock are tolerant of high silt levels but are not exclusive to sheltered silty rock and include *A. aspersa*, the peacock fan worm *Sabella pavonina*, the sponges *Cliona celata*, *Polymastia mamillaris* and *Clavelina lepadiformis* and the bryozoan *Alcyonidium hirsutum*. At the entrance to Strom Yeoratan, tidal streams are slightly increased. Bedrock outcrops here, along with the sediment around them, are densely covered by holothurians, probably *Thyone* sp. or *Thyonidium* sp., to the exclusion of virtually all other macrofauna. The entrance to Heouravay Bay similarly experiences slightly increased tidal streams and the mud here supports large numbers of filter-feeding burrowing holothurians, mainly *Thyone* sp. This occurrence of high densities of these holothurians is very uncommon.

The deeper channel to the south of Orasay is also slightly tide-swept, and beyond the boulder slope, which ends at 14 m depth, is an area of muddy shell-gravel with some maerl attached to shells (Phy). The holothurian *Neopentadactyla mixta* is a characteristic inhabitant of this coarser sediment (Ven.Neo). Other infauna include *E. arcuatus*, *C. variopedatus* and *L. digitata*, while the sediment surface is inhabited by *L. conchilega* and the scallop *Pecten maximus*. Sparse foliose red and brown algae are also present, including *Desmarestia aculeata*, *Brongniartella byssoides*, *D. dichotoma*, *Plocamium cartilagineum*, *Lomentaria clavellosa* and *Ulva sp.*

Soft muds are also found in the central part of Loch Uiskevagh in Scarilode Bay and probably also in Neavag Bay, although the latter has not been surveyed. Algal mats also occur here, but in addition there are patches where the sea-pen *V. mirabilis* predominates along with *A. marina* and terebellid worms (PhiVir). The rarely recorded nudibranch *Armina loveni* has been observed here feeding on *V. mirabilis*; this species has also been recorded from Loch Eport (*Area summary* 18).

Nature conservation

There are no designated nature conservation sites in the area at present.

Human influences

Coastal developments and uses

There is little habitation around Loch Uiskevagh. The tiny settlement of Uiskevagh, situated on the south side at the head of Strom Yeoratan, is served by a minor road from the south. A track runs to Scarilode Bay on the north shore, where there is a pier, but there is no vehicle access to other parts of the loch.

Marine developments and uses

Commercial harvesting of knotted wrack *Ascophyllum nodosum*, which at one time was the mainstay of the Uist economy, still takes place on the shores of Loch Uiskevagh.

Loch Uiskevagh and the nearby island-dotted sea areas to the south and north are heavily used for fish farming. Leases for three salmon sites and three shellfish sites have been granted (data correct at 1 April 1993). There is a pier at Scarilode Bay.

