

Marine Nature Conservation Review

Sectors 3, 4, 12, 13 & 15

Lagoons in mainland Scotland and the Inner Hebrides

Area summaries

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1998

Series editor: David Connor

Location

<i>Position (centre)</i>	57° 16.5'N 05° 45.5'W	NG 747 262
<i>Administrative area</i>	Highland	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North West (Lochaber and Skye & Lochalsh)

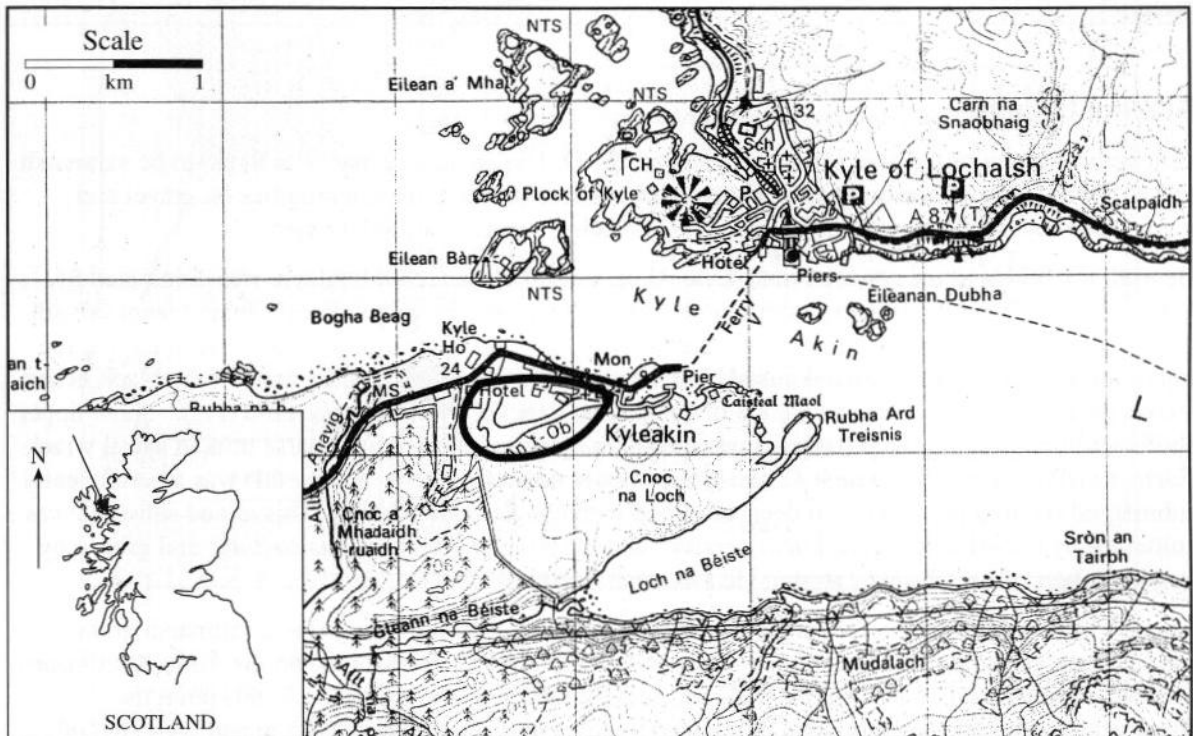


Figure 24.1 Location of the lagoon.

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Marine biological surveys

	<i>Survey method</i>	<i>Date of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	August 1995	MNCR survey 450
<i>Sublittoral</i>	Recording	August 1995	MNCR survey 450

Introduction

An t-Ob is a lagoon on the south-east coast of Skye, opening to the sea at Kyle Akin via a constricted connection over which there is a small road bridge. The lagoon is long and narrow (1 km long by about 0.05 km wide) and runs parallel to the coast behind the buildings of Kyleakin village. At the connection with Kyle Akin there is a sill of boulders at mid- to low tide level. Just inside this sill is a scoured pool with a maximum depth of about 2 m. The rest of the subtidal area of the lagoon has a maximum depth of 0.5 m, which gradually decreases to a point approximately halfway up the lagoon, where there is a single, shallow channel through saltmarsh. The salinity was 24 to 30 ‰ at the time of survey; freshwater input is from the surrounding land and from a stream to the south-west. The site is

surrounded by grassland and woodland to the south, a minor road to the west and the village of Kyleakin and the A850 road to the north.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill at mid- to low tide level)
<i>Area of lagoon</i>	5 ha
<i>Maximum length of lagoon</i>	1 km
<i>Bathymetry</i>	Maximum depth 2 m; generally 0.5 m or intertidal
<i>Wave exposure</i>	Ultra sheltered
<i>Tidal streams</i>	Very weak
<i>Tidal range</i>	1.0 m
<i>Salinity</i>	24-30 ‰ (measured)

Marine biology

A large proportion of the area shown as water on the Ordnance Survey map was found to be saltmarsh (NVC SM8). Of the remaining area, about half consisted of intertidal communities on gravel and mixed sediment, with the remainder of the lagoon being permanently submerged.

Beneath the bridge at the connection to Kyle Akin, a narrow channel of boulders was dominated by bladder wrack *Fucus vesiculosus* with sparse barnacles *Balanus crenatus* (Fves). Inland from this sill the lagoon widened where the intertidal zone consisted of a shallow slope of mixed substrata. At the top of the shore boulders were colonised by lichens (YG), below which was a band of the black lichen *Verrucaria maura* (Ver.Ver) and a band of channelled wrack *Pelvetia canaliculata* (Pel). These upper shore boulders were replaced further down the shore by shingle which had sparse tufts of spiral wrack *Fucus spiralis* and bladder wrack *F. vesiculosus* lower down the shore. Below this was a permanently submerged scoured pit, about 2 m deep and lined with cobbles and pebbles. This mixed substrata was colonised by the serrated wrack *Fucus serratus* and the red alga *Mastocarpus stellatus* and grazed by large numbers of the common periwinkle *Littorina littorea* (FChoG).

About 100 m up the lagoon, the mixed substrata of the littoral fringe changed to a saltmarsh grass embankment containing the furoid *Fucus cottonii* (NVC SM13). Below this, on the shore, were zones of channelled wrack *P. canaliculata* (Pel) and spiral wrack *F. spiralis* (Fspi). At this point the permanently submerged central area of the lagoon had a maximum depth of 0.5 m and consisted of muddy cobbles and pebbles characterised by the red algae *M. stellatus*, *Polyides rotundus* and serrated wrack *F. serratus* (FChoG).

Nature conservation

Conservation sites

<i>Site name</i>	<i>Designation</i>	<i>Centre grid ref.</i>	<i>Main features</i>
An t-Ob	Proposed as a Local Natural Heritage Site	NG 747 262	Important local site for nature conservation and recreation

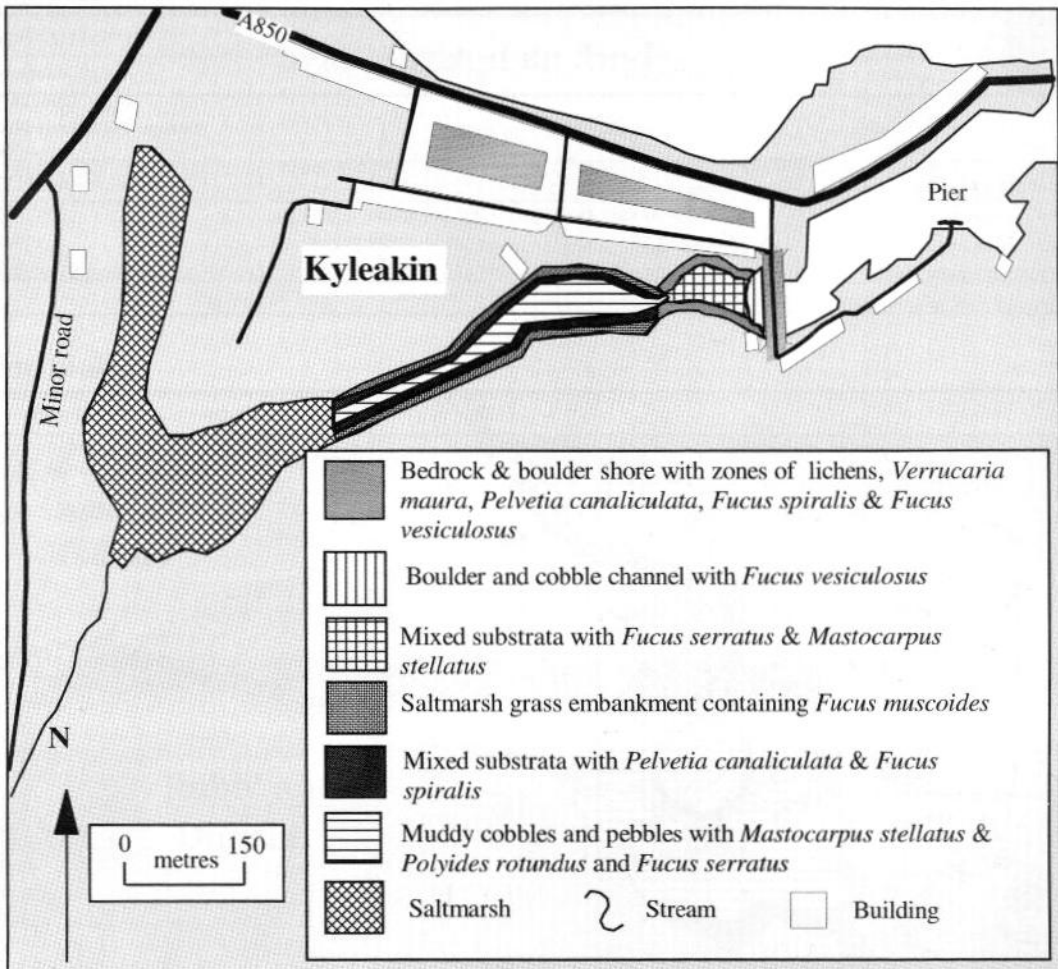


Figure 24.2 Distribution of the main biotopes.

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Human influences

Owing to the close proximity of the houses in Kyleakin there are impacts on the lagoon, including sewage discharge (from a number of discharge pipes) and waste dumping (including broken glass, pottery, road signs and other debris). The site is important for local recreation and has been put forward as a Local Natural Heritage Site which involves the upgrading of footpaths and the provision of interpretative facilities.

References and further reading

None available.

Compiled by: Roger Covey

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Loch na h-Airde, Skye

Location

<i>Position (centre)</i>	57° 09.8'N 06° 18.6'W	NG 394 163
<i>Administrative area</i>	Highland	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North West (Lochaber and Skye & Lochalsh)

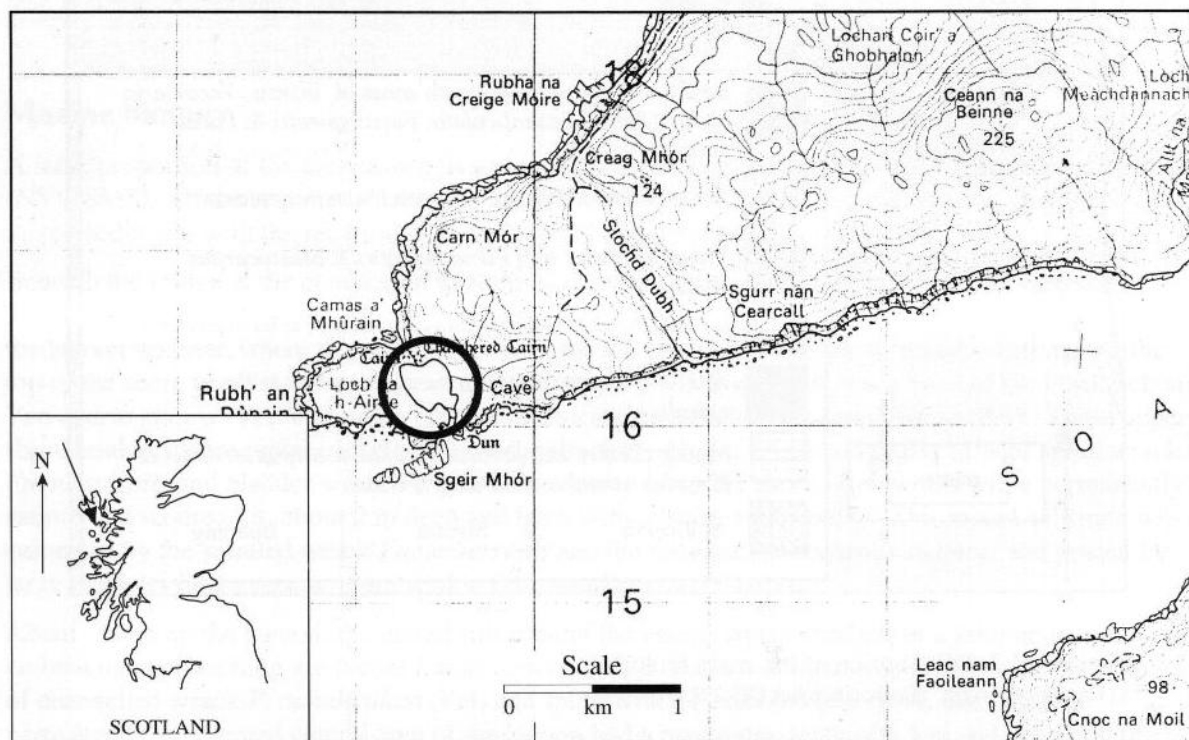


Figure 25.1 Location of the lagoon.

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Marine biological surveys

	<i>Survey method</i>	<i>Date of survey</i>	<i>Source</i>
<i>Sublittoral</i>	Recording	June 1988	Hiscock & Covey (1991)
	Recording	August 1995	MNCR survey 450

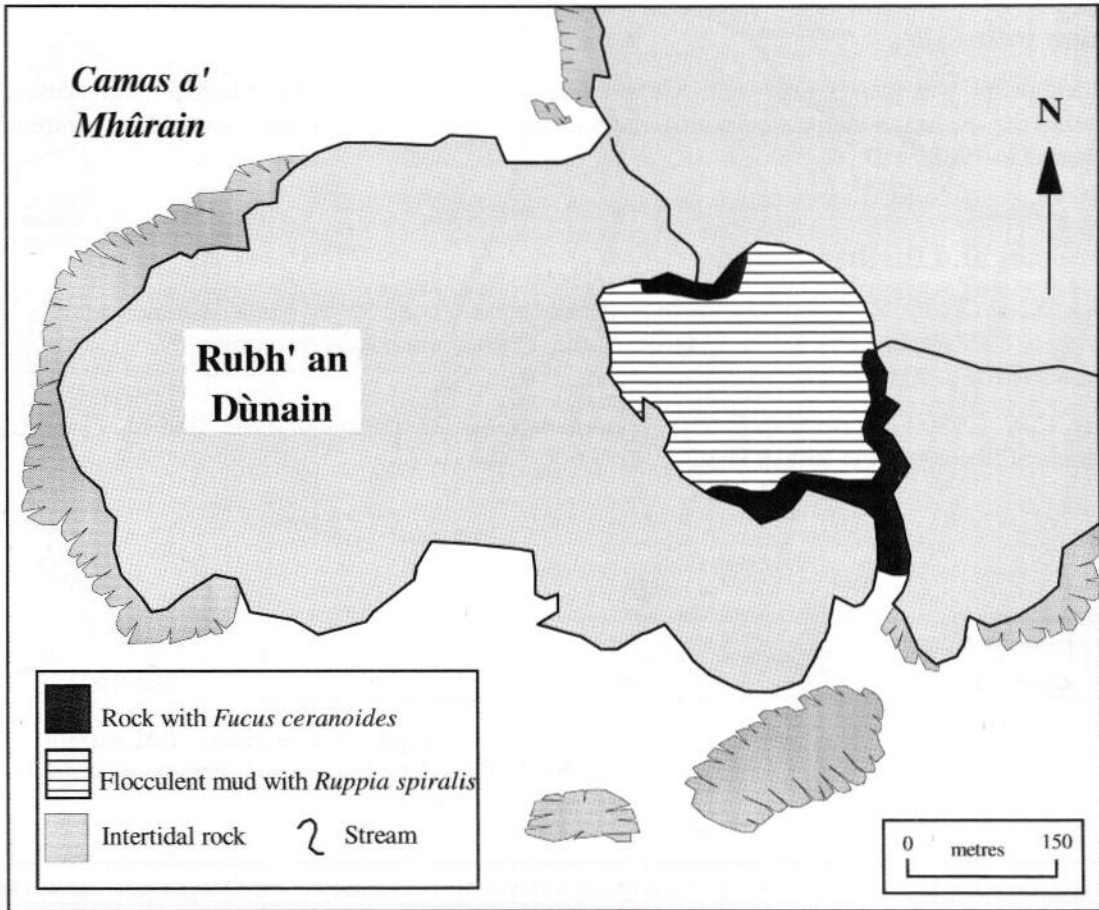
Introduction

Loch na h-Airde lies on the south coast of Skye, on the Rubh' an Dùnain peninsula. The loch connects to the open sea to the south via a rocky channel, 50 m by 20 m with a maximum depth of 0.2 m, and is silled by a boulder dam at upper shore level. The loch is approximately 300 m long, 220 m wide and has a maximum depth of more than 2 m.

