Seasearch West of Scotland

Carna 2018 Report

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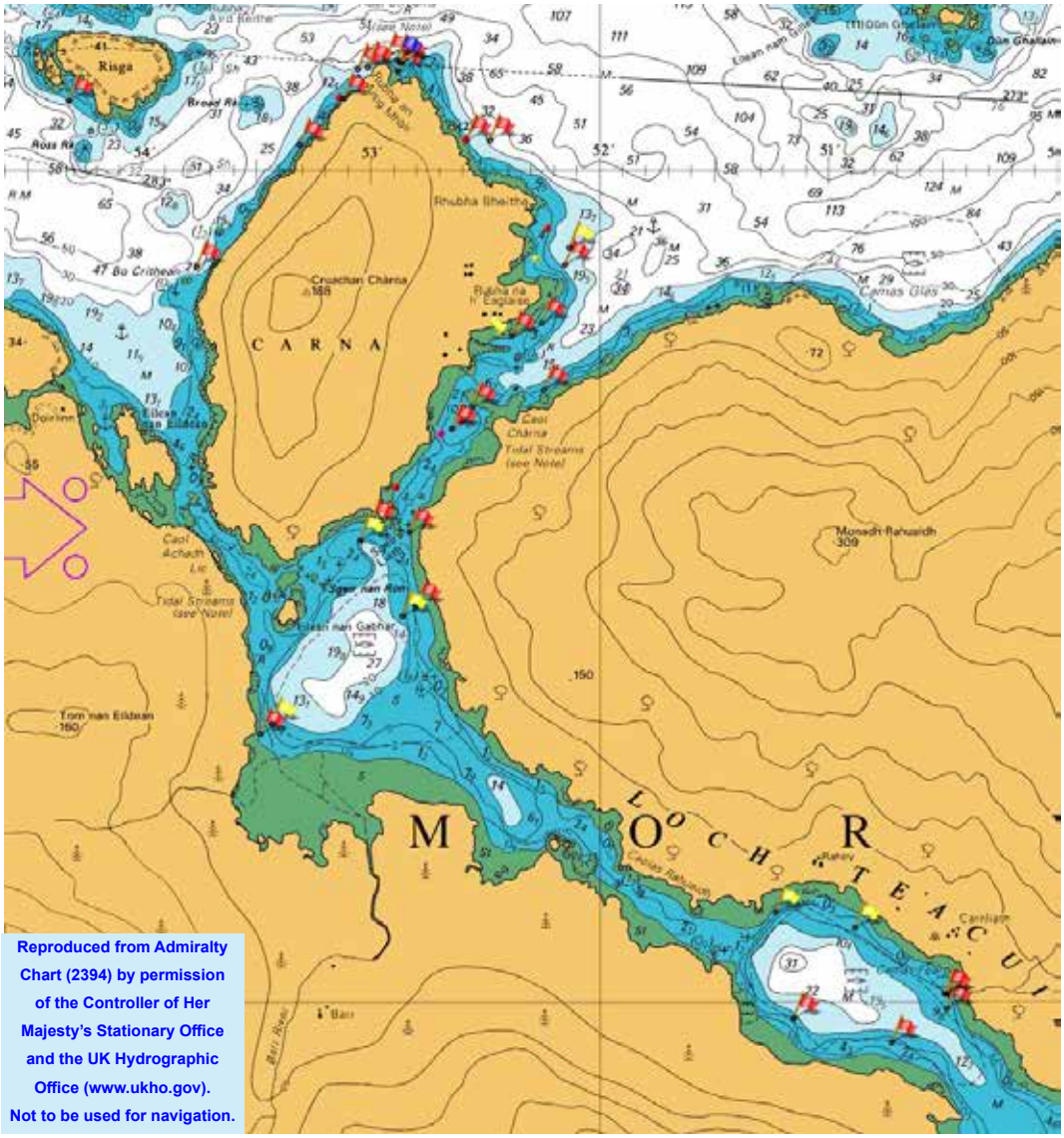
The Carna Dive Team

Serpulid Worm

Flame Shell



Position of 2018 Dive Sites - Red flags mark start of dives, yellow flags the end point

The rare Celtic feather star, *Leptometra* celtica, was recorded from several sites

Seasearch Carna 2018

During 2018, three Seasearch diving expeditions visited Loch Sunnart. The expeditions were based on the Island of Carna, with surveys concentrated around Carna and the neighbouring Loch Teacuis. The first survey took place over six days in June with eight divers, the second took place in October involving 6 divers and the final, smallest expedition, took place again in October, with 4 divers. Over the three expeditions a total of 59 survey forms were completed - 42 Observer forms and 17 Surveyor forms. The survey areas can be conveniently divided into 7areas - North Carna, East Carna, West Carna, South Carna and Caol Charna, Loch Teacuis (Outer and Inner) and the Isle of Risga. This report summarises the findings of the three expeditions. The original survey forms and a list of biotopes recorded are included as appendices.