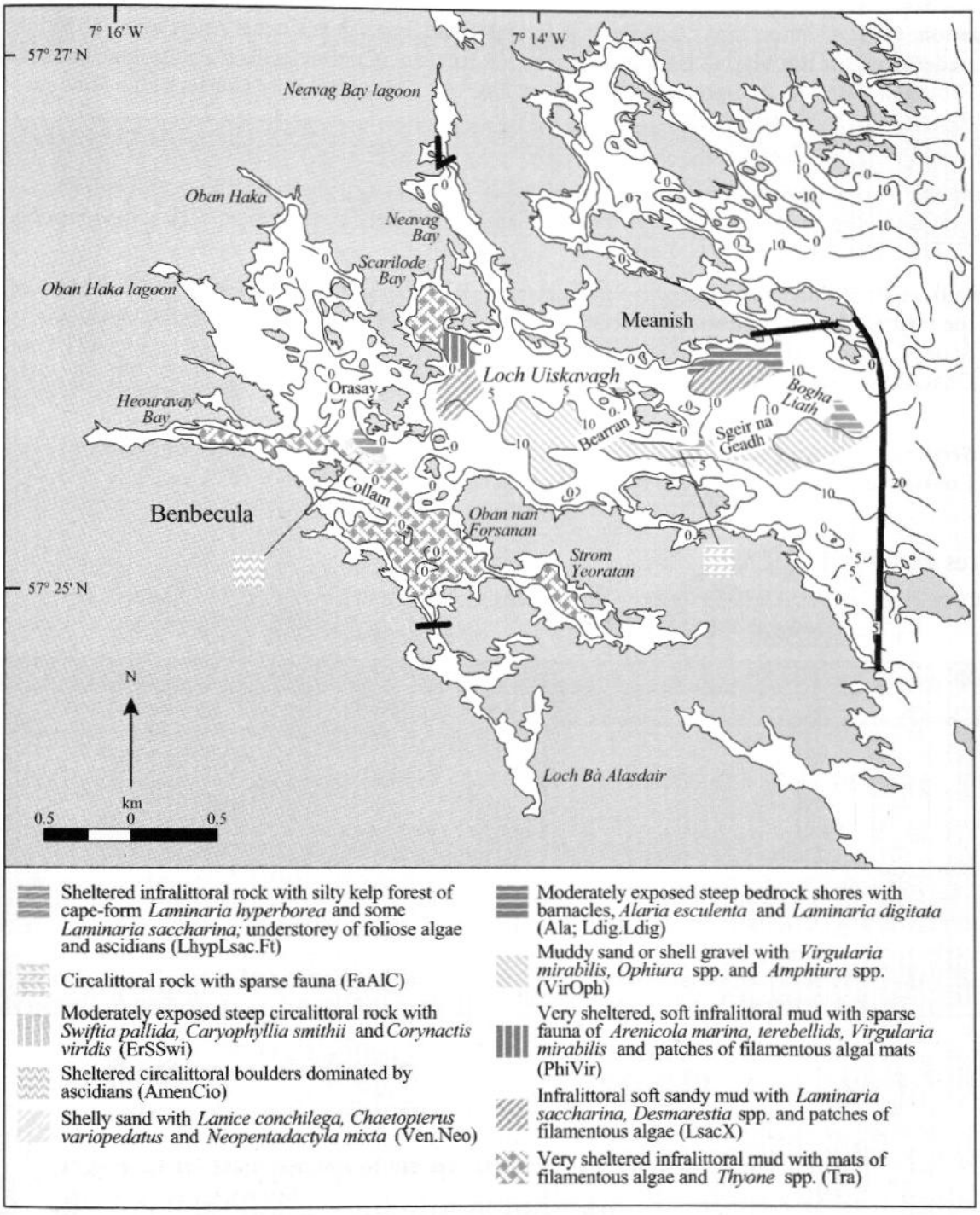

Figure 19.2 Indicative distribution of the main biotopes in the area (based on data from survey sites shown in Figure 19.1, cited literature and additional field observations).

References and further reading

Howson, C.M. 1991. Surveys of Scottish sealochs. The sealochs of North and South Uist and Benbecula. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 3.

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Sites surveyed

Survey 29: 1990 UMBSM survey of sealochs of North and South Uist and Benbecula (Howson 1991).

Sublittoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
29	27	SW of Orasay, Loch Uiskevagh, Benbecula	NF 848 508	57°26.3'N 07°15.2'W	LhypLsac.Ft; AmenCio; Phy; Ven.Neo
29	28	Entrance to Scarilode Bay, Loch Uiskevagh, Benbecula	NF 851 515	57°26.7'N 07°14.9'W	PhiVir
29	29	Middle of main basin, Loch Uiskevagh, Benbecula	NF 858 509	57°26.4'N 07°14.2'W	VirOph; LsacX; Tra
29	30	Sgeir na Geadh, Loch Uiskevagh, Benbecula	NF 867 511	57°26.5'N 07°13.3'W	LhypLsac.Ft; FaAlc; VirOph.HAs
29	31	SE of Meanish, Loch Uiskevagh, Benbecula	NF 869 513	57°26.6'N 07°13.1'W	Lhyp.Ft; LsacX
29	32	S Bogha Liath, Loch Uiskevagh, Benbecula	NF 875 510	57°26.5'N 07°12.5'W	LhypLsac.Ft; Lsac.Pk; ErSSwi; VirOph

Compiled by: Ruth Beaver and Frances Dipper

20 Lochs a' Laip and Kilerivagh

Location		
Position (centre)	NF 850 470	57°24'N 07°15'W
Administrative area	Western Isles	
Conservation agency/area	Scottish Natural Heritage	North Areas (Western Isles)

