



deepwater brittlestar



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clinafish on eelgrass

**Torridon 2000 Survey  
August 2000  
Summary Report**



red cushion star & sea squirts



Fries' goby



diver recording on maerl bed



clinafish in maerl

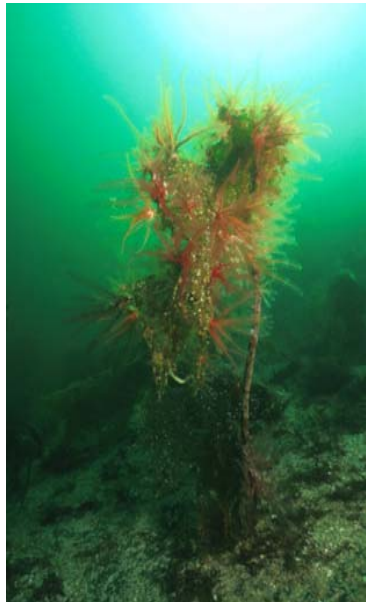


## Outer Loch Torridon

Sites 5, 6, 7 and 8, at the entrance to Loch Torridon, were the most exposed sites surveyed. Kelp forest of cuvie *Laminaria hyperborea* and sugar kelp *Laminaria saccharina* dominated rock slopes to around 10m, with the lower limit of kelp at around 15m. In many places the kelp forest was heavily grazed by urchins. At Site 6, dabberlocks *Alaria esculenta* and tangle *Laminaria digitata* were dominant in narrow band around low water, and at Site 7 there were a few jewel anemones *Corynactis viridis* in shallow water, indicating the more exposed nature of these sites around Sgeir na Trian. At the base of the rock slopes, there were coarse sediments of sand and shell gravel with scattered boulders and cobbles. At Site 8, Sgeir a' Ghair, waves of coarse sediments at 15-16m had pink, live maerl *Phymatolithon calcareum* in the furrows, with a variety of animals including small clingfish (see cover), scallops and 7-armed starfish. There were interesting algae here too, including *Scinaia* sp and *Arthrocladia villosa*.

### Loch Torridon, south side

Sites 1, 2, 9 and 10 had more sheltered versions of kelp forest, on bedrock and boulder slopes, with increasing proportions of sugar kelp. Kelp fronds and stipes were often festooned with featherstars *Antedon bifida*, with pink grazed coralline algae beneath. Featherstars were also abundant on vertical rock faces in deeper water, together with seasquirts *Ciona intestinalis*, often with red cushion stars *Porania pulvillus* feeding on them. There were increasing amounts of boulder slope rather than bedrock at these sites, with coarse sediments at the bases. There was some maerl at Site 9.



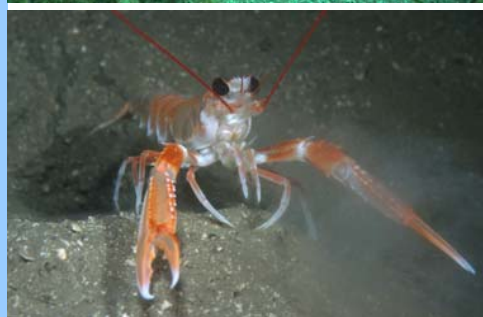
## Loch Torridon Narrows

The narrows between Loch Torridon and Loch Shieldaig are unusual in being relatively deep, at 80-100m. At Site 25 on the south side of the narrows, a steep slope of rock and angular boulders was covered with dense sugar kelp forest in the shallows, with kelp park down to 10m. Below this was a steep slope of boulders in shelly silt disappearing into the depths, inviting further survey in deeper water.