North Carna

The first two expeditions carried out several dives around the northern end of Carna and discovered an extensive flame shell reef forming as

The far more common *Antedon bifida* feather star was also recorded

The Carna pontoon and cottage, base for much of the survey activity

terraces on a fairly steep slope and extending well beyond the dive limit of 30 metres.

East Carna

A number of interesting dives were completed here revealing the presence of several Priority Marine Features including tall sea pens (*Funiculina quadrangulis)*, fireworks anemones (*Pachycerianthus multiplicatus)*, Celtic feather stars (*Leptometra celtica*) and horse mussels (*Modiolus modiolus)*. All three UK sea pens were recorded at this site, in relatively shallow water.

South Carna and Caol Charna

A number of dives were undertaken in this area discovering extensive brittle star beds, horse mussels and spoon worrms.

A small mountain of dive kit on its way to Carna

West Carna

Relatively few dives took place on the west side of Carna reflecting its greater exposure to westerly winds, which limited diving.

Loch Teacuis (Outer and Inner)

Taking advantage of the large diving group the opportunity was taken to survey much of Loch Teacuis in search of serpulid reefs. Sadly, the results were disappointing, with no live reefs found on the southern shore and very few on the northern shore. A solitary fireworks anemone was recorded in the inner basin. The October divers carried out dives in outer Loch Teacuis but found no more serpulid reefs or fireworks anemones. They did find abandoned aquaculture debris including a discarded net.

Visibility was very variable which sometimes hampered surveying

Risga

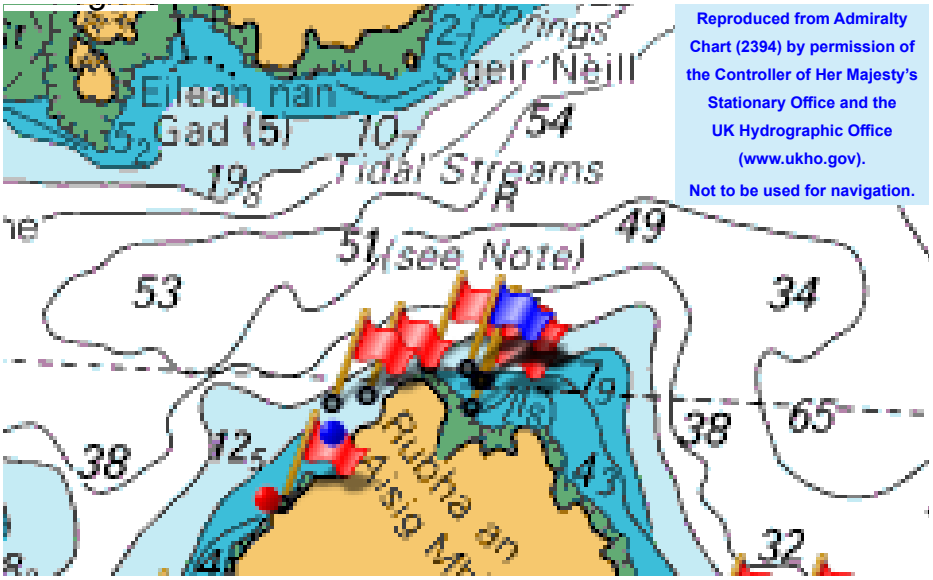
The neighbouring Island of Risga was also visited, and a thriving population of northern sea fans (*Swiftia pallida)* and Celtic feather stars *(Leptometra celtica)* were recorded.

The position of the survey dives is shown on the accompanying charts and in the following pages, the findings in each area are summarised.

A female cuckoo wrasse seen at the north end of Carna

Scattered Horse mussels *Modiolus modiolus* were frequently recorded

Polycera faroensis, one of several nudibranch species recorded in 2018



Empty shells lying on the seabed were the first sign of an extensive flame shell bed

A flame shell temporarily removed from its nest

A long clawed squat lobster making its home under a flameshell nest

North Carna

Forms: 38, 39, 45, 46, 47, 50 ,51, 52, 57, 58, 59, 64, 68, 69, 70, 73, 74, 76, 132, 133, 135, 139, 141.