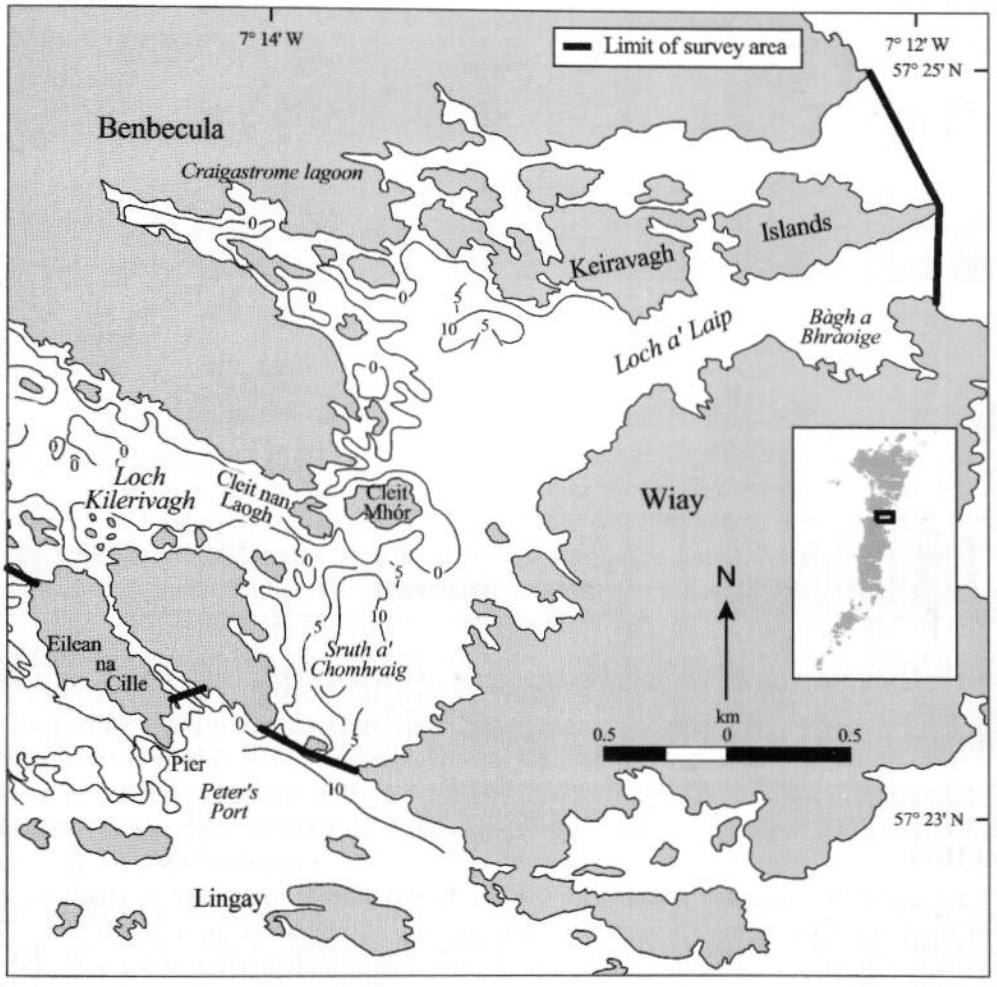

Figure 20.1a Main features of the area (eastern part, including Loch a' Laip), showing sites surveyed.

Physical features	
Physiographic type	Fjardic/complex sound with two shallow sills
Length of coast	33.6 km (51.2 km including islands)
Length of inlet	8.1 km
Area of inlet	5.9 km^2 (5.1 km^2 excluding islands)
Bathymetry	Maximum depths: Loch a' Laip 17 m; Loch Kilerivagh 15 m
Wave exposure	Sheltered to very sheltered
Tidal streams	Moderately strong
Tidal range	3.9 m (mean springs); 1.3 m (mean neaps) (Loch Càrnan)
Salinity	No data available; probably fully marine but may be reduced at heads of inlets