Loch na h-Airde is surrounded by moorland. Two streams enter the lagoon, from the north and north-east, with further freshwater input from run-off from the surrounding land. The salinity was measured at 24 ‰ at the time of survey; there was no evidence of tidal current movement, except in the entrance channel.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill between mean high and mean low water)
<i>Area of lagoon</i>	6.5 ha
<i>Maximum length of lagoon</i>	0.3 km
<i>Bathymetry</i>	Maximum depth at least 2 m
<i>Wave exposure</i>	Ultra sheltered
<i>Tidal streams</i>	Very weak, but strong over sill
<i>Tidal range</i>	Negligible
<i>Salinity</i>	24 ‰ (measured)

Marine biology**Figure 25.2** Distribution of the main biotopes.

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Bedrock and a few large boulders fringed much of the loch, between water level and 0.5 m depth. The rock was dominated by the brackish-water furoid *Fucus ceranoides*, with the green alga *Cladophora rupestris* growing densely on vertical surfaces (FcerEnt). Amongst the algae were mysid shrimps, the three-spined stickleback *Gasterosteus aculeatus* and the brown shrimp *Crangon crangon*. This habitat was also found in the channel to the south as far as the sill. In the channel the green alga *Chaetomorpha* sp. was also present on the submerged boulders, and emergent boulders supported a few barnacle spat and lichens.

In the centre of the loch there was soft, flocculent mud that supported dense tasselweed *Ruppia spiralis* (Rup). Amongst the *Ruppia* plants were filamentous green algae including *Chaetomorpha linum*;

three-spined sticklebacks *G. aculeatus* and mysids were also present. Where rock was absent, this habitat extended into the shallow fringes of the loch where it was mixed with beds of reed *Phragmites* (NVC S4). Hiscock & Covey (1991) mention the presence of a pink bacterial scum in the deeper parts of the lagoon (below 1.5 m depth) where the mud lacked *Ruppia*.

Murray (1980) found the grey club-rush *Schoenoplectus tabernaemontani* in Loch na h-Airde, the only record of this species from Skye.

Nature conservation

There are no conservation sites covering the lagoon.

Human influences

Litter and debris was seen in Loch na h-Airde but the site is remote from direct human influences. The channel to the sea has in the past been artificially lined with boulders; boulders blocked the centre of the channel in 1988.

References and further reading

- Hiscock, S., & Covey, R. 1991. Marine biological surveys around Skye. *Nature Conservancy Council, CSD Report*, No. 1,076. (Marine Nature Conservation Review report, No. MNCR/SR/003).
- Murray, C.W. 1980. *The Botanist in Skye: a guide to flowering plants and ferns*. 2nd ed. Cambridge, Botanical Society of the British Isles.

Location

<i>Position (centre)</i>	57° 24.4'N 06° 32.0'W	NG 277 443
<i>Administrative area</i>	Highland	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North West (Lochaber and Skye & Lochalsh)

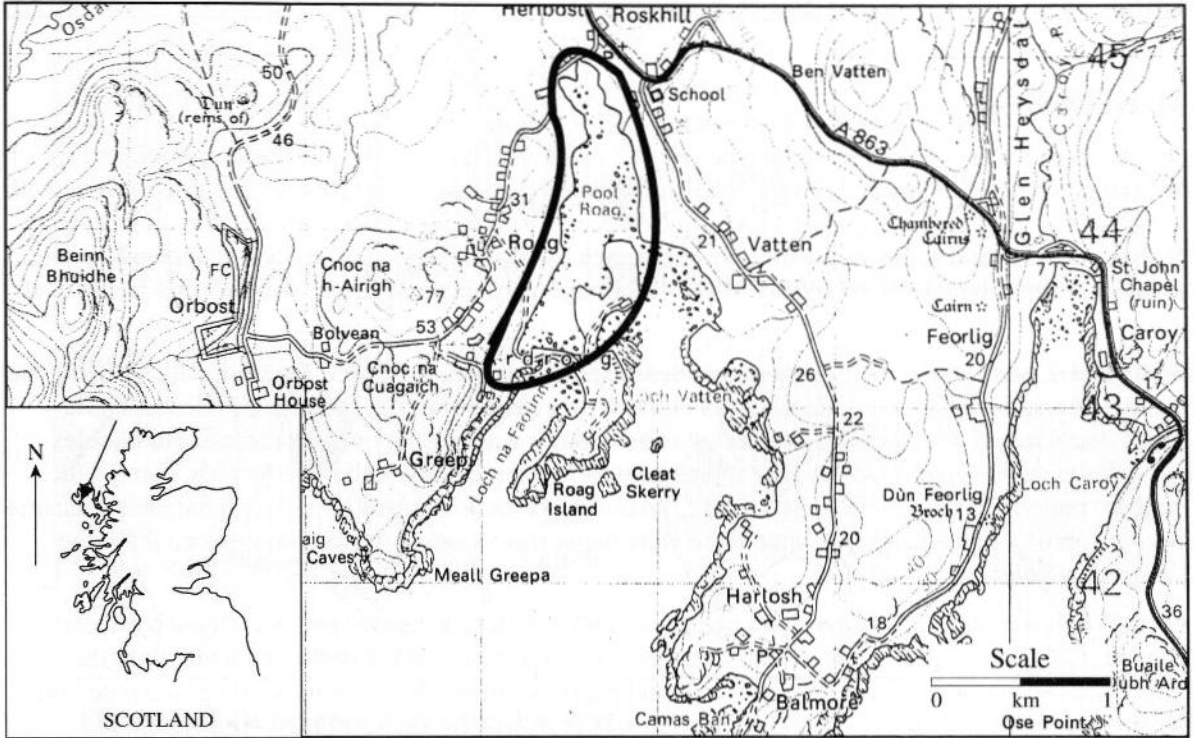


Figure 26.1 Location of the lagoon.

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Marine biological surveys

	<i>Survey method</i>	<i>Date of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	June 1991	MNCR survey 33
	Recording	August 1995	MNCR survey 450
<i>Sublittoral</i>	Recording	June 1988	Hiscock & Covey (1991)
	Recording	August 1995	MNCR survey 450

Introduction

Pool Roag, on the west coast of Skye, is a long, narrow lagoon some 1.75 km in length, approximately 300 m wide and 3 m at its deepest. At its southern end it has a narrow opening to Loch Vatten which in turn opens into Loch Bracadale. The connecting channel is about 200 m long and 10 to 20 m wide with a depth of 3 m, rising to a sill at 0.3 m depth.

To the east and west of the lagoon there are steep grass banks with roads and houses on the top. Three small streams run into the east and west of Pool Roag, as well as a larger one at its head which

produced a lowered salinity of 3 ‰. At the time of survey, salinity in the mid-channel was 25 ‰ whilst in the lower channel it was fully marine.

Physical features

<i>Physiographic type</i>	Saline lagoon inlet
<i>Area of lagoon</i>	40 ha
<i>Maximum length of lagoon</i>	1.75 km (excluding channel)
<i>Bathymetry</i>	Maximum depth 3 m
<i>Wave exposure</i>	Ultra sheltered
<i>Tidal streams</i>	Very weak
<i>Tidal range</i>	2 m
<i>Salinity</i>	3 ‰ - 35 ‰ (measured)

Marine biology

On the upper shores of Pool Roag, at a height of 2 m above datum, the wrack *Fucus cottonii* and occasional channelled wrack *Pelvetia canaliculata* were found on mixed pebbles and gravel along with a zone of the black lichen *Verrucaria maura* (Ver.Ver). This habitat gave way (at 1.5 m height) to pebbles, cobbles and some mud which was colonised by dense channelled wrack *P. canaliculata* and occasional spiral wrack *Fucus spiralis* (Pel). The rough periwinkle *Littorina saxatilis* was frequent at this level on the shore and the insect *Anurida maritima* and halacarid mites were present under stones.

Between 1.2 m and 0.8 m height, there was dense spiral wrack *F. spiralis* and occasional clumps of the knotted wrack *Ascophyllum nodosum* ecad *mackaii* on a mixed shore of cobbles, pebbles and mud (Fspi; AscX.mac). The barnacle *Semibalanus balanoides* was present on the undersides of cobbles and pebbles, while amphipods and the insect *A. maritima* were found under the furoids, along with frequent periwinkles *Littorina littorea* and *L. saxatilis*. In the lower part of this zone barnacles became more common. In the patches of mud there were lugworms *Arenicola marina* and the mud shrimps *Corophium volutator*.

At mid- to lower shore level, the shore became muddier with some gravel and occasional boulders. The tellin *Macoma balthica* and cockle *Cerastoderma edule* were found in the sediment, with the empty shells of the sand gaper *Mya arenaria* and peppery furrow shell *Scrobicularia plana* noted on the surface (Hiscock & Covey 1991). The mud was burrowed by abundant lugworms *A. marina* (HedMac.Are) with serrated wrack *Fucus serratus*, barnacles *S. balanoides* and periwinkles *L. littorea* growing on the hard gravel and boulders. This habitat extended into the sublittoral to a depth of approximately 1 m (AreSyn).

At the head of Pool Roag there were stream channels with cobbles, pebbles and gravel. Here the brackish-water furoid *Fucus ceranoides* and the green alga *Enteromorpha* sp. were found (FcerX).

The shore of the fast-flowing exit/entrance channel was a mixture of bedrock, boulders, cobbles and mixed sediment. The upper shore had zones of the black lichen *V. maura* (Ver.Ver), channelled wrack *P. canaliculata* (Pel), spiral wrack *F. spiralis* (Fspi) and bladder wrack *F. vesiculosus* (Fves). Below this the shore was influenced by the strong currents of the channel with zones of tide-swept knotted wrack *A. nodosum* (Asc.T) and serrated wrack *F. serratus* (Fserr.T), the latter with bootlace weed *Chorda filum* present at low water. The kelp *Laminaria digitata* occurred where the tidal streams flowed at the top and bottom of the channel (Ldig.T), with the rocks beneath the kelp colonised by the breadcrumb sponge *Halichondria panicea* and large purse sponge *Grantia compressa*, hydroids and bryozoans over a coralline algal crust. In the entrance channel, to 3 m depth, there were cobbles and pebbles subject to very strong tidal currents. These were encrusted with coralline red algae and consolidated in many places by the sponges *H. panicea* and *Esperiopsis fucorum*. The kelp *Laminaria hyperborea* was abundant, together with some bootlace weed *C. filum* (XKScrR). The kelp *L. hyperborea* gave way to the sugar kelp *Laminaria saccharina* where the rapids entered the main basin of Pool Roag (LsacX).

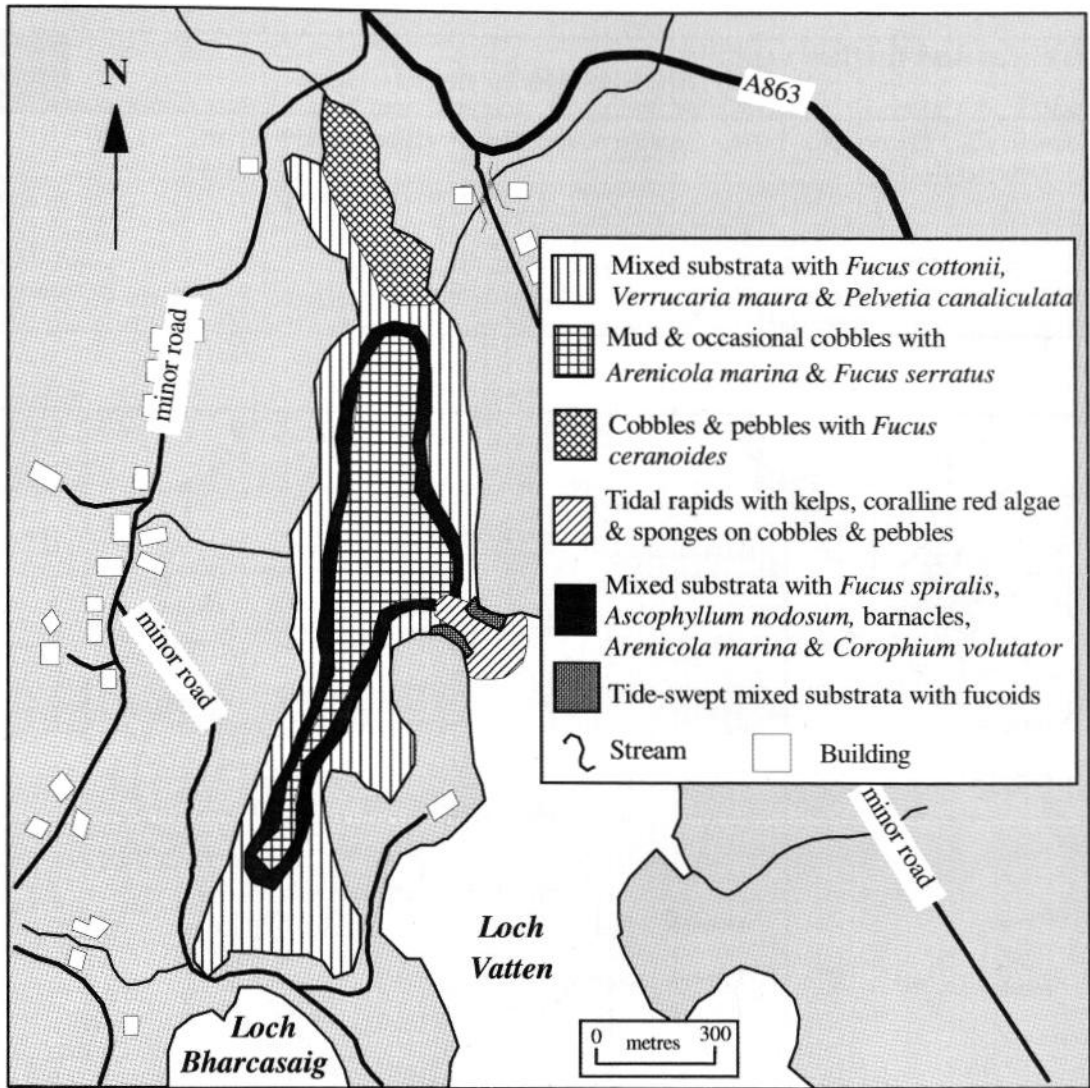


Figure 26.2 Distribution of the main biotopes.

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Nature conservation

Conservation sites			
Site name	Designation	Centre grid ref.	Main features
Pool Roag	Proposed as a Local Natural Heritage Site	NG 277 443	Large saltmarsh area, locally important for waders and ducks

Human influences

Jet-skiers and wind-surfers from nearby holiday homes have been reported to use the loch, inducing complaints of disturbance to wildlife such as otters *Lutra lutra*. Shellfish collection occurs in Pool Roag.

References and further reading

- Hiscock, S., & Covey, R. 1991. Marine biological surveys around Skye. *Nature Conservancy Council, CSD Report*, No. 1,076. (Marine Nature Conservation Review report, No. MNCR/SR/003.)