More dives were undertaken off the north tip of Carna than any other site. This was partially because of the exceptionally high biodiversity in the area and partially in an attempt to gauge the extent of the flame shell reef located off the northern tip of Carna. The enhanced biodiversity in this area is probably due to the powerful currents which sweep through the 400m wide channel between Carna and Ardnamurchan. Diving was only feasible around slack water and, on one occasion, a dive was aborted due the divers encountering a powerful down current.

The strong currents and protection from dredging provide ideal conditions for flame shells (*Limaria hians*), filter feeding bivalves with a striking appearance. These animals build nests around themselves binding together sand and other materials with strong byssus threads. Given time they can completely cover the seabed in a mat of nests, which makes the entire seabed feel spongy. These nests have the effect of stabilising the seabed and providing homes for a myriad other creatures on and amongst the nests.

As the flame shells are hidden in their nests, they are not immediately apparent and the first sign of their presence is often a few empty shells lying on the seabed. Some empty shells were noted during the first dives in this area and, with closer investigation, it became apparent that there was an extensive area of flame shell nests, starting at a depth of around 10 metres and continuing down to 30m+, beyond the limits of the survey.

The north end of Carna

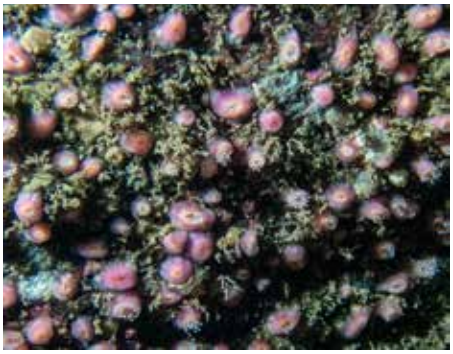
The chart for the narrows shows a depth of 53 metres in the centre and it seems likely that the flame shell reefs will continue on to this depth. Unusually, the flame shells in the area form a series of terraces running parallel to the shore rather than a continuous blanket.

Long clawed squat lobsters (*Munida rugosa*) were frequently observed living in burrows excavated at the base of each terrace. It may be that the terraces are just a phase before an expanding population of flame shells eventually covers the entire seabed in a living carpet, or there may be an equilibrium between animals such as the squat lobsters and the flame shells, and the terraces will be a long lived feature. An interesting avenue of enquiry for future dives.

As well as providing cover for animals such as squat lobsters, the terraces supported an abundant population of hydroids including *Nemertesia* and *Halecium*.

The nudibranch *L.genei* feeding on the hydroid *Nemertesia ramosa*

The flame shell bed was found to the east and north-east of the point. At the point itself, the divers found rock walls down to 10 metres followed by a boulder and sand seabed descending on a fairly steep slope. Again, this area was very rich, with noticeable finds being sheets of jewel anemones (*Corynactis viridis*) on the rock walls and the nudibrach *Lomanotus genei* found feeding on the hydroid *Nemertisa ramosa.* This species was last recorded near Carna in 1989, so it was an encouraging to confirm its continued presence.



Jewel anemones at North Carna

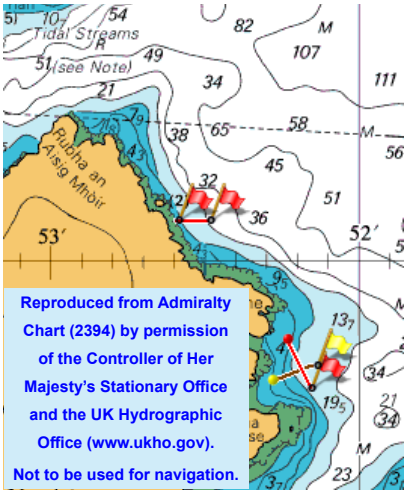
The sun star *Solaster endeca* was recorded at North Carna but was rare elswehere in Sunnart

A closed horseman anemone, one of the largest species found around Carna

Sea loch anemones and sea squirts were common on the North Carna boulder slope

Cup corals were found all around Carna with particularly fine speciems at the north end

Hydroids were abundant off North Carna



East Carna

Forms: 138, 144, 147

East Carna was quite different to the other sites surveyed. Three dives were undertaken, two in the bay between Rubha na h'Eaglaise and Rubha Bheithe, and one to the North of Rubha Bheithe. At all three sites, divers found fine examples of burrowed mud habitat supporting populations of all three Scottish sea pens, the tall sea pen, phosphorescent sea pen and slender sea pen.