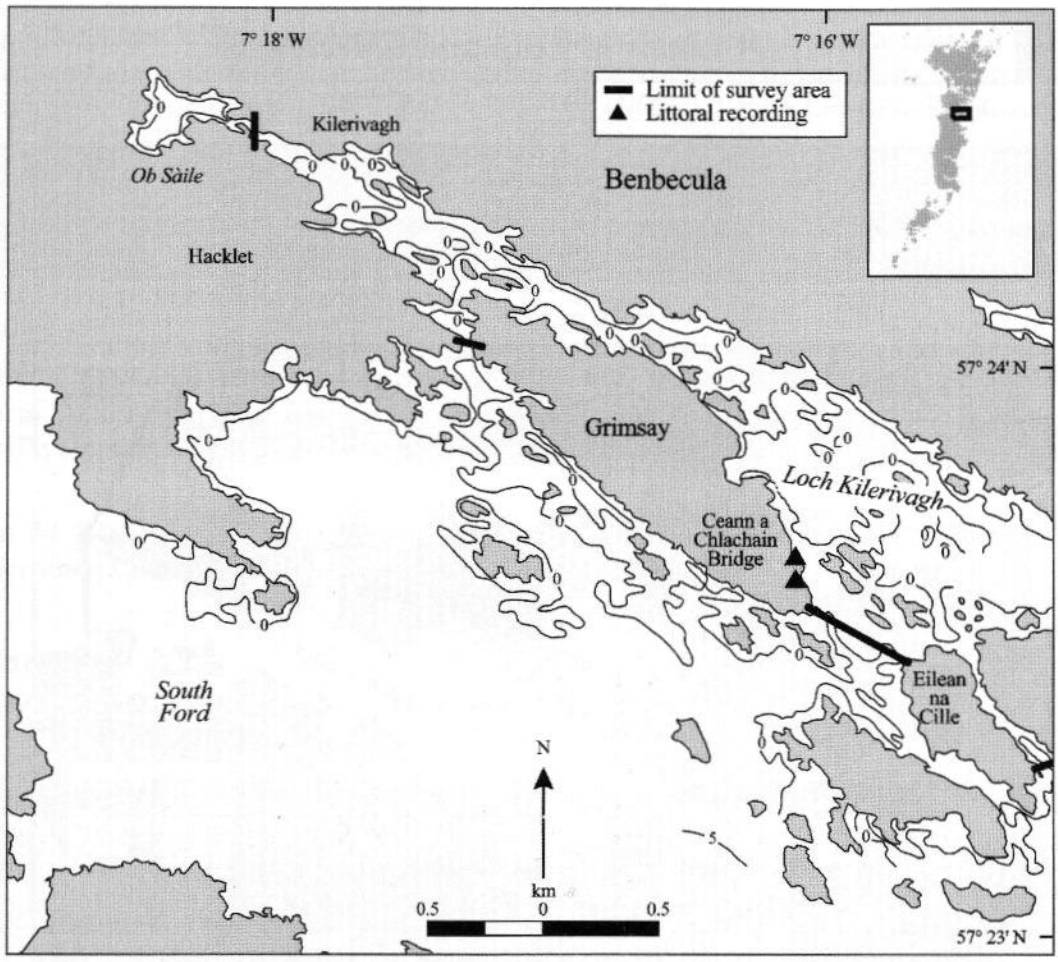

Figure 20.1b Main features of the area (western part, including inner Loch Kilerivagh), showing sites surveyed.

Introduction

Lochs a' Laip and Kilerivagh are situated on the south-east side of the island of Benbecula adjacent to Bàgh nam Faoilean or South Ford that separates Benbecula from South Uist. The coast in this area is highly fragmented with hundreds of tiny islands and skerries and a very indented coastline. Navigation is hazardous, making access to these lochs by boat difficult. However, the many islands give the area a unique character and beauty, enhanced by the extensive clean sands of Bàgh nam Faoilean to the south-east (Buck 1993).

The mainland of Benbecula forms the northern shore of Loch Kilerivagh, while the southern shore is made up predominantly of a string of islands running from north-west to south-east and separated from each other only at high tide. Loch a' Laip is bounded to the west by the mainland, to the north by the Keiravagh Islands and to the south by the island of Wiay which provides shelter from wave action. The small island of Cleit Mhór separates Loch Kilerivagh from the southern end of Loch a' Laip. Wiay is an uninhabited bird sanctuary with a variety of marsh and shoreline species. As its Gaelic name implies, Loch a' Laip ('spoon-shaped loch') has a long thin section at the entrance with depths of up to 15 m, and a wide inner shallow section. The sluiced saline Craigastrome lagoon, which leads off the inner northern shore of the loch, is described by Thorpe *et al.* (1998).