Loch of Reiff, Enard Bay

Location

<i>Position (centre)</i>	58° 04.3'N 05° 27.0'W	NB 965 145
<i>Administrative area</i>	Highland	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North West (Ross & Cromarty and Inverness)

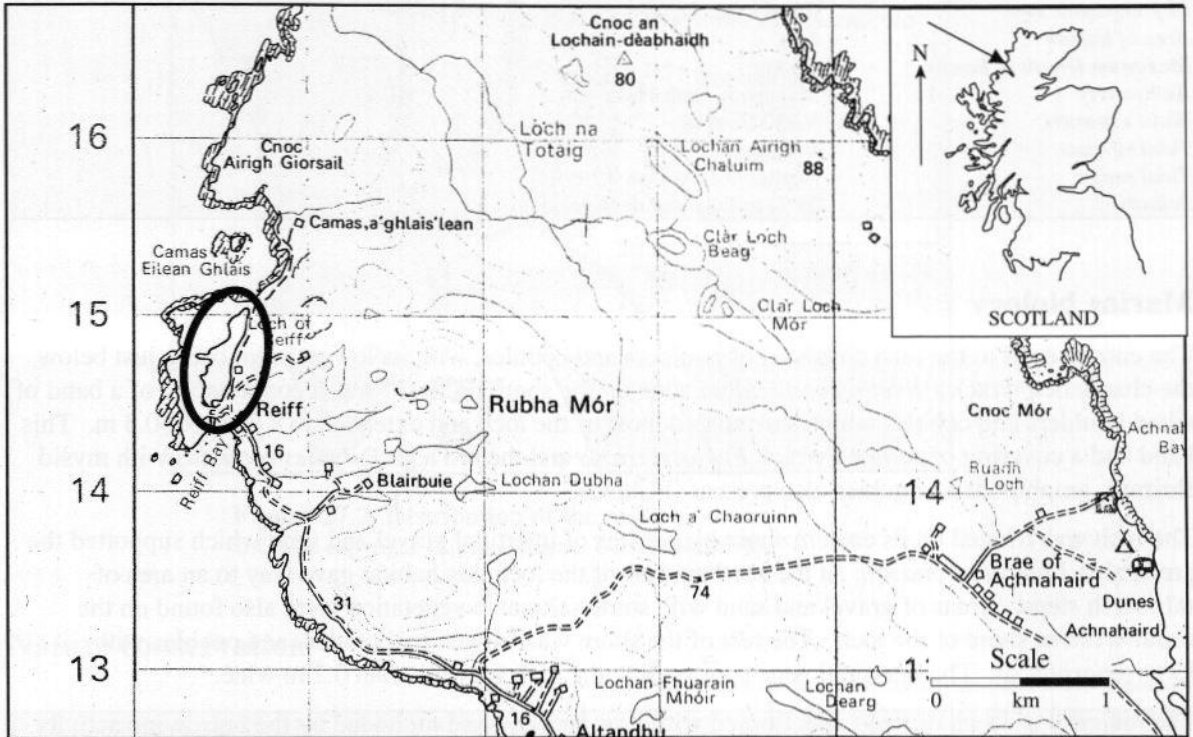


Figure 27.1 Location of the lagoon.

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Marine biological surveys

	<i>Survey method</i>	<i>Date of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	July to August 1949, 1950 & 1951	Drinkwater (1951)
	Recording	April & June 1952; June 1954	Drinkwater (1954)
<i>Sublittoral</i>	Recording	July to August 1949, 1950 & 1951	Drinkwater (1951)
	Recording	April & June 1952; June 1954	Drinkwater (1954)
	Recording	May 1994	MNCR survey 473

Introduction

Loch of Reiff is a silled lagoon situated on the western side of the Rubha Coigeach headland, to the west of Enard Bay. The loch connects to Reiff Bay through a tidal channel, approximately 200 m long with a rocky sill at upper shore level. The loch consists of a single basin, 0.5 km in length with a maximum depth of 1.5 m. Water enters across the sill during most high tides; Drinkwater (1951)

measured current speeds of $4.5 \text{ m}^{-\text{s}}$ during inflow. Drinkwater (1954) considered that the flow rate may have increased since 1953, due to storm action raising the height of the sill.

The loch has a low freshwater input from two small streams, one on its eastern shore and a smaller stream at the head of the loch. There is also some input from the septic tank "soak-away" of a nearby house. Near to the sill there is considerable mixing of incoming seawater with loch water. The salinity at the head of the loch was 25 ‰ in May 1994.

The loch is surrounded by grassland and some saltmarsh.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill at upper shore level)
<i>Area of lagoon</i>	8 ha
<i>Maximum length of lagoon</i>	0.5 km
<i>Bathymetry</i>	Maximum depth 1.5 m
<i>Wave exposure</i>	Very sheltered
<i>Tidal streams</i>	Very weak
<i>Tidal range</i>	Negligible (less than 0.2 m)
<i>Salinity</i>	25 ‰ to fully marine (measured)

Marine biology

The entrance sill to the loch consisted of boulders and cobbles, with its lowest point being just below the channelled wrack *Pelvetia canaliculata* zone on the shore. The sill was a continuation of a band of silted boulders and cobbles which surrounded most of the loch and extended to a depth of 0.3 m. This band had a covering of serrated wrack *Fucus serratus* and the red alga *Polyides rotundus* with mysid shrimps, amphipods and gobies also present (FChoG).

The loch was fringed on its eastern shore by patches of intertidal gravel and sand which supported the green alga *Enteromorpha* sp. At the northern end of the loch this habitat gave way to an area of saltmarsh steps. Areas of gravel and sand with some saltmarsh vegetation were also found on the south-western shore of the loch. The rest of the shore was fringed by boulders and cobbles with *Enteromorpha* sp. The intertidal zone surrounding the loch was less than 0.2 m wide.

The majority of Loch of Reiff was floored with fine, muddy sand mounded by the burrowing activity of the lugworm *Arenicola marina* (FaMS). This habitat extended from the band of fringing boulders to a depth of 1.5 m, although in some areas, notably on the south-western shore, there were no boulders and the muddy sand extended into the intertidal zone where saltmarsh vegetation grew upon it. The sand gaper *Mya arenaria*, the cockle *Cerastoderma edule* and the sand mason worm *Lanice conchilega* were present within the sediment, while occasional mysid shrimps and gobies were found on the sediment surface. At the time of survey, large areas of the loch bottom were covered by drifting, decomposing algae brought into the loch via the entrance channel. Drinkwater (1951) noted the presence, in the same part of the loch, of large amounts of loose-lying decomposing algae during the surveys of 1949-1951. He also reported beds of the tasselweed *Ruppia* sp. which were not present in May 1994.

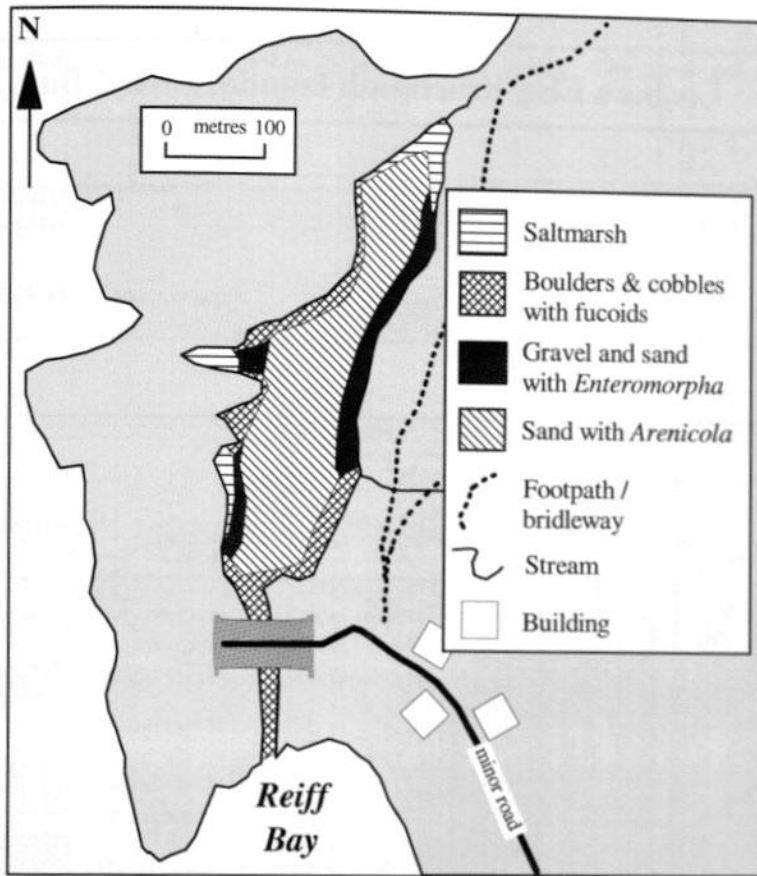


Figure 27.2 Distribution of the main biotopes.
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Nature conservation

Conservation sites

Site name	Designation	Centre grid ref.	Main features
Assynt-Coryach	NSA	NB 200 300	Scenic value

Human influences

On the eastern shore of the loch there is a septic tank outfall or 'soak-away' from a bungalow; two additional houses are located on the eastern side. The surrounding area is crofting ground.

References and further reading

- Drinkwater, J. 1951. *Report of the Kings College Exploration Club, Wester Ross Expeditions, 1949 - 51*. Durham, Durham University Exploration Society.
- Drinkwater, J. 1954. *The ecology of the Loch of Reiff, Wester Ross*. Durham, Durham University Exploration Society. (Unpublished field notes.)

Compiled by: Frank Fortune

the tidal rapid. Salinity varied from 9 to 25 ‰ at time of survey. The site is surrounded by woodland and saltmarsh.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill at upper mid-tide level)
<i>Area of lagoon</i>	2 ha
<i>Maximum length of lagoon</i>	0.2 km (excluding channel)
<i>Bathymetry</i>	Maximum depth 0.6 m
<i>Wave exposure</i>	Ultra sheltered
<i>Tidal streams</i>	Uncertain
<i>Tidal range</i>	1.5 m (estimated)
<i>Salinity</i>	9-25 ‰ (measured)

Marine biology

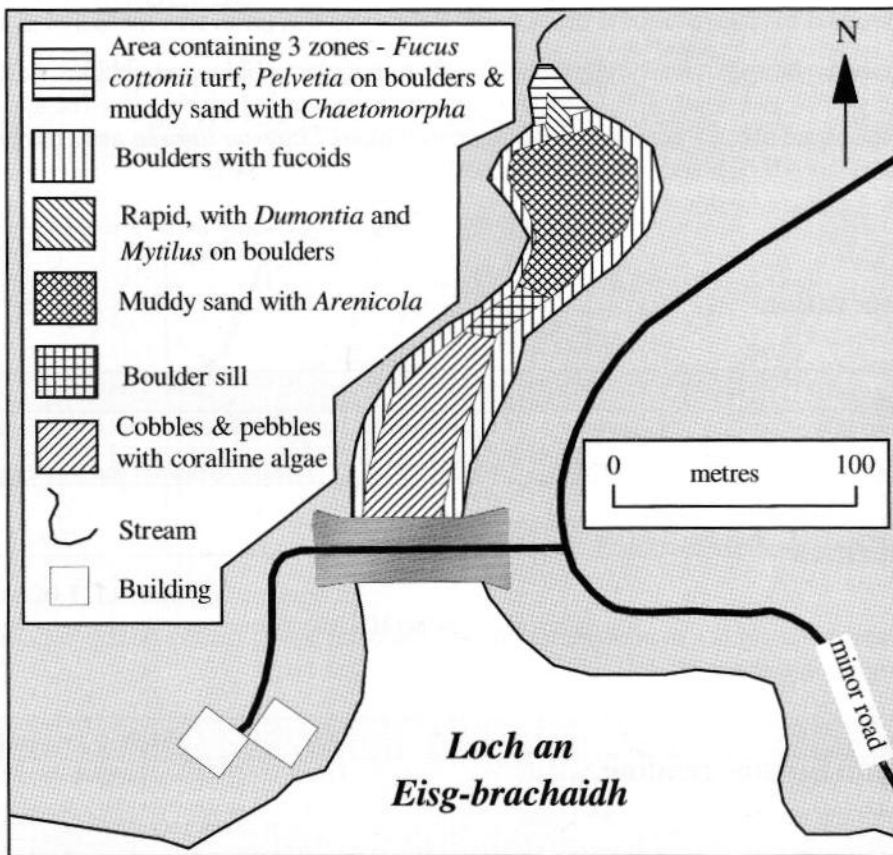


Figure 28.2 Distribution of the main biotopes.
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The inner basin was surrounded by a saltmarsh turf (0.5 m to 0.2 m height), supporting the saltmarsh fucoid *Fucus cottonii* and thrift *Armeria maritima*, together with a covering of filamentous green algae (NVC SM13). Below this zone and to the water's edge, there was an area of boulders and cobbles colonised by channelled wrack *Pelvetia canaliculata*, the lichen *Lichina confinis* and the green alga *Enteromorpha* sp. (Pel). The basin was floored with coarse, muddy sand to a depth of 0.3 m and had balls of the filamentous green alga *Chaetomorpha linum* growing loose upon it, with mysid shrimps and a few lugworm *Arenicola marina* mounds also present (FaMS). The salinity in this part of the system was measured at 9 ‰. Towards the rapids connecting this basin to the middle basin, at a depth

of 0.6 m, the substratum changed to a mixture of boulders and bedrock with coarse sand in-between. Bladder wrack *Fucus vesiculosus*, serrated wrack *Fucus serratus*, the green alga *Cladophora rupestris* and filamentous red algae were found here (FChoG), while closer to the rapids, a few large mussels *Mytilus edulis* and the common periwinkle *Littorina littorea* occurred. There was a noticeable surface layer of freshwater in this area at the time of survey; the salinity below this was measured at 23 ‰.

Within the connecting rapids between the inner and middle basins there was a mixture of bedrock, boulders, cobbles and gravel to a depth of 0.2 m. Large mussels *M. edulis* were packed between cobbles and on the bedrock edges of the channel. The main algal cover was bladder wrack *F. vesiculosus* and the red alga *Dumontia contorta*, the latter found growing epiphytically on the mussels (FChoG).

The middle basin was floored, to a depth of 0.3 m, by coarse, muddy sand with some boulders, cobbles, pebbles and gravel. The predominantly soft bottom was covered by lugworm *A. marina* casts, with mysids present in the water column above the sediment (FaMS). The occasional hard substrata supported bladder wrack *F. vesiculosus*, the red alga *D. contorta* and the green alga *Cladophora* sp., with the rock surfaces covered by the crustose red alga *Hildenbrandia* sp. (FChoG). Near to the shore there were occasional patches of anoxic black mud. Salinity in this basin was measured at 11 ‰.

The outer basin had a bottom consisting predominantly of angular pebbles and cobbles, with some patches of shell gravel, to a depth of 0.5 m. The stones were encrusted by coralline red and brown algae, with attached red alga *D. contorta*, common periwinkles *Littorina littorea* and chitons. Some of the larger cobbles supported bladder wrack *F. vesiculosus* plants (FChoG). The salinity was measured at 25 ‰, below a surface freshwater layer.

Nature conservation

Conservation sites			
Site name	Designation	Centre grid ref.	Main features
Inverpolly	NNR, SSSI	NC 135 125	Upland, freshwater and woodland habitats

Human influences

A water pipe approximately 0.1 m in diameter crossed the outer basin, resting on the bottom. The pipe was not discharging into the pool.

References and further reading

None available.

Compiled by: Frank Fortune

Loch Roe lagoon, Lochinver

Location

<i>Position (centre)</i>	58° 10.1'N 05° 16.4'W	NC 074 246
<i>Administrative area</i>	Highland	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North West (Caithness and Sutherland)

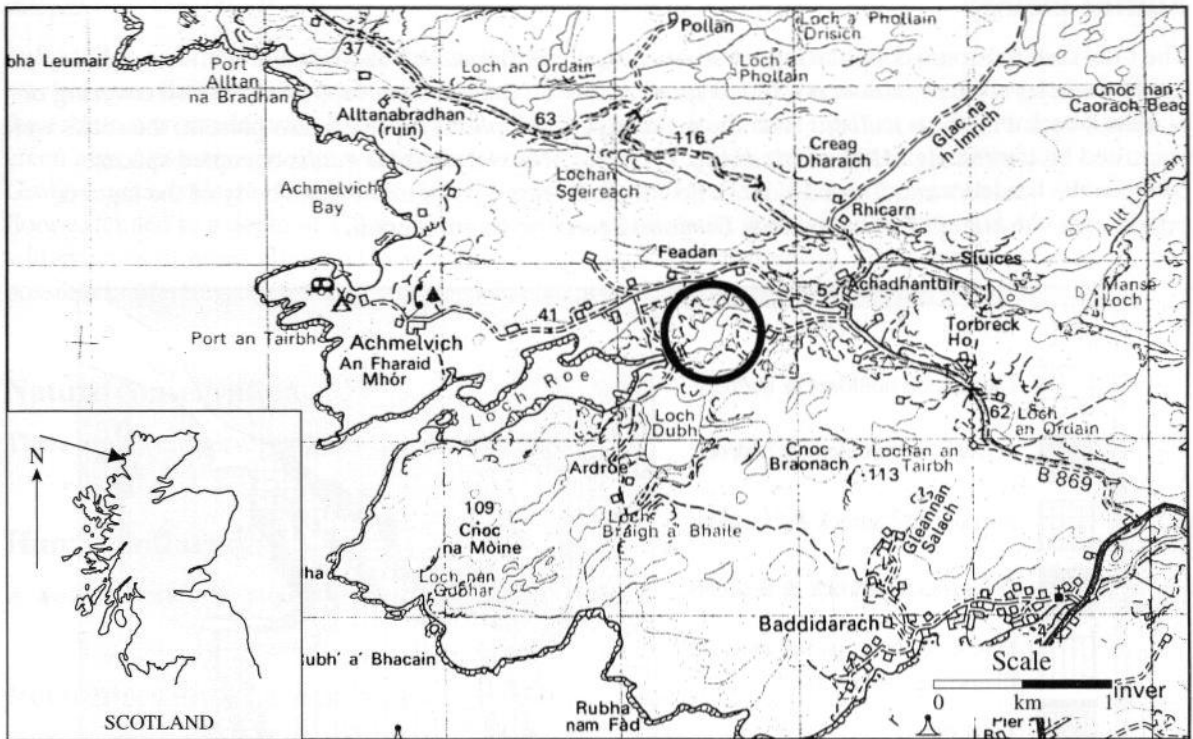


Figure 29.1 Location of the lagoon.