## Loch Shieldaig

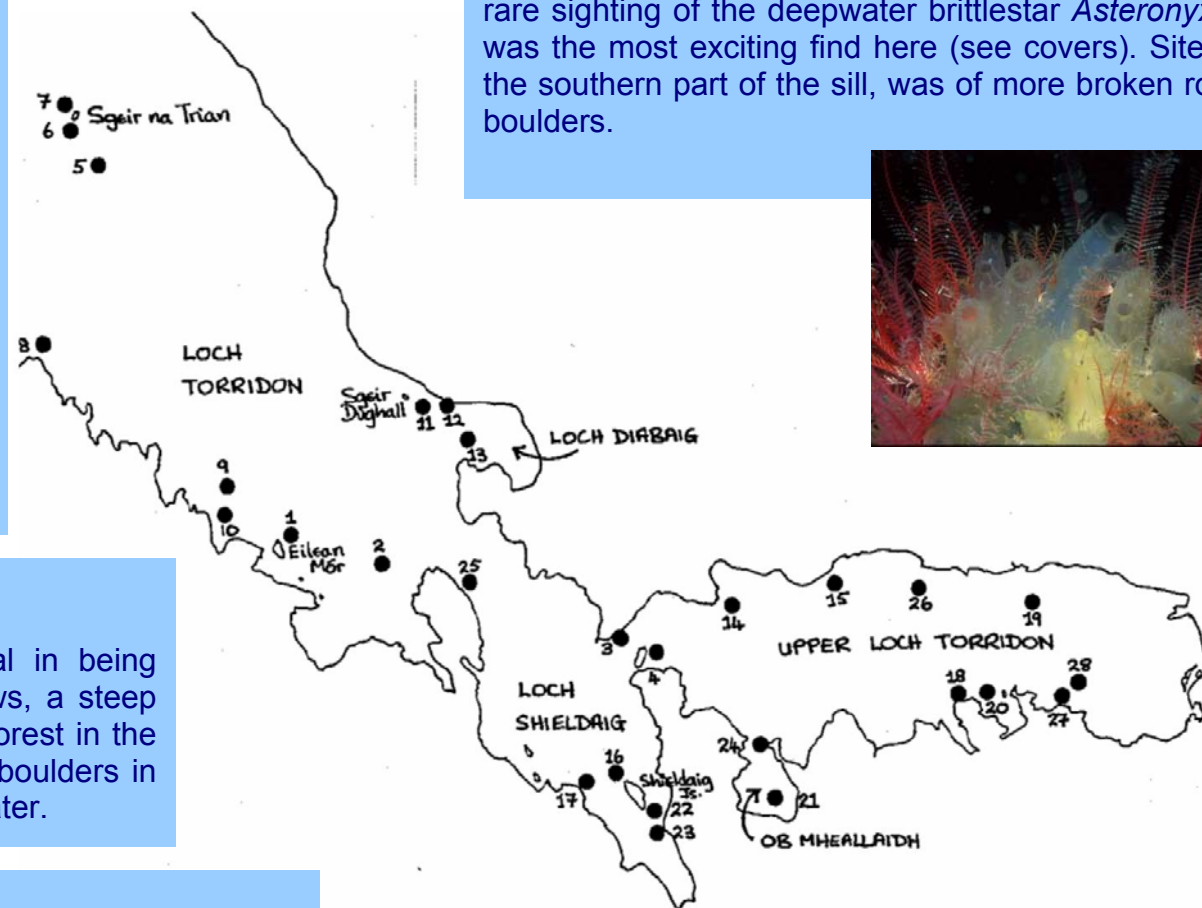
The sites surveyed in Loch Shieldaig were mainly of boulder slopes and sediments, with sand and shell gravel in the shallows and increasing amounts of mud with depth. In enhanced currents between Shieldaig Island and the village (Site 22), the shallow sandy seabed was particularly rich, with seagrass *Zostera marina*, numerous sea potatoes *Echinocardium cordatum* and razor shells *Ensis* sp. In slightly deeper water the sand surface was covered with a film of diatoms, and many burrows and tubes indicated a rich infauna. Pipefish *Syngnathus acus* and clingfish *Lepadogaster candollei* (see cover) were living amongst the eelgrass, which also had small hydroids and sea squirts growing on its leaves. Boulders were covered with dense seaweeds including sea oak *Halidrys siliquosa* and other scour-resistant algae.

At Sites 16 and 17, boulders were pink with coralline algae, and scattered with ascidians, particularly *Ascidia mentula*. Long-clawed squat lobsters *Munida rugosa* were common, and in mud in deeper water there were occasional burrows with Norway lobsters *Nephrops norvegicus*. Off Shieldaig Jetty (Site 23), a steep slope of cinders led into mud in deeper water, with the sea pen *Pennatula phosphorea*, Norway lobsters, and Fries' goby *Lesueurigobius friesii* (see covers).