Loch Kilerivagh is relatively long and shallow throughout its length. There is an area of rapids south-west of Cleit Mhór at Cleit nan Laogh, marking the position of the entrance sill. Water also

flows in and out through a channel at Ceann a' Chlachain Bridge (referred to as Leiravagh Bridge in some reports) in the middle of the south side. At the head of the loch there is a small, shallow brackish lagoon, Ob Sàile, joined to the main loch by a muddy channel (Thorpe *et al.* 1998; Smith 1984).

There are many small kelp-covered skerries and small islands in the lower reaches of both lochs, and at low tide these provide ideal seal haul-outs. The marine life in these lochs is rich and varied. There are several areas of maerl supporting a wide range of species in the mid-loch regions of both Loch Kilerivagh and Loch a' Laip, while areas of increased tidal stream flow support a large number of sponges, hydroids and molluscs.

Marine biology

Marine biological surveys

	Survey methods	*No. of sites*	*Date(s) of survey*	*Source*
Littoral	Recording (epibiota)	1	May 1978	Powell *et al.* (1979)
	Recording (epibiota)	1	May 1978	Smith (1978)

Littoral

The shores in this loch complex are mostly rocky with extensive reefs exposed around the islands and skerries at low tide. The sheltered nature of the lochs means that most shores are likely to be dominated by fucoid algae, especially *Ascophyllum nodosum*. However, only one area comprising an interesting, very sheltered rocky channel has been studied in detail. This is the area of rapids under Ceann a' Chlachain Bridge, situated about half-way down Loch Kilerivagh on the south side. The bridge leads onto a causeway that spans the area between the large island of Grimsay and the smaller Eilean na Cille. At low tide the water level in Loch Kilerivagh, although 2–3 m below high water level, is still over 1 m higher than the water level below the causeway in Bàgh nam Faoilean (which lies to the south of Loch Kilerivagh), and water flows out through the rapids area until the incoming tide is high enough for the water to flow in the opposite direction. The channel beneath the bridge is about 30 m wide and 200 m long and does not dry completely, remaining about 0.5 m deep at low tide. It has steep rocky sides and a floor composed of shell-gravel interspersed with boulders.

The upper north end of the channel is constricted and partly blocked by a rough line of boulders resting on a natural sill. The boulders in the channel and those which make up the causeway support an extremely rich fauna of molluscs, ascidians, sponges and hydroids, as well as kelp *Laminaria digitata* and thongweed *Himanthalia elongata*. Luxuriant growths of sponges grow on the kelp and the rock (Ldig.T) and extensive sheets and lumps of *Halichondria panicea* are abundant, together with unusually large *Grantia compressa* growing up to 5 cm high. The barnacle *Verruca stroemia* is abundant under small to medium-sized boulders. The hydroid *Dynamena pumila* is abundant on *Fucus serratus* in the channel, as is the bryozoan *Alcyonidium* sp. and the ascidian *Ascidiella scabra* which flourish in the strong water flow. The black brittlestar *Ophiocomina nigra* and the purple sun-star *Solaster endeca*, although normally sublittoral species, are also found in this area. A good range of algae occurs, including encrusting red species *Hildenbrandia* sp. and *Lithophyllum incrustans* together with *Catenella caespitosa*, *Membranoptera alata* and *Laurencia hybrida*. Annual brown algae such as *Asperococcus fistulosus* and *Pilayella littoralis* are common. On the bridge itself, the anemone *Sagartia elegans* var. *nivea* is common.

The bedrock and boulders at the edges of the channel and in adjacent areas south of the causeway are dominated by dense growths of *A. nodosum* (Asc.Asc) interspersed with patches of muddy sand inhabited by lugworms *Arenicola marina*. Below the causeway to the south there is a stretch

some 100 m long which is composed of *Lithothamnion glaciale* maerl-gravel, much of which is alive and which dries in some places at low water. This maerl-gravel has few mollusc species, with chitons being surprisingly absent. Species present include the bivalves *Dosinia exoleta*, *Crenella decussata* and *Circomphalus casina* and the tortoiseshell limpet *Acmaea virginea*, which is common on dead shells. Saddle oysters are also common.