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Marine biological surveys

	<i>Survey method</i>	<i>Date of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	May 1994	MNCR survey 473
<i>Sublittoral</i>	Recording	May 1994	MNCR survey 473

Introduction

Situated at the head of Loch Roe, on the north-west coast of Scotland, this brackish lagoon is connected to the loch via a shallow channel, 8 m wide, 50 m long and 0.5 m deep. The lagoon is separated from a freshwater loch at its eastern end by a weir which was overflowing at the time of survey and which leads to variable salinity conditions within the lagoon. The lagoon is approximately 300 m long; it is 4 m deep near to the connecting channel, but becomes shallower towards its eastern end. The site is surrounded by a mixture of grassland and moorland.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill at upper shore level)
<i>Area of lagoon</i>	4 ha
<i>Maximum length of lagoon</i>	0.3 km
<i>Bathymetry</i>	Maximum depth 4 m
<i>Wave exposure</i>	Ultra sheltered
<i>Tidal streams</i>	Very weak
<i>Tidal range</i>	Approx. 0.5 m
<i>Salinity</i>	Locally brackish to fully saline (estimated)

Marine biology

The tidal channel connecting the lagoon to Loch Roe was floored by bedrock and boulders, and lay at upper shore level (the spiral wrack *Fucus spiralis* zone). The boulders supported a dense covering of bladder wrack *Fucus vesiculosus* with the green alga *Cladophora rupestris* also present; the rocks were encrusted by the red alga *Hildenbrandia* sp. (FChoG). Mussels *Mytilus edulis* occupied spaces between the boulders and formed a dense bed at the entrance point to the main body of the lagoon, providing a substratum for the red alga *Dumontia contorta* to grow upon.

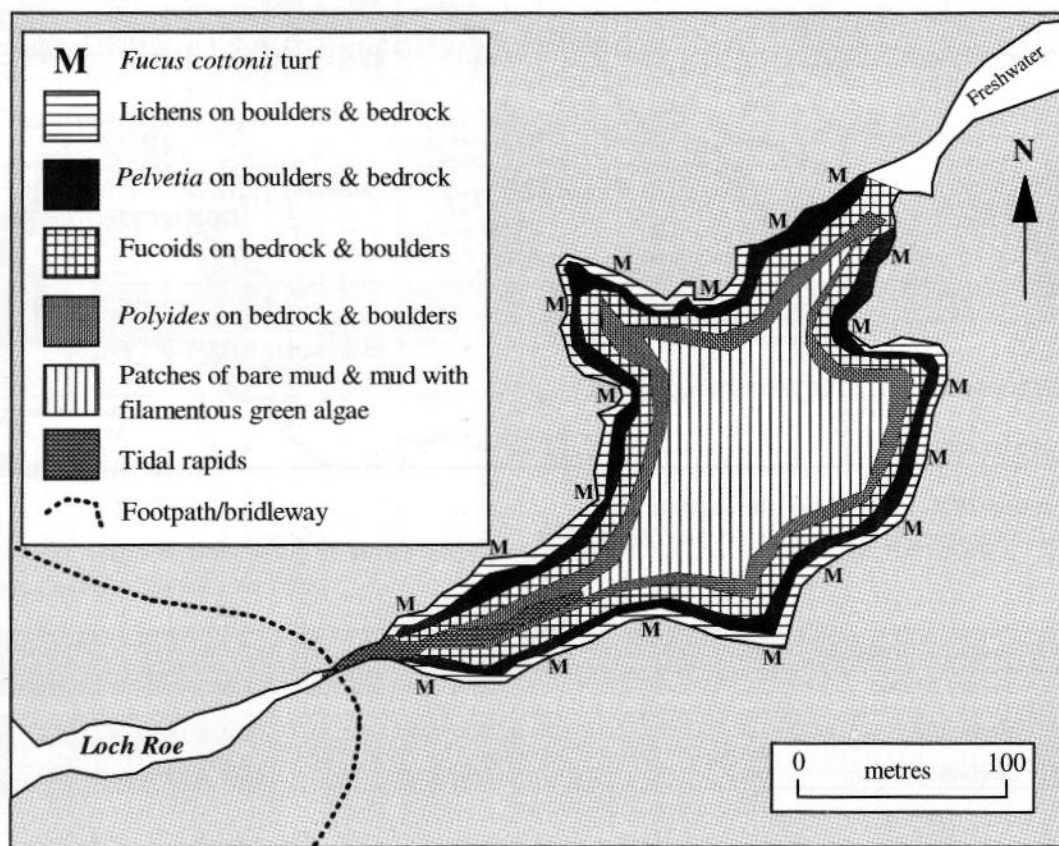


Figure 29.2 Distribution of the main biotopes.
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The intertidal area surrounding the lagoon supported a turf of the saltmarsh fucoid *Fucus cottonii* in a band between 0.4 and 0.3 m above water level (NVC SM13). This band gave way down the shore to boulders with the black lichen *Verrucaria maura* and moss (Ver.Ver). Nearer to the water's edge the lichen *Lichina confinis* replaced *V. maura* and was mixed with channelled wrack *Pelvetia canaliculata* and filamentous green algae (Pel).

In the shallow sublittoral, to a depth of 1.5 m, a mixture of bedrock and boulders supported fucoids and patches of the green alga *Enteromorpha* sp. The spiral wrack *Fucus spiralis* (Fspi) near to water level was replaced at greater depth by bladder wrack *Fucus vesiculosus* (Fves). The green alga *Cladophora* sp. formed a dense understory attached to the rock below the fucoids, while immediately adjacent to the channel there was sea oak *Halidrys siliquosa* and serrated wrack *Fucus serratus* at 1.5 m depth (FChoG). This dense covering of fucoids changed at 1.5 m to a dense turf of the red alga *Polyides rotundus* and filamentous red algae (PolFur); the nudibranch *Coryphella* sp. was present on the algae. This community extended to 4.0 m depth and, at its deepest, large plumose anemones *Metridium senile* and the anemone *Sagartiogeton* sp. were observed. The bedrock and boulders on the south side of the lagoon formed a gentle slope, while on the north side the slope of the bedrock was steeper.

Soft muddy sediment filled the central part of the lagoon and was covered by lugworm *Arenicola marina* casts (LagMu). Occasional radiating marks on the mud surface, similar to those produced by the echiuran worm *Maxmuelleria lankesteri*, were present. In the main part of the lagoon patches of green alga *Enteromorpha* sp. were found, with associated mysids, three-spined sticklebacks *Gasterosteus aculeatus* and gobies (FiG). Towards the head of the lagoon (the eastern end) the muddy floor extended to a depth of 1.0 m. Here a few hydrobiid snails were noted on the mud surface, along with patches of green algae and young growths of tasselweed *Ruppia* sp. Some soft mud tubes, possibly containing chironomid larvae, were also noted in this part of the lagoon.

Nature conservation

There are no conservation sites covering the lagoon.

Human influences

A weir separates the lagoon from the freshwater loch.

References and further reading

None available.

during storms. There is freshwater input from a small burn on the western side of the lagoon and the salinity was measured at 25 ‰ at the time of survey. The lagoon is surrounded by grassland.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill at upper shore level)
<i>Area of lagoon</i>	3 ha
<i>Maximum length of lagoon</i>	0.2 km (excluding channel)
<i>Bathymetry</i>	Maximum depth 3 m
<i>Wave exposure</i>	Extremely sheltered
<i>Tidal streams</i>	Very weak
<i>Tidal range</i>	Negligible (less than 0.2 m)
<i>Salinity</i>	25 ‰ throughout (measured)

Marine biology

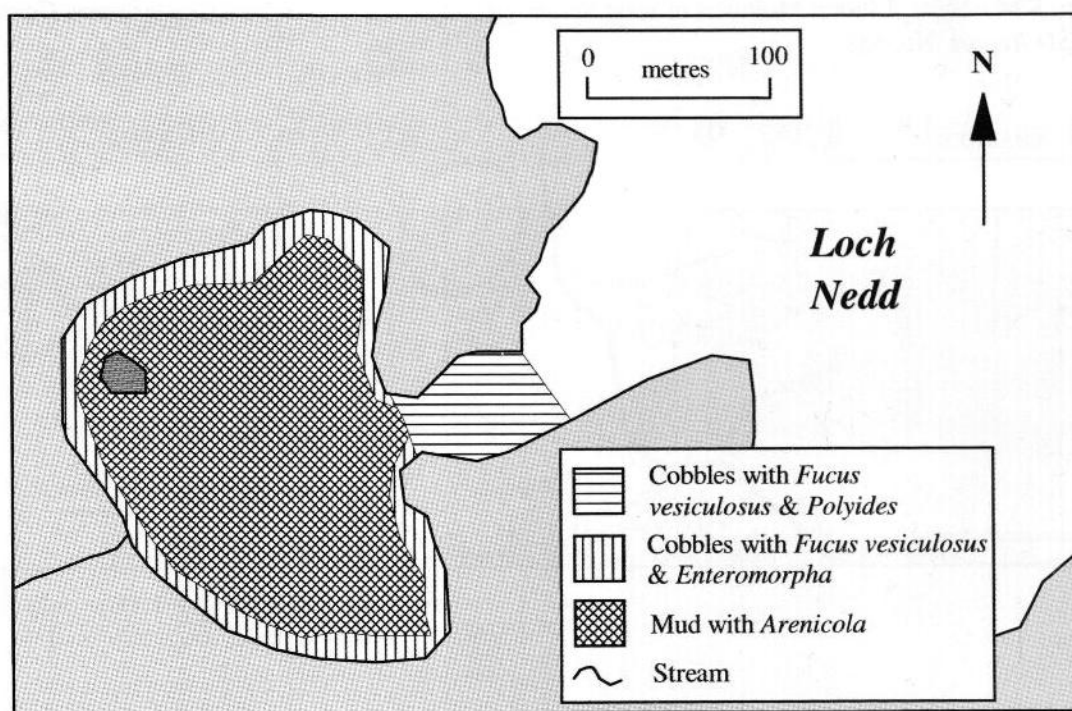


Figure 30.2 Distribution of the main biotopes.

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The channel connecting the lagoon to Loch Nedd was floored by cobbles, which were widely dispersed and rested on a bed of mud, in approximately 0.2 m of water. The biota on the cobbles included bladder wrack *Fucus vesiculosus* and serrated wrack *Fucus serratus*, the red alga *Polyides rotundus*, the mussel *Mytilus edulis* and the common periwinkle *Littorina littorea* (FChoG). The rest of the lagoon had an intertidal fringe of cobbles, with some pebbles, gravel and mud which also formed the sill at the Loch Nedd end of the connecting channel. This fringe lay at the height of the channelled wrack *Pelvetia canaliculata* zone on the adjacent shore of Loch Nedd (i.e. upper shore), but due to limited tidal exchange within the lagoon the intertidal zone was compressed into a 0.2 m vertical range. The cobbles supported bladder wrack *F. vesiculosus* and the green alga *Enteromorpha* sp. with mud snails *Ventrosia ventrosa* also present (FvesX).

The main body of the lagoon was floored by soft, flocculent mud from 0.2 to 3 m depth, the deeper area near to the entrance channel formed by tidal scouring. The mud supported sparse green alga *Enteromorpha* sp. and widely-spaced lugworm *Arenicola marina* (LagMu).

Nature conservation

There are no conservation sites covering the lagoon.

Human influences

None were noted at the time of survey.

References and further reading

Smith, S.M. 1981. Littoral Mollusca of west Sutherland and Coigach. *Nature Conservancy Council, CSD Report, No. 538.*

Physical features

<i>Physiographic type</i>	Saline lagoon inlet
<i>Area of lagoon</i>	8 ha
<i>Maximum length of lagoon</i>	0.6 km (excluding channel)
<i>Bathymetry</i>	Maximum depth 5 m
<i>Wave exposure</i>	Ultra sheltered
<i>Tidal streams</i>	Very weak
<i>Tidal range</i>	3 m
<i>Salinity</i>	Locally brackish to fully marine (estimated)

Marine biology

The sill and rapid at the loch entrance consisted of broken bedrock and boulders which were subject to strong tidal currents. The rock supported dense kelp *Laminaria hyperborea* with a few sea oak *Halidrys siliquosa* plants, as well as crustose coralline algae and dead-man's fingers *Alcyonium digitatum* (HalXK). Just inside the main body of the loch there was an area of maerl and maerl gravel.

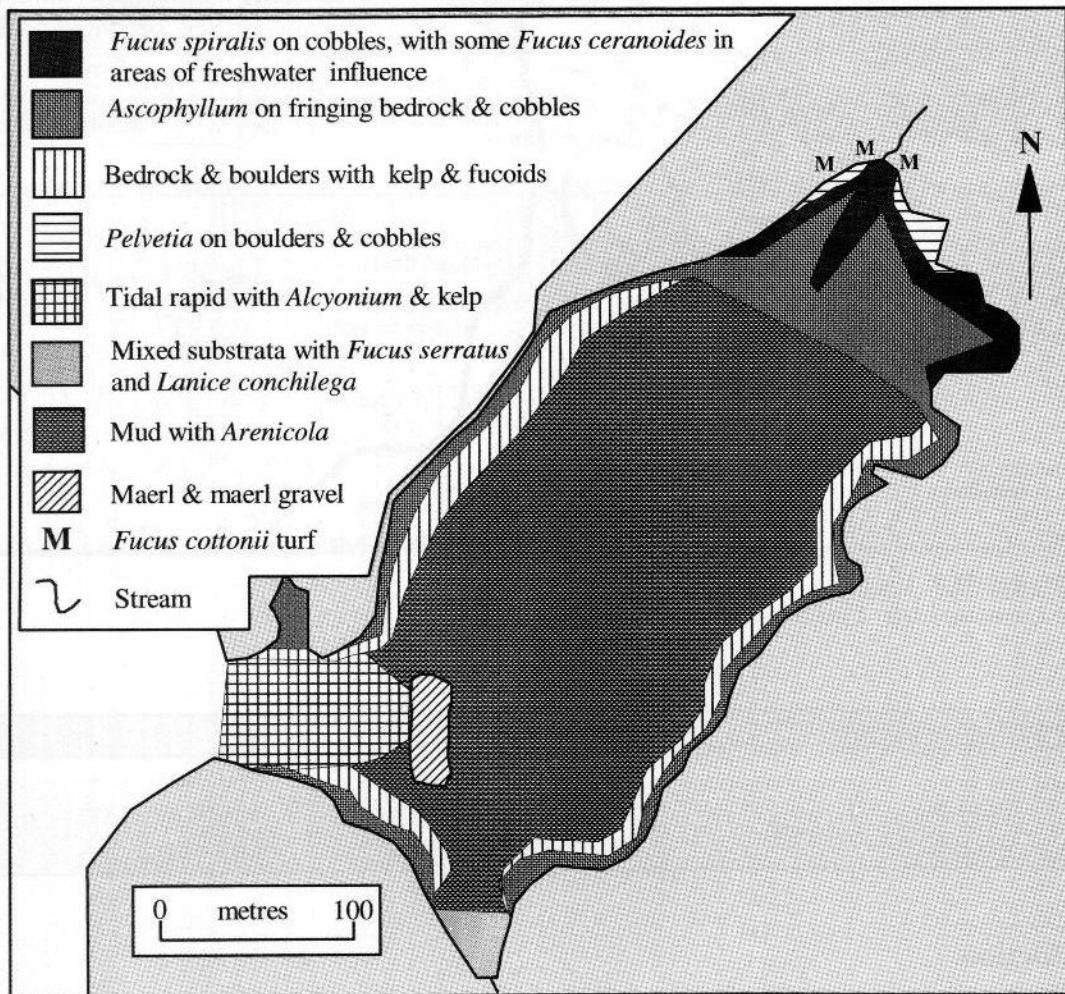


Figure 31.2 Distribution of the main biotopes.
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Around the upper basin the littoral zone, at about 3 m height, extended down from a saltmarsh turf with *Fucus cottonii* (NVC SM13); below this on bedrock and boulders was a sparse upper littoral zone of the black lichen *Verrucaria maura* (Ver.Ver). Below the lichens, a zone of channelled wrack

Pelvetia canaliculata occurred on boulders, bedrock and cobbles (Pel), changing further down the shore to stable upper shore cobbles with spiral wrack *Fucus spiralis* (Fspi). The *F. spiralis* was replaced by the brackish-water wrack *Fucus ceranoides* in areas where there was freshwater influence from the stream (FcerX), the wrack *F. ceranoides* itself being replaced by unattached knotted wrack *Ascophyllum nodosum* ecad *mackaii* lower down the shore (AscX.mac). On the mid shore, stable cobbles were dominated by knotted wrack *Ascophyllum nodosum* (AscX), with the presence of *A. nodosum* ecad *mackaii* suggesting very low levels of disturbance from wave action. In this area of the shore there were a number of steep bedrock outcrops encrusted by coralline red algae, barnacles *Semibalanus balanoides* and spirorbid worms, the bedrock also having a dense covering of knotted wrack *A. nodosum* (Asc.Asc). Below this area of shore, cobbles gave way to muddy sand with abundant lugworm *Arenicola marina* casts and occasional large cobbles supporting knotted wrack *A. nodosum* (MS).