## Loch Diabaig

Sites 11 and 12 ran into Loch Diabaig from the top of the sill separating it from Loch Torridon. In shallow water at Site 12, furbellows *Saccorhiza polyschides* was abundant, in extensive pure stands. On top of the bedrock sill at 12-14m sparse sugar kelp was covered with featherstars and ascidians thriving in the enhanced currents across the sill. Some of the featherstars here were the northern species *Antedon petasus*. Hermit crabs with the cloak anemone *Adamsia carciniopados* were also seen. A steep rock slope into Loch Diabaig had ascidians, hydroids and the large opisthobranch *Pleurobranchus membranaceus*. Below 25m the seabed was deep, soft mud, with dense giant seapens *Funiculina quadrangularis* below 30m. A rare sighting of the deepwater brittlestar *Asteronyx loveni* was the most exciting find here (see covers). Site 13, on the southern part of the sill, was of more broken rock and boulders.



## Upper Loch Torridon Narrows

At only 20m deep, the narrows between Upper Loch Torridon and Loch Shieldaig (Sites 3 and 4) are current-swept for a large part of the tidal cycle. The seabed was of scoured rock, boulders and coarse sediments, with typical current-swept communities of soft corals, brittlestars and maerl, and scour-resistant life such as keelworms and encrusting algae on boulders. At Site 3, on the north side of the narrows, there is a rock wall from 0-14m leading down to the floor of the narrows.

Site 4 is in a more sheltered position behind Eilean a'Chaoil, out of the main current but still with good water exchange. Here mixed sediments and rock provided habitats for a wide range of seaweeds and animals.



## Upper Loch Torridon

Upper Loch Torridon sites were increasingly shallow and sheltered towards the head of the loch, although wave action in shallow water can be vigorous during storms so coarse sediments were found in the shallows at many sites. Most places in the upper loch were of sediments or mixtures of rock and sediment, with short rock or boulder slopes leading up to the shore. Sugar kelp was the predominant kelp in the upper loch, with lower limit between 5-10m. On the south side of the loch there were loosely-lying mats of algae in shallow water, with maerl at Sites 24 & 28.

Site 26 was the only place during the survey where a community typical of deep, sheltered rock was found on boulders at 29m, with brachiopods and the sealoch anemone *Protanthea simplex*.

## Ob Meallaidh

Ob Meallaidh (Site 21) has an intertidal sill, which cuts off a pool a few metres deep at low water. Currents flowing across the sill allow a few normally deeper subtidal species such as the soft coral *Alcyonium digitatum* to live here in very shallow water, and there is a rich mollusc fauna in coarse shell gravel. Inside the ob, there were lugworm mounds and urchin burrows in fine sand, with algae on scattered boulders.



## Species seen on the survey

The table opposite summarises the numbers of species recorded in each group, and lists some common species. The number of species recorded by the survey is relatively low, partly reflecting the type of survey which concentrated mainly on habitats, and prominent, easily identifiable species. It also reflects the limited water movement in many parts of sealochs, and the northern position in the UK. However crustaceans and echinoderms in particular are well represented.



A few particularly interesting species were found, especially in Loch Diabaig, making up for the lack of overall variety. Some of the deepest inshore waters in Britain at over 300m are found in the Inner Sound just outside Loch Torridon,

Normal and rare white specimens of the red cushion star *Porania pulvillus*

and the basins within the loch complex are also deep (Loch Torridon 160m, Loch Shildaig 144m and Upper Loch Torridon 93m). The unusual species found in the fjordic sealochs are often ones more typical of deep waters off the continental shelf, or of colder waters to the north of Britain.