The mollusc fauna is particularly rich at this site and 74 live species were collected in the various habitats during a survey in 1978 (Smith 1978).

Sublittoral

In the mid-loch region of Loch Kilerivagh a steep slope of medium-sized boulders to a depth of 3–5 m is found at the edge, followed by a gently sloping sandy mud-plain with an extensive maerl bed to 7 m depth at the centre of the channel. The boulders are dominated by a dense covering of ascidians, mainly *Ciona intestinalis* with some *Ascidia mentula* and *Ascidiella aspersa* (AmenCio). The scavenging crabs *Carcinus maenas* and *Liocarcinus puber* and the hermit *Pagurus bernhardus* are common. At the edge of the sandy mud-plain, sea-oak *Halidrys siliquosa* is colonised by the snakelocks anemone *Anemonia viridis*. The daisy anemone *Cereus pedunculatus*, *Urticina felina* and *S. elegans* var. *nivea* and var. *miniata* and the peacock fan worm *Sabella pavonina* can be found living amongst the maerl (Lgla), which is mainly in the form of 'hedgehog' stones. A surprising number of fish species inhabit this stretch of the loch including the pogge *Agonus cataphractus*, butterfish *Pholis gunnellus*, pipefish *Syngnathus* spp. and corkwing wrasse *Crenilabrus melops*. Molluscs include the scallop *Pecten maximus* and the nudibranch *Aeolidia papillosa*.

The channel in Loch a' Laip next to Wiay has a seabed of clean sand at a depth of 9 m, with brown algae, in particular *Dictyota dichotoma*, and dense living maerl (Mrl). Crabs *C. maenas*, *N. puber* and *Cancer pagurus* are abundant along with occasional *P. maximus*.

A level plain of clean rippled sand exists between Wiay and Lingay Flat just outside Loch Kilerivagh at a depth of 19 m, with some large *P. maximus* and drift kelp.

Nature conservation

There are no designated nature conservation sites in the area at present.

Human influences

Coastal developments and uses

The B891 road skirts the whole southern shore of Loch Kilerivagh, crossing Grimsay, Ceann a' Chlachain Bridge and causeway before terminating at the pier at Peter's Port on Eilean na Cille. A minor road to Uiskevagh in the north skirts the north shore and heads of both lochs. There are a few scattered houses along these roads, most clustered around the head of Loch Kilerivagh at Hacklet.

Marine developments and uses

Fishing and fish and shellfish farming are the main industries in this part of Benbecula. There are farmed fish cages in Loch a' Laip at Bàgh a' Bhràoige and at the west side of Sruth a' Chomhraig on the south-west side of Wiay. Three salmon farm leases have been granted within Loch a' Laip and a further three granted for sites at the entrance to Loch Kieravagh to the north (data correct at 1 April 1993).

Potting for lobsters *Homarus gammarus* and crabs takes place along the whole of the east coast of Benbecula, North and South Uist. Diving for scallops also takes place periodically throughout the Uists by itinerant divers for whom it is the main source of income, or by locals as an additional

source of income or for personal consumption. Periwinkles *Littorina littorea* are harvested from the lower shores and transported to Spain. Winkle-picking provides a supplementary source of income to the local population (McKay & Fowler 1997).

References and further reading

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Sites surveyed

Survey 94: 1978 Smith Uists rocky shores mollusc survey (Smith 1978).
Survey 265: 1970–1980 SMBA/MBA intertidal survey of Great Britain (Powell *et al.* 1979).

Littoral sites

Survey	*Site*	*Place*	*Grid reference*	*Latitude/longitude*	*Biotopes recorded*
94	7	Ceann a' Chlachain Bridge, Grimsay, Benbecula	NF 839 468	57°24.0'N 07°15.8'W	G; Ldig.Ldig; Fser.Fser; Asc.Asc
265	146	Leiravagh Bridge, Loch Kilerivagh	NF 839 467	57°24.0'N 07°15.8'W	Asc.T; Ldig.T; Ver;

Compiled by: Ruth Beaver and Frances Dipper