The intertidal zone of the main basin was fringed by bedrock and boulders, dominated by knotted wrack *A. nodosum* (Asc.Asc) which graded into grass and moorland on the upper shore. The lower shore supported serrated wrack *Fucus serratus* on the same substratum (submerged at time of survey) (Fserr) and below this in the sublittoral the sugar kelp *Laminaria saccharina* occurred (Lsac.Ft). The sea bed changed at 1.5 m depth to mud with occasional patches of the bacterial mat *Beggiatoa*; the mud was worked by lugworms *A. marina* and crabs *Carcinus maenas* (AreSyn). This habitat extended to a depth of 5 m. At the southern end of the loch there was a slightly constricted area where freshwater from Loch a'Mhuilinn entered the lagoon. This area had a mixture of cobbles, pebbles and shell gravel which supported serrated wrack *F. serratus*, the red alga *Dumontia contorta* and the sand mason worm *Lanice conchilega* (FChoG).

Nature conservation

Conservation sites			
Site name	Designation	Centre grid ref.	Main features
Loch a'Mhuilinn	NNR	NC 166 394	Woodland, heath, freshwater, swamp and bog habitats

Human influences

None were noted at the time of survey.

References and further reading

None available.

Loch an Roin has only limited freshwater input and is considered to be fully marine. The freshwater input is derived from run-off from the surrounding moorland and from two small streams which flow into the loch from the east. The loch has a reduced tidal range of approximately 1 m.

Physical features

<i>Physiographic type</i>	Silled saline lagoon (sill between mean high and mean low water)
<i>Area of lagoon</i>	12.5 ha
<i>Maximum length of lagoon</i>	0.95 km (excluding channel)
<i>Bathymetry</i>	Maximum depth 12 m
<i>Wave exposure</i>	Extremely to ultra sheltered
<i>Tidal streams</i>	Very weak, but strong through outflow channel
<i>Tidal range</i>	Approximately 1 m
<i>Salinity</i>	Fully marine (estimated)

Marine biology

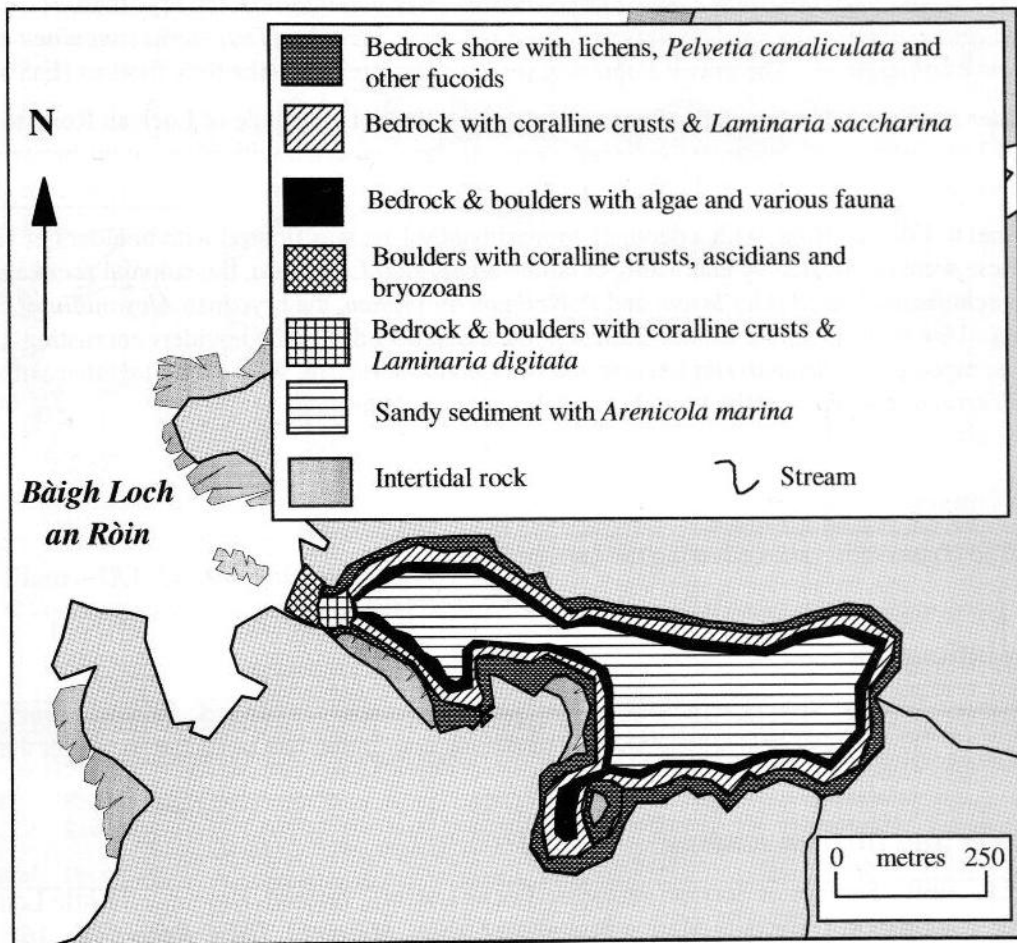


Figure 32.2 Distribution of the main biotopes.
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Loch an Roin had an intertidal zone of 1-10 m width, consisting of igneous bedrock. On the upper shore the rock was dominated by the lichens *Verrucaria maura* and *Caloplaca* sp. with scattered periwinkles *Littorina saxatilis* (Ver.Ver). Below this, the channelled wrack *Pelvetia canaliculata* was dominant (Pel), with the spiral wrack *Fucus spiralis* lower on the shore (Fspi). At the water's edge the

bladder wrack *Fucus vesiculosus* was present, together with some knotted wrack *Ascophyllum nodosum* (Fves).

Around the entrance channel, to approximately 1 m depth, the bottom was of smooth, rounded bedrock and boulders dominated by encrusting coralline red algae with patches of the brown algal crust *Aglaozonia* sp. and the kelp *Laminaria digitata* (Ldig.Ldig). There were also common sea urchins *Echinus esculentus*, frequent chitons and some filamentous algae present on the rocks. Smith (1984) noted the flat periwinkle *Littorina mariae* and the gastropod *Rissoa inconspicua* here.

The bedrock fringing the rest of Loch an Roin, to a depth of approximately 1 m, was dominated by crustose coralline algae and sugar kelp *Laminaria saccharina* (Lsac.Ft). Beneath boulders in this zone there were tubeworms *Spirorbis* sp. and the gooseberry sea squirt *Dendrodoa grossularia*. Coralline algal crusts and the sponge *Esperiopsis fucorum* were also present. From 1 to 7 m depth, on the north side of the loch, there was steep bedrock coated with sandy sediment and bound by flocculent brown algae with occasional sponges *Suberites ficus* (FaSwV). This steeply-sloping zone graded into boulders grazed by urchins. On the south side of the loch, vertical and overhanging rock was dominated by encrusting coralline algae with frequent keel worms *Pomatoceros triqueter*, light-bulb sea squirts *Clavelina lepadiformis*, saddle oysters *Pododesmus patelliformis*, the bryozoan *Scrupocellaria reptans* and a small variety of foliose red algae, including *Delesseria sanguinea* and *Plocamium cartilagineum*. The prawn *Palaemon serratus* was present in the rock fissures (FaSwV).

The boulder zone graded into a plain of coarse sand which floored the whole of Loch an Roin, to a depth of 12 m. In the sandy sediment were lugworms *Arenicola marina* with filamentous brown algae, the bootlace weed *Chorda filum* and gobies *Pomatoschistus* sp. present on the sediment surface (FaS).

The channel to Loch an Roin, with a depth of approximately 1 m, was floored with boulders of various sizes. These were dominated by encrusting coralline algae, kelp *L. digitata*, the colonial ascidians *Botryllus schlosseri*, *Botrylloides leachi* and *Polyclinum aurantium*, the bryozoan *Alcyonidium hirsutum* and the hydroid *Sarsia eximia* (Ldig.T). On the undersides of the boulders encrusting bryozoans, especially *Schizomavella linearis* and *Umbonula verrucosa*, were found together with the barnacle *Verruca stroemia* and the wrinkled rock borer *Hiatella arctica*.

Nature conservation

There are no conservation sites covering the lagoon.

Human influences

Public access to Loch an Roin is very difficult and human influences are limited. However, both surveys (Smith 1984; Holt 1991) noted evidence of potting and finned fish aquaculture within the loch.

References and further reading

- Holt, R.H.F. 1991. Surveys of Scottish sealochs. Lochs Laxford, Inchard, Broom and Little Loch Broom. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 16.
- Smith, S.M. 1984. Scottish saline lagoons with emphasis on the Mollusca. (Contractor: S.M. Smith, Edinburgh.) *Nature Conservancy Council, CSD Report*, No. 526.

Compiled by: Dora Nichols

Loch Ceann na Saile, Loch Inchard

Location

<i>Position (centre)</i>	58° 26.8'N 05° 03.9'W	NC 211 551
<i>Administrative area</i>	Highland	
<i>Conservation agency/area</i>	Scottish Natural Heritage	North West (Caithness and Sutherland)

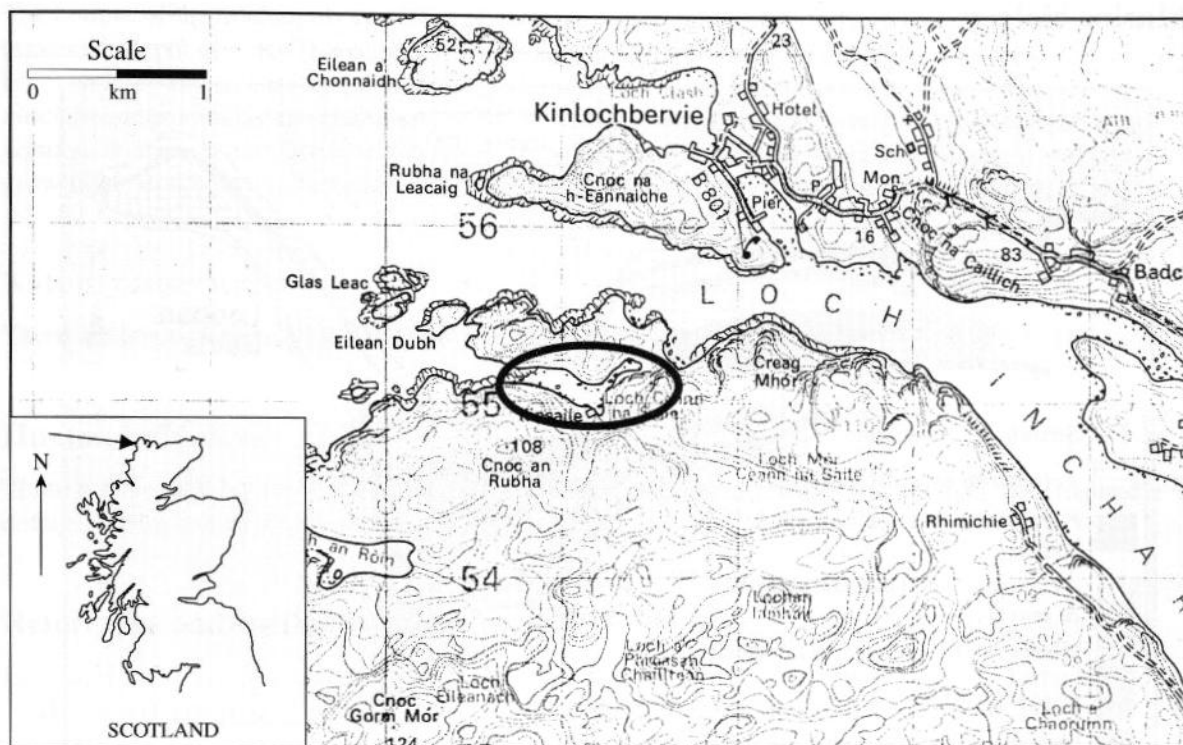


Figure 33.1 Location of the lagoon.

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Marine biological surveys

	<i>Survey method</i>	<i>Date of survey</i>	<i>Source</i>
<i>Littoral</i>	Recording	July 1984	Smith (1985)
	Recording	May 1991	Holt (1991)
<i>Sublittoral</i>	Recording	May 1994	MNCR survey 473

Introduction

Loch Ceann na Saile is situated on the north-west coast of Scotland, south of the mouth of Loch Inchard. The loch is separated from the open sea by a tidal rapid, approximately 80 m long and 10 m wide, with a maximum depth of 1 m and a sill at 0.5 m. The rest of the loch consists of two basins, the larger about 0.6 km in length with a maximum depth of 4 m and a smaller basin called Loch Uaina to the north-east which is 0.3 km long and dries at low tide. There is limited disturbance by tidal currents or wave action in the system, with the exception of the tidal rapids. Substantial water exchange through the rapids maintains full salinity in the loch; there is limited freshwater input from a small burn. The loch is surrounded by grassland.

Physical features	
<i>Physiographic type</i>	Saline lagoon inlet
<i>Area of lagoon</i>	12 ha
<i>Maximum length of lagoon</i>	0.9 km (excluding channel)
<i>Bathymetry</i>	Maximum depth 4 m
<i>Wave exposure</i>	Extremely sheltered
<i>Tidal streams</i>	Very weak, except at entrance channel
<i>Tidal range</i>	Approx. 3 m
<i>Salinity</i>	Fully saline (estimated)

Marine biology

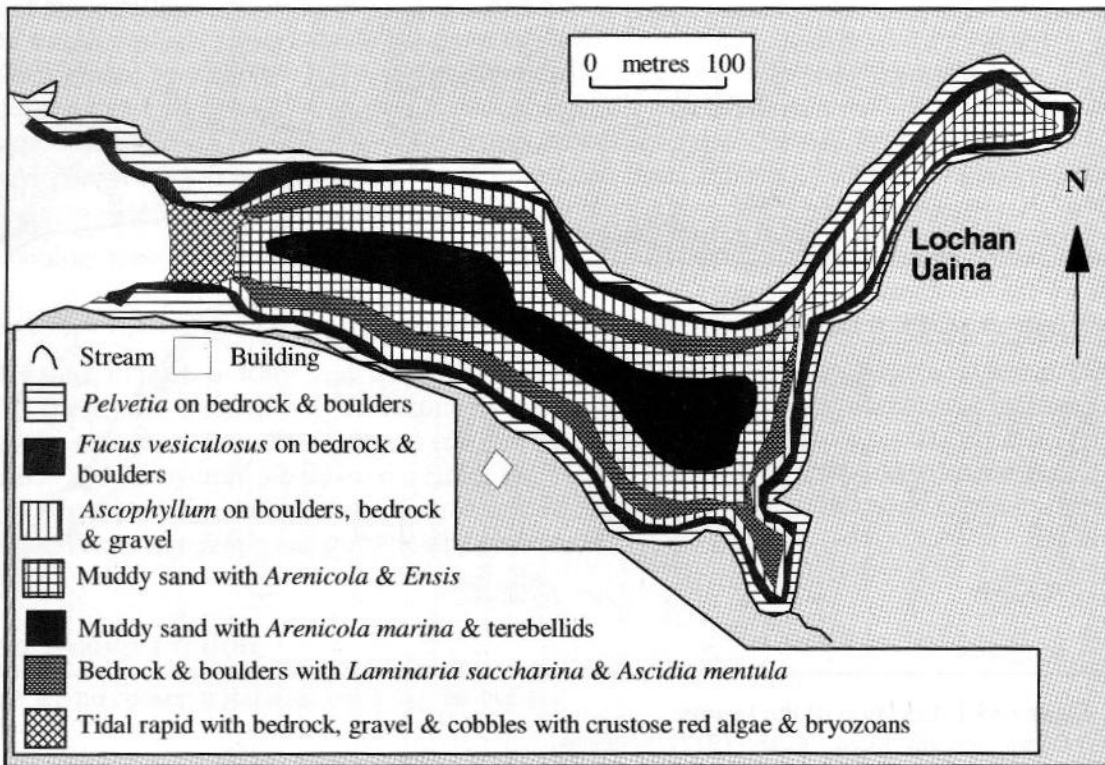


Figure 33.2 Distribution of the main biotopes.