A particularly exciting find was the large white brittlestar *Asteronyx loveni*, at 34m in Loch Diabaig (Site 11; see front cover). This brittlestar is very rarely seen by divers because it normally lives deeper than 100m. Although it is known from deep video surveys in a few sealochs, this is the first time this brittlestar has been seen in such shallow water, and photographed by divers. *Asteronyx* lives on the top of giant seapens, holding on with parts

Phylum	Common name	No of species	Common species
Algae	Seaweeds	47	Kelps <i>Laminaria</i> spp Cord weed <i>Chorda filum</i> Encrusting coralline algae Maerl <i>Phymatolithon calcareum</i> <i>Bonnemaisonia hamifera</i> (Trailliella phase)
Angiospermae	Seagrass	1	Eelgrass <i>Zostera marina</i>
Foraminifera	Foraminiferan	1	Giant naked foraminiferan
Porifera	Sponges	3	
Cnidaria	Anemones, corals, sea fans	20	Hermit crab hydroid <i>Hydractinia echinata</i> Kelp hydroid <i>Obelia geniculata</i> Burrowing anemone <i>Cerianthus lloydii</i> Cloak anemone <i>Adamsia carcinipados</i>
Nemertea, Echiura	Worms	2	
Annelida	Segmented worms	11	Keelworm <i>Pomatoceros triqueter</i> Parchment worm <i>Chaetopterus variopedatus</i> Sandmason <i>Lanice conchilega</i>
Chelicerata	Sea spiders	1	
Crustacea	Prawns, crabs, lobsters	16	Hermit crabs Paguridae Long-clawed squat lobster <i>Munida rugosa</i> Swimming crab <i>Liocarcinus depurator</i> Velvet crab <i>Necora puber</i> Green crab <i>Carcinus maenas</i> Brown crab <i>Cancer pagurus</i> King scallop <i>Pecten maximus</i> Painted topshell <i>Calliostoma ziziphinum</i> Queen scallop <i>Aequipecten opercularis</i>
Mollusca	Snails, bivalves, sea slugs, octopus	22	
Brachipoda	Lamp shells	1	<i>Neocrania anomala</i>
Bryozoa	Sea mats	5	Lacy sea mat <i>Membranipora membranacea</i>
Echinodermata	Starfish, urchins, sea cucumbers	19	Common urchin <i>Echinus esculentus</i> Common starfish <i>Asterias rubens</i> Red cushion star <i>Porania pulvillus</i> Common featherstar <i>Antedon bifida</i> Spiny starfish <i>Marthasterias glacialis</i> Seven-armed starfish <i>Luidia ciliaris</i>
Tunicata	Sea squirts	12	<i>Asciadiella aspersa</i> <i>Ascidia mentula</i> <i>Ciona intestinalis</i> Lightbulb seasquirt <i>Clavellina lepadiformis</i>
Pisces	Fish	9	Gobies <i>Pomatoschistus</i> spp Butterfish <i>Pholis gunnellus</i> Leopard-spotted goby <i>Thorogobius ephippiatus</i>
<b>TOTAL SPECIES</b>		<b>170</b>	

of its coiled arms, while the ends hang out in the water, presumably to catch falling food particles.

Giant naked foraminiferans (Sites 1, 12, 23) look like a small white fungus-like branched mass up to 5cm across with an outer organised network or 'pepperpot' of sand grains. Its has only recently been recognised, and so far has only been found in Scottish sealochs. These fragile organisms are more typical of sediments in very deep water.

Fries' goby *Lesueurigobius friesii* (Sites 11, 23, see front cover) lives

in the same deep muddy habitats as Norway lobsters. On a dusk dive at Shildaig slipway many more Fries' gobies were seen out of their burrows than on a daytime dive, suggesting that they may be more active at dusk.

The starfish *Luidia sarsi* (Site 12) has a northern distribution, preferring colder water. It is not often seen, and is probably most active by night, living buried in the sand during the day.



Seasearch in Scotland is co-ordinated by the Marine Conservation Society. Surveyors taking part were: Lynsey Bayer, Micha Bayer, Rosey Bayne, Sue Chambers, Neil Cowie (organiser) Ben Dipper, Iain Dixon, Calum Duncan, Frank Fortune, Anne Frankland, Chris Griffiths, Mary Harvey, Digger Jackson, Jeremy Milne, Sue Scott and Victoria Wiltshire. Thanks to Angus McHattie for organising boats and air.



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