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Lochan Uaina (the upper basin) had steeply sloping bedrock and boulders on its south-eastern shore and more gently sloping boulders on a muddy gravel bottom fringing the north-western shore. The rocky substrata showed typical sheltered shore zonation from the upper to mid-shore, with a band of the channelled wrack *Pelvetia canaliculata* in the upper shore (Pel) giving way to the bladder wrack *Fucus vesiculosus* (Fves). This in turn gave way to knotted wrack *Ascophyllum nodosum* in the mid-shore (AscX), which formed the bottom edge of the rocky fringe. The head and bottom of the basin were floored by muddy sand, dominated by lugworm *Arenicola marina* (MS), with the sediment changing to gravel at the south-western end of the basin. A narrow channel at mid-shore level and floored by gravel connected the lochan to the main body of Loch Ceann na Saile.

The main basin was fringed by bedrock and boulders which supported a typical sheltered intertidal zonation but with impoverished communities. Towards the bottom end of the intertidal the substratum was boulders on mud and gravel, supporting knotted wrack *A. nodosum*, ectocarpoid brown algae and

the gooseberry sea squirt *Dendrodoa grossularia*, the communities here being richer in comparison to those higher on the shore.

In the sublittoral the loch was fringed from 0 to 2.0 m depth by bedrock and boulders, interspersed with patches of mud. The rocky substrata supported sugar kelp *Laminaria saccharina* and the ascidian *Ascidia mentula* along with a variety of foliose and crustose red algae (Lsac.Ft); terebellid worms were present in muddy patches between rocks. Below the fringing rock and mud there was an area of muddy sand supporting abundant lugworms *A. marina* and scattered razor shells *Ensis* sp. (FaMS). This habitat ranged from 0.3 to 1.0 m depth, below which the same sediment type supported lugworms *A. marina* and scattered terebellids, to a maximum depth of 4 m, but lacked the razor shells.

The bottom of the tidal rapids consisted of bedrock with patches of gravel, cobbles and pebbles, with a maximum depth of 1 m. This habitat had a mixed covering of crustose red algae, a hydroid and bryozoan turf and calcareous tubeworms, with rhodoliths of the coralline red alga *Lithothamnion glaciale* present among the gravel and pebbles. The bedrock and larger boulders supported the kelps *Laminaria digitata* and *Laminaria hyperborea*, with the breadcrumb sponge *Halichondria panicea* growing among kelp holdfasts and a number of gastropods grazing upon the algae (Ldig.T).

Nature conservation

There are no conservation sites covering the lagoon.

Human influences

There was a small holiday cottage on the shore which discharged sewage into the loch. Access to the cottage was by a boat which was moored in the loch.

References and further reading

- Holt, R.H.F. 1991. Surveys of Scottish sealochs. Lochs Laxford, Inchard, Broom and Little Loch Broom. (Contractor: University Marine Biological Station, Millport.) *JNCC Report*, No. 16.
- Smith, S.M. 1985. *A survey of the shores and shallow sublittoral of west Sutherland*. (Contractor: S.M. Smith, Edinburgh.) Unpublished, Nature Conservancy Council, Peterborough.

Appendix A

Biotopes classification

A hierarchical classification of the biotopes present in the lagoons in mainland Scotland and the Inner Hebrides (using the data listed in Table 1), shown together with their higher types, is given below. The biotopes listed are derived from the MNCR national biotope classification (Connor *et al.* 1997a, b), except for IMU.LagMu for which a description is given here.

Higher code	Biotope code	Biotope
LR		LITTORAL ROCK
LR.L		Lichens or algal crusts
LR.L	YG	Yellow and grey lichens on supralittoral rock
LR.L	Ver	<i>Verrucaria maura</i> on littoral fringe rock
LR.L	Ver.Ver	<i>Verrucaria maura</i> on moderately exposed to very sheltered upper littoral fringe rock
ELR.MB		Mytilus (mussels) and barnacles
ELR.MB	BPat	Barnacles and <i>Patella</i> spp. on exposed or moderately exposed, or vertical sheltered, eulittoral rock
ELR.MB	BPat.Sem	<i>Semibalanus balanoides</i> on exposed or moderately exposed, or vertical sheltered, eulittoral rock
SLR.F		Dense fucoids (stable rock)
SLR.F	Pel	<i>Pelvetia canaliculata</i> on sheltered littoral fringe rock
SLR.F	Fspi	<i>Fucus spiralis</i> on moderately exposed to very sheltered upper eulittoral rock
SLR.F	Fves	<i>Fucus vesiculosus</i> on sheltered mid eulittoral rock
SLR.F	Asc	<i>Ascophyllum nodosum</i> on very sheltered mid eulittoral rock
SLR.F	Asc.Asc	<i>Ascophyllum nodosum</i> on full salinity mid eulittoral rock
SLR.F	Asc.T	<i>Ascophyllum nodosum</i> , sponges and ascidians on tide-swept mid eulittoral rock
SLR.F	Asc.VS	<i>Ascophyllum nodosum</i> and <i>Fucus vesiculosus</i> on variable salinity mid eulittoral rock
SLR.F	Fserr	<i>Fucus serratus</i> on sheltered lower eulittoral rock
SLR.F	Fserr.T	<i>Fucus serratus</i> , sponges and ascidians on tide-swept lower eulittoral rock
SLR.FX		Fucoids, barnacles or ephemeral seaweeds (mixed substrata)
SLR.FX	FvesX	<i>Fucus vesiculosus</i> on mid eulittoral mixed substrata
SLR.FX	AscX	<i>Ascophyllum nodosum</i> on mid eulittoral mixed substrata
SLR.FX	AscX.mac	<i>Ascophyllum nodosum</i> ecad. <i>mackaii</i> beds on extremely sheltered mid eulittoral mixed substrata
SLR.FX	FserX	<i>Fucus serratus</i> on lower eulittoral mixed substrata

Higher code	Biotope code	Biotope
SLR.FX	EphX	Ephemeral green and red seaweeds on variable salinity or disturbed eulittoral mixed substrata
SLR.FX	FcerX	<i>Fucus ceranoides</i> on reduced salinity eulittoral mixed substrata
LR.Rkp		Rockpools
LR.Rkp	Cor	<i>Corallina officinalis</i> and coralline crusts in shallow eulittoral rockpools
LS		LITTORAL SEDIMENTS
LMS.MS		Muddy sand shores
LMU.Sm		Saltmarsh
LMU.Sm	NVC SM8	<i>Salicornia</i> spp.
LMU.Sm	NVC SM13	<i>Puccinellia maritima</i>
LMU.Sm	NVC SM13	Sub-communities of <i>Puccinellia maritima</i> saltmarsh with <i>Limonium vulgare</i> and <i>Armeria maritima</i> ; <i>Puccinellia maritima</i> with <i>Glaux maritima</i> co-dominant in species-poor vegetation; <i>Puccinellia maritima</i> with <i>Plantago maritima</i> and/or <i>Armeria maritima</i>
LMU.SMu		Sandy mud shores
LMU.SMu	HedMac	<i>Hediste diversicolor</i> and <i>Macoma balthica</i> in sandy mud shores
LMU.SMu	HedMac.Are	<i>Hediste diversicolor</i> , <i>Macoma balthica</i> and <i>Arenicola marina</i> in muddy sand or sandy mud shores
LMU.Mu		Soft mud shores
IR		INFRALITTORAL ROCK
MIR.KR		Kelp with red seaweeds (moderately exposed rock)
MIR.KR	Ldig	<i>Laminaria digitata</i> on moderately exposed or tide-swept sublittoral fringe rock
MIR.KR	Ldig.Ldig	<i>Laminaria digitata</i> on moderately exposed sublittoral fringe rock
MIR.KR	Ldig.T	<i>Laminaria digitata</i> , ascidians and bryozoans on tide-swept sublittoral fringe rock
MIR.KR	Lhyp	<i>Laminaria hyperborea</i> and foliose red seaweeds on moderately exposed infralittoral rock
MIR.KR	Lhyp.TFt	<i>Laminaria hyperborea</i> forest, foliose red seaweeds and a diverse fauna on tide-swept upper infralittoral rock
MIR.SedK		Sand or gravel-affected or disturbed kelp and seaweed communities
MIR.SedK	XKScrR	Mixed kelps with scour-tolerant and opportunistic foliose red seaweeds on scoured or sand-covered infralittoral rock
MIR.SedK	HalXK	<i>Halidrys siliquosa</i> and mixed kelps on tide-swept infralittoral rock with coarse sediment

Higher code	Biotope code	Biotope
SIR		Sheltered infralittoral rock
SIR.K		Silted kelp (stable rock)
SIR.K	Lsac	<i>Laminaria saccharina</i> on very sheltered infralittoral rock
SIR.K	Lsac.Ft	<i>Laminaria saccharina</i> forest on very sheltered upper infralittoral rock
SIR.EstFa		Estuarine faunal communities (shallow rock/mixed substrata)
SIR.EstFa	MytT	<i>Mytilus edulis</i> beds on reduced salinity tide-swept infralittoral rock
SIR.Lag		Submerged fucoids, green and red seaweeds (lagoonal rock)
SIR.Lag	FChoG	Mixed fucoids, <i>Chorda filum</i> and green seaweeds on reduced salinity infralittoral rock
SIR.Lag	PolFur	<i>Polyides rotundus</i> and/or <i>Furcellaria lumbricalis</i> on reduced salinity infralittoral rock
SIR.Lag	FcerEnt	<i>Fucus ceranoides</i> and <i>Enteromorpha</i> spp. on low salinity infralittoral rock
		Infralittoral rock (other)
IR.FaSwV		Fauna and seaweeds (shallow vertical rock)
SS		SUBLITTORAL SEDIMENTS
IGS.FaS		Shallow sand faunal communities
IMS.Sgr		Seagrass beds (sublittoral/lower shore)
IMS.Sgr	Zmar	<i>Zostera marinalangustifolia</i> beds in lower shore or infralittoral clean or muddy sand
IMS.Sgr	Rup	<i>Ruppia maritima</i> in reduced salinity infralittoral muddy sand
IMS.FaMS		Shallow muddy sand faunal communities
IMU.Ang		Angiosperm communities (lagoons)
IMU.Ang	NVC A12	<i>Potamogeton pectinatus</i> community
IMU.Ang	NVC S4	<i>Phragmites australis</i> swamp and reed beds
IMU.MarMu		Shallow marine mud communities
IMU.MarMu	AreSyn	<i>Arenicola marina</i> and synaptid holothurians in extremely shallow soft mud
IMU.LagMu		Sublittoral lagoonal mud communities
		Shallow, typically anoxic, muddy sediments in areas of reduced, although stable, salinity (the salinity may vary annually). The sediment supports largely ephemeral faunal communities characterised by lugworm <i>Arenicola marina</i> and blue-green algae, together with other species, including shore crabs <i>Carcinus maenas</i> , mysid shrimps and tubificid oligochaetes, which commonly occur in lagoons.

Higher code	Biotope code	Biotope
CMU		Cirralittoral muds
CMU	Beg	<i>Beggiatoa</i> spp. on anoxic sublittoral mud
IMX.KSwMx		<i>Laminaria saccharina</i> (sugar kelp) and filamentous seaweeds (mixed sediment)
IMX.KSwMx	LsacX	<i>Laminaria saccharina</i> , <i>Chorda filum</i> and filamentous red seaweeds on sheltered infralittoral sediment
IMX.KSwMx	FiG	Filamentous green seaweeds on low salinity infralittoral mixed sediment or rock
IMX.FaMx		Shallow mixed sediment faunal communities

References

- Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O. 1997a. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 1. Littoral biotopes. Version 97.06. *JNCC Report*, No. 229.
- Connor, D.W., Dalkin, M.J., Hill, T.O., Holt, R.H.F., & Sanderson, W.G. 1997b. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes. Version 97.06. *JNCC Report*, No. 230.

Appendix B

Biotores present in each lagoon

The biotores recorded in each lagoon, using the data listed in Table 1, are summarised below. Biotope codes are given according to MNCR classification version 97.06 (Connor *et al.* 1997a, b), except for IMU.LagMu (see Appendix A).

Numbers refer to the area summaries as follows:

Sector 3 North Scotland

- 1 Lochan Havurn, Loch Eriboll

Sector 4 East Scotland

- 2 Loch Fleet lagoon
- 3 Fearn Lodge lagoon, Dornoch Firth
- 4 Alness Point lagoon, Cromarty Firth
- 5 Muirtown Basin lagoon, Inverness
- 6 South Kessock lagoon, Inverness
- 7 Barry Links lagoon, Firth of Tay
- 8 Pond Cottage lagoon, Firth of Forth
- 9 Island Farm lagoon (Skinflats), Firth of Forth

Sector 12 Clyde Sea

- 10 Ballantrae lagoons
- 11 Dubh Loch, Loch Fyne

Sector 13 West Scotland

- 12 Craiglin lagoon, Loch Sween
- 13 Easdale Island quarry no. 1
- 14 Easdale Island quarry no. 2
- 15 Easdale Island quarry no. 3

Sector 13 West Scotland (cont.)

- 16 Easdale Island quarry no. 4
- 17 Easdale Island quarry no. 5
- 18 Easdale Island quarry no. 6
- 19 Easdale lagoon, Seil
- 20 Easdale quarry, Seil
- 21 Loch Caithlim, Seil
- 22 Leth-fhonn, Mull
- 23 Loch a' Chumhainn, Mull

Sector 15 North-west Scotland

- 24 An t-ob, Skye
- 25 Loch na h-Airde, Skye
- 26 Pool Roag, Skye
- 27 Loch of Reiff, Enard Bay
- 28 Loch an Eisg-brachaidh lagoon, Enard Bay
- 29 Loch Roe lagoon, Lochinver
- 30 Loch Nedd lagoon, Eddrachillis Bay
- 31 Loch an Obain, Eddrachillis Bay
- 32 Loch an Roin, Loch Inchard
- 33 Loch Ceann na Saile, Loch Inchard

Lagoons in North Scotland, East Scotland and the Clyde Sea

Lagoon	North		East							Clyde	
	1	2	3	4	5	6	7	8	9	10	11
Littoral rock											
Pel					•						
Fspi					•						
Fves									•		
AscX					•						
FcerX		•									
Littoral sediment											
HedMac		•									
Mu					•						
Sublittoral rock											
MytT								•			
FChoG	•				•						
FcerEnt		•	•			•					•

	North	East									Clyde	
Lagoon	1	2	3	4	5	6	7	8	9	10	11	
Sublittoral sediment												
FaS		•										
Zmar		•		•				•				
Rup	•			•						•	•	
NVC A12			•									
NVC S4			•									
LagMu									•	•		
LsacX	•						•					
FiG			•					•		•	•	
FaMx											•	

Lagoons in west Scotland

Lagoon	12	13	14	15	16	17	18	19	20	21	22	23
Littoral rock												
YG		•					•					•
Ver.Ver		•					•					•
BPat.Sem		•					•					
Pel		•					•					•
Fspi		•					•	•				
Asc.Asc								•				
AscX												•
AscX.mac												•
FcerX												•
Sublittoral rock												
Ldig.T							•					
Lhyp.TFt												•
Lsac.Ft		•					•		•			
MytT										•		
FChoG	•									•		
PolFur	•											
FcerEnt											•	
FaSwV		•	•	•	•	•	•		•			
Sublittoral sediment												
Zmar	•											
Rup	•											
FaMS											•	
LagMu								•		•		•
Beg	•											
FiG	•							•				

Lagoons in north-west Scotland

Lagoon	24	25	26	27	28	29	30	31	32	33
<i>Littoral rock</i>										
YG	•	•								
Ver.Ver	•	•	•			•		•	•	
Pel	•		•		•	•		•	•	•
Fspi	•		•			•		•	•	
Fves	•					•			•	•
Asc.Asc								•		
Asc.T			•							•
Asc.VS					•					
Fserr								•		
Fserr.T			•							•
FvesX							•			
AscX								•		•
AscX.mac			•					•		
FserX	•		•							
EphX	•		•							
FcerX			•					•		
Cor										•
<i>Littoral sediment</i>										
MS								•		•
NVC SM8	•									
NVC SM13	•		•		•	•		•		
HedMac.Are			•							
<i>Sublittoral rock</i>										
Ldig.Ldig									•	
Ldig.T			•						•	•
XKScrR			•							
HalXK								•		
Lsac.Ft								•	•	•
FChoG	•			•	•	•	•	•		
PolFur						•				
FcerEnt		•								
FaSwV									•	
<i>Sublittoral sediment</i>										
FaS									•	
Rup		•								
FaMS				•	•					•
AreSyn			•					•		
LagMu						•	•			
Beg		•								
LsacX			•							•
FiG						•				

References

- Connor, D.W., Brazier, D.P., Hill, T.O., & Northen, K.O. 1997a. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 1. Littoral biotopes. Version 97.06. *JNCC Report*, No. 229.
- Connor, D.W., Dalkin, M.J., Hill, T.O., Holt, R.H.F., & Sanderson, W.G. 1997b. Marine Nature Conservation Review: marine biotope classification for Britain and Ireland. Volume 2. Sublittoral biotopes. Version 97.06. *JNCC Report*, No. 230.

Appendix C

Summary of physical features for each lagoon

Key: Extent of freshwater/seawater input: *Very limited **Limited ***Large ****Very large
 Seawater levels: (M)HW - (mean) high water (MLW) - (mean) low water

Lagoon no.	Site name	Physiographic type	Area (ha)	Max. depth (m)	Tidal range (m)	Seawater input	Extent of seawater input	Freshwater input	Extent of freshwater input	Salinity range (‰)	Salinity regime
1	Lochan Havum, Loch Eriboll	Silled	9	3	Northern basin 1 m; southern basin 0.1 m	Sills at HW	**	Stream	**	18-30	Stable
2	Loch Fleet lagoon	Sluiced	24	0.5	>0.3	Via tidal flap valves	***	River	***	13-35	Variable, salinity gradient across lagoon
3	Fearn Lodge lagoon, Dornoch Firth	Sluiced	13	0.5	Negligible	Culverted channel at HW	**	Stream	**	10-12	Stable
4	Alness Point lagoon, Cromarty Firth	Silled	2	0.4	0.1-0.2 (negligible)	Sill at MHW	**	Land drainage	*	28	Stable
5	Muirtown Basin lagoon, Inverness	Inlet	1	1	0.5	Channel below LW	***	Land drainage	*	28	Stable
6	South Kessoack lagoon, Inverness	Sluiced	<1	0.4	Negligible	Pipe at HW	**	Land drainage	*	5-10	Stable
7	Barry Links lagoon, Firth of Tay	Silled	3	0.7	0.5 (approx.)	Sill at upper mid-tide level	***	Stream	****	0-30	Variable, salinity gradient across lagoon
8	Pond Cottage lagoon, Firth of Forth	Sluiced	<1	1.5	Negligible	Via a pipe at HW (springs)	*	Land drainage	**	30	Highly stable

Lagoon no.	Site name	Physiographic type	Area (ha)	Max. depth (m)	Tidal range (m)	Seawater input	Extent of seawater input	Freshwater input	Extent of freshwater input	Salinity range (‰)	Salinity regime
9	Island Farm lagoon (Skinflats), Firth of Forth	Stuiced	8	0.2	Negligible	Via a failed tidal flap valve at HW	**	Land drainage	**	11-12	Stable
10	Ballantrae lagoons	Percolation & silled	10	0.7	<0.2 (negligible)	Sill at HW (springs)	*	Southern lagoon - land drainage; northern lagoon - River Stinchar	Southern lagoon - **; northern lagoon - ****	8-20	Stable (southern); variable (northern)
11	Dubh Loch, Loch Fyne	Silled	26	>7	<0.1 (negligible)	Sill above MHW	**	River Shira	***	5-15	Stable; salinity gradient across lagoon; halocline at 1 m
12	Craiglin lagoon, Loch Sween	Silled	8	5	0.1 (negligible)	Sill at mid-tide level	**	Land drainage	**	20-35	Stable; halocline at 1 m
13	Easdale island quarry no. 1	Silled	0.25	>20	2.5	Sill at mid-tide level	**	Land drainage & septic tank 'soak-aways'	**	Fully marine	Stable
14	Easdale island quarry no. 2	Silled	0.25	>20	Negligible	Sill at HW (springs)	*	Land drainage & septic tank 'soak-away'	**	33	Stable
15	Easdale island quarry no. 3	Isolated	0.25	>20	Negligible	Sill above HW (springs)	*	Land drainage	**	26	Highly stable
16	Easdale island quarry no. 4	Isolated	0.25	>20	Negligible	Sill above HW (springs)	*	Land drainage	**	20	Highly stable
17	Easdale island quarry no. 5	Isolated	0.25	>20	Negligible	Percolation and over-topping during storms	*	Land drainage	**	18-30	Stable; halocline present
18	Easdale island quarry no. 6	Inlet	0.5	>60	2	Sills in the sublittoral & at HW	****	Land drainage	**	35	Highly stable
19	Easdale lagoon, Seil	Percolation	2	5	1	Percolation	***	Land drainage	**	31	Stable

Lagoon no.	Site name	Physiographic type	Area (ha)	Max. depth (m)	Tidal range (m)	Seawater input	Extent of seawater input	Freshwater input	Extent of freshwater input	Salinity range (‰)	Salinity regime
20	Easdale quarry, Seil	Silled	1.5	>70	2-3	Sill below MLW	***	Land drainage	**	Fully marine (estimated)	Stable
21	Loch Caithlim, Seil	Sluiced	10	0.5	0.2 (negligible)	Culvert	***	Streams	***	29-30	Variable, salinity gradient across lagoon
22	Leth-fhonn, Mull	Inlet	12	1	0.5	Restricted channel	***	Streams	***	0-30	Variable, salinity gradient across lagoon
23	Loch a' Chumhainn, Mull	Inlet	54	5	1	Restricted channel	***	Streams	***	0-35	Variable; halocline present
24	An t-ob, Skye	Silled	5	2	1	Sill at mid- to low shore	**	Stream	**	24-30	Variable
25	Loch na h-Airde, Skye	Silled	6.5	>2	Negligible	Sill between MHW & MLW	**	Streams	**	24	Variable
26	Pool Roag, Skye	Inlet	40	3	2	Restricted channel	***	Streams	**	3-35	Variable, salinity gradient across lagoon
27	Loch of Reiff, Enard Bay	Silled	8	1.5	<0.2 (negligible)	Sill at HW	**	Streams & septic tank 'soak-away'	**	25-35	Stable, salinity gradient across lagoon
28	Loch an Eisg-brachaidh lagoon, Enard Bay	Silled	2	0.6	1.5 (estimated)	Sill at upper mid-tide level	**	Land drainage	**	9-25	Variable
29	Loch Roe lagoon, Lochinver	Silled	4	4	0.5 (approx.)	Sill at HW	**	Overflow from neighbouring freshwater loch	***	Locally brackish to fully marine (estimated)	Variable

Lagoon no.	Site name	Physiographic type	Area (ha)	Max. depth (m)	Tidal range (m)	Seawater input	Extent of seawater input	Freshwater input	Extent of freshwater input	Salinity range (‰)	Salinity regime
20	Easdale quarry, Seil	Silled	1.5	>70	2-3	Sill below MLW	***	Land drainage	**	Fully marine (estimated)	Stable
21	Loch Caithlim, Seil	Sluiced	10	0.5	0.2 (negligible)	Culvert	***	Streams	***	29-30	Variable, salinity gradient across lagoon
22	Leth-fhonn, Mull	Inlet	12	1	0.5	Restricted channel	***	Streams	***	0-30	Variable, salinity gradient across lagoon
23	Loch a' Chumhainn, Mull	Inlet	54	5	1	Restricted channel	***	Streams	***	0-35	Variable; halocline present
24	An t-ob, Skye	Silled	5	2	1	Sill at mid- to low shore	**	Stream	**	24-30	Variable
25	Loch na h-Airde, Skye	Silled	6.5	>2	Negligible	Sill between MHW & MLW	**	Streams	**	24	Variable
26	Pool Roag, Skye	Inlet	40	3	2	Restricted channel	***	Streams	**	3-35	Variable, salinity gradient across lagoon
27	Loch of Reiff, Enard Bay	Silled	8	1.5	<0.2 (negligible)	Sill at HW	**	Streams & septic tank 'soak-away'	**	25-35	Stable, salinity gradient across lagoon
28	Loch an Eisg-brachaidh lagoon, Enard Bay	Silled	2	0.6	1.5 (estimated)	Sill at upper mid-tide level	**	Land drainage	**	9-25	Variable
29	Loch Roe lagoon, Lochinver	Silled	4	4	0.5 (approx.)	Sill at HW	**	Overflow from neighbouring freshwater loch	***	Locally brackish to fully marine (estimated)	Variable

Appendix D

Species recorded

All taxa recorded during the surveys given in Table 1 are listed below; records of species noted in the text but not shown here come from additional published sources noted in the individual area summaries. Species nomenclature follows Howson & Picton (1997); that for higher plants follows Stace (1991) and that for lichens follows Purvis *et al.* (1992).

Numbers refer to the *area summaries* as follows:

Sector 3 North Scotland

- 1 Lochan Havarn, Loch Eriboll

Sector 4 East Scotland

- 2 Loch Fleet lagoon
3 Fearn Lodge lagoon, Dornoch Firth
4 Alness Point lagoon, Cromarty Firth
5 Muirtown Basin lagoon, Inverness
6 South Kessock lagoon, Inverness
7 Barry Links lagoon, Firth of Tay
8 Pond Cottage lagoon, Firth of Forth
9 Island Farm lagoon (Skinflats), Firth of Forth

Sector 12 Clyde Sea

- 10 Ballantrae lagoons
11 Dubh Loch, Loch Fyne

Sector 13 West Scotland

- 12 Craiglin lagoon, Loch Sween
13 Easdale Island quarry no. 1
14 Easdale Island quarry no. 2
15 Easdale Island quarry no. 3

Sector 13 West Scotland (cont.)

- 16 Easdale Island quarry no. 4
17 Easdale Island quarry no. 5
18 Easdale Island quarry no. 6
19 Easdale lagoon, Seil
20 Easdale quarry, Seil
21 Loch Caithlim, Seil
22 Leth-fhonn, Mull
23 Loch a' Chumhainn, Mull

Sector 15 North-west Scotland

- 24 An t-ob, Skye
25 Loch na h-Airde, Skye
26 Pool Roag, Skye
27 Loch of Reiff, Enard Bay
28 Loch an Eisg-brachaidh lagoon, Enard Bay
29 Loch Roe lagoon, Lochinver
30 Loch Nedd lagoon, Eddrachillis Bay
31 Loch an Obain, Eddrachillis Bay
32 Loch an Roin, Loch Inchard
33 Loch Ceann na Saile, Loch Inchard

	North	East	Clyde	West	North-west
Porifera					
<i>Clathrina coriacea</i>				14	26, 32, 33
<i>Leucosolenia</i> sp.					26, 32, 33
<i>Leucosolenia botryoides</i>				13, 18, 23	33
<i>Leucosolenia complicata</i>					32
<i>Scypha ciliata</i>				18, 23	26
<i>Grantia compressa</i>				13	26, 33
<i>Suberites</i> sp.				14, 18	
<i>Suberites ficus</i>					26, 32
<i>Halichondria panicea</i>	1			13, 18, 23	26, 31, 33
<i>Hymeniacion perleve</i>				18, 23	26, 32
<i>Esperiopsis fucorum</i>					26
<i>Myxilla incrustans</i>					26, 32, 33
<i>Haliclona</i> sp.				13, 18	33
<i>Haliclona cinerea</i>					32
<i>Dysidea fragilis</i>					26, 32
Porifera indet. (crusts)				18	32, 33
Cnidaria					
<i>Halicystus auricula</i>					26
<i>Aurelia aurita</i>		8		12	
Hydrozoa indet.				12	
<i>Sarsia eximia</i>					32
<i>Hydractinia echinata</i>				23	26, 31, 33
<i>Clava</i> sp.					33
<i>Clava multicornis</i>					26
<i>Cordylophora caspia</i>			11		

	North	East	Clyde	West	North-west
<i>Abietinaria</i> sp.					26
<i>Abietinaria abietina</i>					33
<i>Abietinaria filicula</i>					33
<i>Diphasia rosacea</i>					33
<i>Dynamena pumila</i>				18	26
<i>Obelia</i> sp.					26
<i>Obelia dichotoma</i>				21	33
Anthozoa indet.					26
<i>Alcyonium digitatum</i>	1			13, 18, 23	31, 33
<i>Actinia equina</i>				13, 18, 21, 23	26, 31, 33
<i>Anemonia viridis</i>					33
<i>Urticina felina</i>				13	32
<i>Diadumene cincta</i>				19	
<i>Metridium senile</i>	1			14, 23	29
<i>Sagartia elegans</i>				13	
<i>Sagartia troglodytes</i>				12	
<i>Sagartiogeton</i> sp.				12	29
<i>Caryophyllia smithii</i>					33
Nemertea					
Nemertea indet.		8			26
<i>Lineus ruber</i>		8			
Annelida					
Polychaeta indet.				21, 23	27, 33
Polynoidae sp.					32, 33
<i>Eteone longa</i>					26
<i>Mysta picta</i>					26
<i>Mystides</i> sp.					29
<i>Exogone naidina</i>					26
Nereididae indet.					33
<i>Hediste diversicolor</i>		2, 6, 9			26
<i>Nephtys hombergii</i>					26
<i>Scoloplos armiger</i>					26
<i>Malacoceros fuliginosus</i>		2			
<i>Polydora</i> sp.					32
<i>Pygospio elegans</i>	1	2, 6			26
<i>Spio martinensis</i>					26
<i>Chaetopterus variopedatus</i>					33
<i>Capitella capitata</i>		2			26
<i>Mediomastus fragilis</i>	1				
<i>Arenicola marina</i>	1	2, 4, 5, 6	10	22, 23	24, 26, 27, 28, 29, 30, 31, 32, 33
<i>Melinna palmata</i>					26
Terebellidae indet.				13, 19	33
<i>Eupolyornia nebulosa</i>					33
<i>Lanice conchilega</i>	1			23	27, 31, 33
<i>Fabricia sabella</i>					26
<i>Manayunkia aestuarina</i>	1				26
<i>Sabella pavonina</i>				14, 18	24, 31
<i>Hydroides</i> sp.					33
<i>Pomatoceros triqueter</i>	1			13, 15, 18, 23	24, 26, 28, 32, 33
<i>Serpula vermicularis</i>				14, 18	
<i>Filograna implexa</i>				18	33
Spirorbidae indet.				18, 23	24, 26, 28, 31, 32, 33
<i>Spirorbis corallinae</i>					33
<i>Paranais litoralis</i>		7			
Tubificidae indet.	1				
<i>Heterochaeta costata</i>	1	2, 6, 9			26
<i>Tubificoides benedii</i>		2			26
<i>Tubificoides pseudogaster</i>					26
Enchytraeidae indet.	1	2, 6, 7			26

	North	East	Clyde	West	North-west
Chelicerata					
Halacaridae indet.				23	24, 26
Crustacea					
<i>Verruca stroemia</i>					32
<i>Chthamalus</i> sp.				13, 18	
<i>Chthamalus montagui</i>					24
<i>Semibalanus balanoides</i>				13, 18	26, 27, 28, 31, 32, 33
<i>Balanus balanus</i>					32
<i>Balanus crenatus</i>				18, 21, 23	24, 26, 31, 32, 33
<i>Balanus improvisus</i>		9			
Ostracoda indet.		3			
Mysidae indet.	1	2, 3, 5, 6, 8, 11		12, 19, 21, 22, 23	24, 25, 27, 28, 29, 30, 31
<i>Neomysis integer</i>		2		12	
Amphipoda indet.		8			24, 26, 27, 30, 31, 33
<i>Hyale prevostii</i>					26, 32, 33
Gammaridae indet.		2, 3, 6, 9	10, 11	12, 19	26, 31, 33
<i>Parajassa pelagica</i>					32
<i>Corophium</i> sp.	1	2, 3, 5			
<i>Corophium volutator</i>	1	2, 6, 9		21, 22, 23	26
Caprellidae indet.					33
<i>Jaera</i> sp.					26
<i>Jaera albifrons</i>					26
<i>Idotea</i> sp.				12	32
<i>Ligia oceanica</i>					24, 31, 32, 33
<i>Palaemon serratus</i>					32, 33
<i>Crangon crangon</i>		2, 5		23	25, 26
<i>Nephrops norvegicus</i>					26
<i>Pagurus bernhardus</i>				23	24, 26, 27, 28, 31, 33
<i>Munida rugosa</i>					33
<i>Pisidia longicornis</i>					33
<i>Hyas araneus</i>					31, 33
<i>Macropodia rostrata</i>					26
<i>Cancer pagurus</i>					26, 33
<i>Necora puber</i>					26, 31, 33
<i>Carcinus maenas</i>	1	8	11	12, 13, 19, 21, 22, 23	25, 26, 27, 29, 30, 31, 32, 33
Insecta					
Chironomida indet.	1	2, 6, 7, 8			
<i>Anurida maritima</i>					24, 26, 31
Mollusca					
Polyplacophora indet.					28, 31, 32
<i>Leptochiton asellus</i>				12	
<i>Lepidochitona cinerea</i>				12	26, 33
<i>Tonicella rubra</i>					33
Gastropoda indet.					25
<i>Tectura testudinalis</i>	1				24, 28, 33
<i>Tectura virginea</i>					32
<i>Patella</i> sp.				13	
<i>Patella ulyssiponensis</i>				18	
<i>Patella vulgata</i>				18	24, 26, 31, 32, 33
<i>Helcion pellucidum</i>					33
<i>Margarites helycinus</i>					33
<i>Gibbula cineraria</i>					26, 31, 32, 33
<i>Gibbula umbilicalis</i>				18	26, 33
<i>Calliostoma zizyphinum</i>				18	26, 32, 33
<i>Lacuna pallidula</i>					33
<i>Lacuna vincta</i>					33

	North	East	Clyde	West	North-west
<i>Littorina</i> sp.					26, 31
<i>Littorina littorea</i>	1	4		18, 19, 21, 22, 23	24, 26, 27, 28, 29, 30, 31, 33
<i>Littorina maria</i>				13	26, 33
<i>Littorina obtusata</i>					26, 32, 33
<i>Littorina neglecta</i>					31
<i>Littorina saxatilis</i>			11	18	24, 26, 31, 32, 33
<i>Littorina saxatilis</i> var. <i>rudis</i>					26
<i>Littorina obtusata/mariae</i>				18, 19	24, 31
<i>Melarhapha neritoides</i>				13, 18	26
<i>Hydrobia</i> sp.	1		11	12, 23	25, 29
<i>Hydrobia neglecta</i>		5			
<i>Hydrobia ulvae</i>				23	26, 31
<i>Ventrosia ventrosa</i>		6			30
<i>Potamopyrgus antipodarum</i>			10		
Rissoidae indet.					33
<i>Rissoa parva</i>					32
<i>Trivia monacha</i>					33
<i>Nucella lapillus</i>				18, 23	26, 33
<i>Buccinum undatum</i>					26, 31, 33
Opisthobranchia indet.					32
<i>Elysia viridis</i>				14	
<i>Akera bullata</i>				12, 14	
Doridoidea indet.					33
<i>Archidoris pseudoargus</i>					26, 32
<i>Coryphella</i> sp.					29
<i>Flabellina pellucida</i>				12	
<i>Eubranchius farrani</i>					27
Mytilidae indet.					26
<i>Mytilus edulis</i>	1	8, 9	11	12, 14, 15, 16, 21, 23	26, 27, 28, 29, 30, 31, 33
<i>Modiolus</i> sp.		4			
<i>Chlamys</i> sp.				12	
<i>Aequipecten opercularis</i>				14	
<i>Anomia ephippium</i>					33
<i>Pododesmus patelliformis</i>					32, 33
<i>Cerastoderma</i> sp.				12, 23	33
<i>Cerastoderma edule</i>					26, 27
<i>Cerastoderma glaucum</i>		8		12	
<i>Ensis</i> sp.					33
<i>Macoma balthica</i>		2			26
<i>Tapes aureus</i>				12	
<i>Turtonia minuta</i>				18	
<i>Mya</i> sp.					33
<i>Mya arenaria</i>	1	2, 5	11	23	27
<i>Hiatella arctica</i>					26, 32
Bryozoa					
Crisiidae indet.					32, 33
<i>Filicrisia geniculata</i>					32
<i>Alcyonidium diaphanum</i>					26
<i>Alcyonidium gelatinosum</i>					26
<i>Alcyonidium hirsutum</i>				18, 23	26, 32, 33
<i>Bowerbankia imbricata</i>	1				33
<i>Umbonula littoralis</i>					32
<i>Schizomavella linearis</i>					32
<i>Membranipora membranacea</i>				18, 23	26, 33
<i>Electra pilosa</i>					26
<i>Scrupocellaria reptans</i>					32
<i>Bugula turbinata</i>				13, 18	
Bryozoa indet. (crusts)				18	32, 33

	North	East	Clyde	West	North-west
Echinodermata					
<i>Henricia</i> sp.					32, 33
<i>Henricia oculata</i>					33
<i>Henricia sanguinolenta</i>					31
<i>Asterias rubens</i>	1		11	12, 13, 18	26, 31, 33
<i>Ophiothrix fragilis</i>					26, 33
<i>Ophiopholis aculeata</i>					33
<i>Amphipholis squamata</i>					24
<i>Ophiura albida</i>					26
<i>Psammechinus miliaris</i>				14	33
<i>Echinus esculentus</i>				14	31, 32, 33
Tunicata					
<i>Clavelina lepadiformis</i>				12, 18	26, 32, 33
<i>Polyclinum aurantium</i>					32, 33
<i>Sidnyum turbinatum</i>					26
Didemnidae indet.					33
<i>Diplosoma listerianum</i>					32
<i>Ciona intestinalis</i>				12, 14	24, 32, 33
<i>Perophora listeri</i>				18	
<i>Corella parallelogramma</i>				18	33
<i>Asciidiella aspersa</i>				14, 18	33
<i>Asciidiella scabra</i>					24, 26, 31
<i>Ascidia conchilega</i>					33
<i>Ascidia mentula</i>				18	26, 31, 33
<i>Polycarpa scuba</i>				18, 23	
<i>Dendrodoa grossularia</i>					26, 32, 33
<i>Botryllus schlosseri</i>					26, 32, 33
<i>Botrylloides leachi</i>					26, 32, 33
Pisces					
<i>Anguilla anguilla</i>		2, 8	11	12	25, 29
<i>Salmo trutta</i>			11	22	26
<i>Pollachius virens</i>					26, 32
<i>Gasterosteus aculeatus</i>		3, 5, 8	10, 11	12, 22	24, 25, 28, 29
<i>Cyclopterus lumpus</i>					27, 31, 33
<i>Crenilabrus melops</i>					26
<i>Ctenolabrus rupestris</i>					26
<i>Labrus bergylta</i>				14	
<i>Pholis gunnellus</i>					26
<i>Ammodytes</i> sp.				12	
<i>Callionymus lyra</i>					26
Gobiidae indet.		2		12	
<i>Gobius niger</i>				12	
<i>Gobiusculus flavescens</i>					31, 32, 33
<i>Pomatoschistus</i> sp.		2, 5	11	12, 14, 18, 22, 23	25, 26, 27, 28, 29, 30, 32, 33
<i>Pomatoschistus minutus</i>				12	
<i>Zeugopterus punctatus</i>					32
Pleuronectidae indet.			11	22, 23	28, 33
<i>Platichthys flesus</i>		8	11		26
<i>Pleuronectes platessa</i>		8			25
Cyanophycota					
Cyanophycota indet.		6, 8			25, 28, 29
<i>Beggiatoa</i> sp.	1	8	11	12, 23	25, 26, 30, 31
Rhodophycota					
Rhodophycota indet.	1				28
<i>Audouinella</i> sp.				13	
<i>Trailiella intricata</i>				12, 14, 19	31
<i>Palmaria palmata</i>				13, 18, 23	26, 33

	North	East	Clyde	West	North-west
<i>Dilsea carnosa</i>				18, 23	33
<i>Dumontia contorta</i>	1				26, 27, 28, 29, 30, 31, 33
<i>Peyssonnelia</i> sp.					29
<i>Hildenbrandia</i> sp.		4		12	24, 26, 28, 29, 31, 33
<i>Hildenbrandia rubra</i>					29, 31
Corallinaceae indet.	1			13, 14, 18, 19, 23	24, 26, 27, 28, 29, 30, 31, 32, 33
<i>Corallina officinalis</i>				13, 18, 19	26, 33
<i>Lithophyllum orbiculatum</i>					26, 33
<i>Lithothamnion glaciale</i>				19	26, 33
<i>Phymatolithon lenormandii</i>					26, 33
<i>Phymatolithon purpureum</i>					26
<i>Titanoderma litorale</i>					31
<i>Gracilaria gracilis</i>				12	33
<i>Ahnfeltia plicata</i>					33
<i>Phyllophora crispa</i>					26, 32, 33
<i>Phyllophora pseudoceranoides</i>					26, 33
<i>Mastocarpus stellatus</i>				12	24, 26, 33
<i>Chondrus crispus</i>	1	4		12, 13, 18, 21, 23	26, 29, 30, 31, 33
<i>Polyides rotundus</i>	1			12, 18, 21, 23	24, 27, 29, 30, 31, 33
<i>Plocamium cartilagineum</i>				13, 14, 18	31, 32, 33
<i>Furcellaria lumbricalis</i>					26, 29, 32, 33
<i>Catenella caespitosa</i>					26, 33
<i>Cystoclonium purpureum</i>	1			12	26, 27, 29, 31, 33
<i>Chylocladia verticillata</i>					31, 33
<i>Lomentaria articulata</i>					33
<i>Lomentaria clavellosa</i>					31, 33
<i>Lomentaria orcadensis</i>				13	
<i>Ceramium</i> sp.	1	2, 5		21, 23	24, 26, 29, 33
<i>Ceramium pallidum</i>					31
<i>Ceramium diaphanum</i>		2			
<i>Ceramium nodulosum</i>				12	26
<i>Halurus flosculosus</i>					26, 33
<i>Plumaria plumosa</i>				13	33
<i>Ptilota gunneri</i>					33
<i>Cryptopleura ramosa</i>					33
<i>Delesseria sanguinea</i>				13, 18, 23	31, 32, 33
<i>Membranoptera alata</i>				23	26, 33
<i>Phycodryis rubens</i>				18	33
<i>Bostrychia scorpioides</i>					24
<i>Osmundea hybrida</i>					26, 33
<i>Odonthalia dentata</i>					33
<i>Polysiphonia</i> sp.	1	4		12, 23	28, 31, 33
<i>Polysiphonia brodiei</i>	1				
<i>Polysiphonia elongata</i>					26, 31
<i>Polysiphonia lanosa</i>				19	26, 31, 33
<i>Polysiphonia fucoidea</i>				12	26, 27, 30
<i>Polysiphonia stricta</i>					33
<i>Pterosiphonia parasitica</i>					33
<i>Rhodomela confervoides</i>					28, 29, 33
Filamentous red algae indet.				12	29
Rhodophycota indet. (non-calcareous crusts)				12, 22	24, 25, 27, 28, 30, 33
Chrysophycota					
Diatoms – colonial		2			
Diatoms – film	1	2, 3, 5, 8		12, 15, 17, 18	30
Chromophycota					
Ectocarpaceae indet.	1	2, 3, 5	11	12, 13, 14, 18, 19, 21	24, 25, 26, 32, 33
<i>Spongonema tomentosum</i>					26
<i>Ralfsia</i> sp.					31, 33

	North	East	Clyde	West	North-west
<i>Leathesia difformis</i>				12	
<i>Eudesme virescens</i>					26
<i>Aglaozonia</i> (asexual <i>Cutleria</i>)					32
<i>Sphacelaria</i> sp.	1			12	29, 33
<i>Sphacelaria radicans</i>					25
<i>Cladostephus spongiosus</i>					26, 33
<i>Desmarestia aculeata</i>					31, 33
<i>Desmarestia viridis</i>	1			13, 18	26, 31, 33
<i>Stictyosiphon</i> sp.				12	
<i>Striaria attenuata</i>	1				27
<i>Asperococcus</i> sp.					26, 33
<i>Asperococcus compressus</i>				21	
<i>Asperococcus fistulosus</i>				13, 19	
<i>Asperococcus bullosus</i>					31
<i>Dictyosiphon</i> sp.					31
<i>Colpomenia peregrina</i>	1			14	27, 31
<i>Scytosiphon lomentaria</i>					26
<i>Chorda filum</i>	1			19, 21, 23	24, 26, 27, 31, 32, 33
<i>Laminaria</i> sp.				23	33
<i>Laminaria digitata</i>				18	26, 32, 33
<i>Laminaria hyperborea</i>				23	26, 31, 33
<i>Laminaria saccharina</i>	1			12, 13, 18, 23	26, 31, 32, 33
<i>Alaria esculenta</i>				13, 18	
<i>Ascophyllum nodosum</i>		5		12, 18, 19, 21, 23	26, 29, 31, 32, 33
<i>Ascophyllum nodosum</i> ecad <i>mackaii</i>				23	26, 31
<i>Fucus ceranoides</i>		2, 3, 4, 6	10, 11	22, 23	25, 26, 31
<i>Fucus cottonii</i>					24, 26, 28, 29, 31
<i>Fucus serratus</i>	1			12, 18, 21, 23	24, 26, 27, 28, 29, 30, 31, 33
<i>Fucus spiralis</i>		5		13, 18, 19	24, 26, 29, 31, 32, 33
<i>Fucus vesiculosus</i>	1	5, 9		12, 19, 23	24, 26, 28, 29, 30, 31, 32, 33
<i>Pelvetia canaliculata</i>		5		13, 18, 19, 23	24, 26, 28, 29, 31, 32, 33
<i>Himantalia elongata</i>					31, 33
<i>Halidrys siliquosa</i>	1			12, 23	26, 29, 31, 33
Filamentous brown algae indet.		2, 4			26, 29, 32
Chromophycota indet. (crusts)					26, 28
Chlorophycota					
Chlorophycota indet.					31
<i>Ulothrix</i> sp.		3, 9		13	
<i>Percursaria percursa</i>		4		19	
<i>Enteromorpha</i> sp.	1	2, 4, 6	10, 11	12, 14, 18, 22, 23	24, 26, 27, 28, 29, 30, 31, 33
<i>Enteromorpha crinata</i>					31
<i>Enteromorpha flexuosa</i>		7, 8			
<i>Enteromorpha intestinalis</i>	1	2, 3, 5, 7	10, 11	12, 13, 19, 23	24, 25, 27, 31
<i>Enteromorpha linza</i>					27
<i>Enteromorpha prolifera</i>		2, 4, 5, 8			
<i>Ulva</i> sp.	1		10	13, 18	26, 27, 30, 31, 32, 33
<i>Ulva lactuca</i>			10		32
<i>Blidingia</i> sp.		5	10		
<i>Blidingia marginata</i>		9			
<i>Blidingia minima</i>		2, 3, 5			26
<i>Monostroma</i> sp.					26, 28, 31
<i>Monostroma oxyspermum</i>		2			
<i>Prasiola</i> sp.	1				
<i>Urospora</i> sp.		8			
<i>Spongomorpha aeruginosa</i>	1				
<i>Chaetomorpha</i> sp.		9		12	25
<i>Chaetomorpha capillaris</i>					33
<i>Chaetomorpha linum</i>	1	9		19	25, 28, 30
<i>Chaetomorpha melagonium</i>		6			

	North	East	Clyde	West	North-west
<i>Cladophora</i> sp.		8	10	12, 13, 18, 22, 23	25, 26, 29, 31
<i>Cladophora flexuosa</i>		3			
<i>Cladophora liniformis</i>	1	2, 8		12	
<i>Cladophora rupestris</i>	1	2			25, 26, 28, 29, 30, 31, 32, 33
<i>Cladophora sericea</i>					26, 33
<i>Rhizoclonium riparium</i>		3, 8		13, 19, 23	25
<i>Derbesia</i> sp.			11		
<i>Derbesia marina</i>	1	4, 8	10, 11		
<i>Codium</i> sp.					33
Encrusting green algae indet.					33
Filamentous green algae indet.			10	19	24, 25, 28, 29, 32
Foliose green algae indet.				12	

Xanthophyta

<i>Vaucheria</i> sp.		7		23	
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Angiospermae

<i>Zostera marina</i>		2, 4, 8		12	
<i>Ruppia</i> sp.	1	5	10, 11	12, 22	29
<i>Ruppia maritima</i>		4, 6	11	12	25
<i>Ruppia spiralis</i>					25
<i>Salicornia</i> sp.					24
<i>Armeria maritima</i>					28, 29, 31
<i>Potamogeton</i> sp.		3	10		
<i>Plantago maritima</i>		5			
<i>Phragmites</i> sp.		3			25

Lichens

<i>Anaptychia fusca</i>					29
<i>Caloplaca</i> sp.				13, 18	32
<i>Caloplaca marina</i>				23	24, 25
<i>Caloplaca thallicola</i>					25
<i>Lecanora atra</i>				18, 23	
<i>Lichina confinis</i>					28, 29, 31, 32, 33
<i>Ochrolechia</i> sp.					32
<i>Ochrolechia parella</i>					24, 25
<i>Ramalina</i> sp.					25
<i>Verrucaria</i> sp.				13, 18	
<i>Verrucaria maura</i>				23	24, 25, 26, 28, 29, 31, 32, 33
<i>Verrucaria mucosa</i>				23	26, 32, 33
<i>Xanthoria</i> sp.				13	
<i>Xanthoria parietina</i>				18, 23	24, 25, 29, 31
Grey lichens indet.					24, 25, 29

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