In addition, there were scattered fireworks anemones and, in the shallower areas, horse mussels. Nephrops burrows with associated Fries gobies were recorded, and there was also a record of the rarely reported Jeffreys goby. The distinctive mud runner crab (*Goneplax rhomboides*) was also recorded at all three sites. The site north of Rhubha Bheithe seemed to be the richest, with not only all the sea pens present but a population of Celtic feather stars found in relatively shallow water.

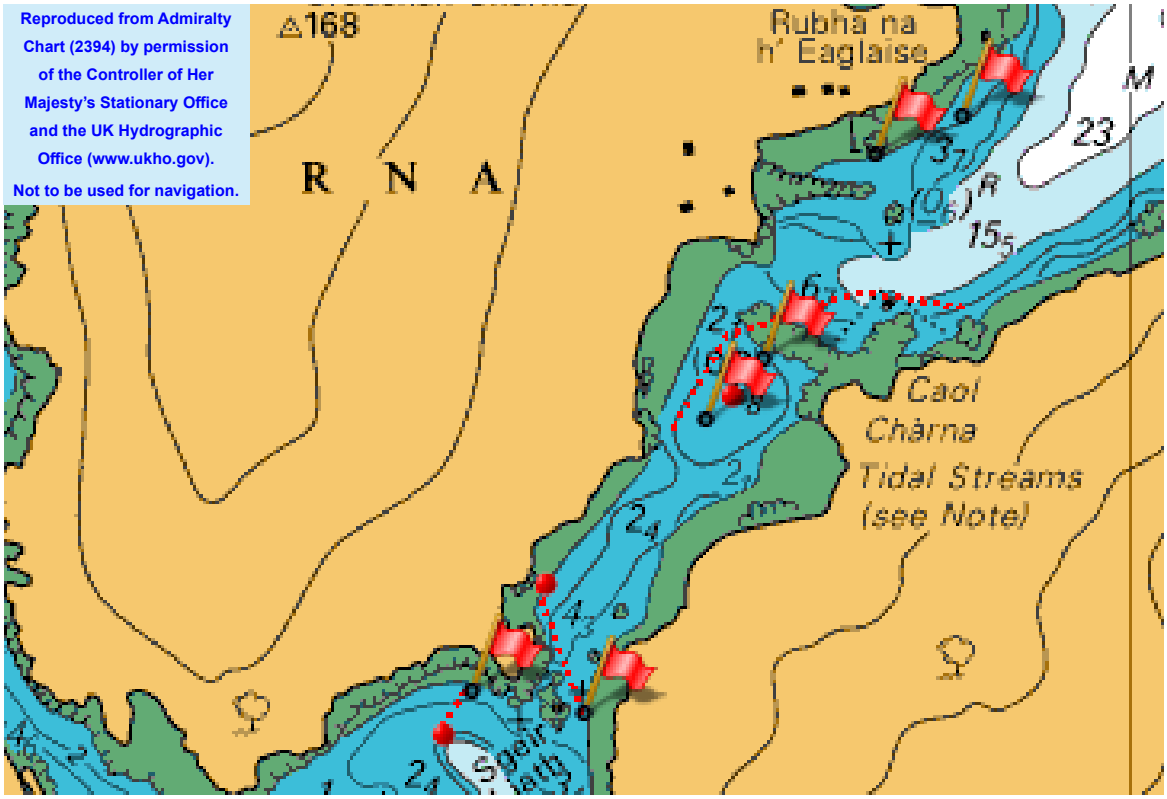
On one of the dives, the surveyors were surprised to see a large lobster walking in a purposeful fashion along the seabed, heading into deeper water. It ignored the divers completely and carried on into the depths.

Phosphorescent sea pen

The mud runner crab
(Goneplax rhomboides)

The wandering lobster

Part of a *Funiculina* sea pen, recorded off East Carna



Caol Charna narrows from the south

The pontoon with Carna beyond

A clump of *A. nodosum ecad mackii* next to the pontoon

South Carna

Forms: 40, 43, 62, 130, 140, 146, 44, 49, 60, 63, 67, 72,129, 131, 149, 150.

The expeditions were mainly based in the cottages on Carna Island, using the pontoon as a base for the boats and compressor. A number of dives took place from the jetty, with the main items of note being a population of the spoon worm, *Amalosoma eddystonense* and a population of the rare algae, *Ascophyllum nodosum ecad mackii.*

To the south of the pontoon lie the Caol Charna Narrows. This is a tortuous channel about 1 Km in length, which leads from Loch Sunnart into Loch Teacuis. The channel is subject to strong tidal currents of up to 2.5 kts but, in contrast to the channel between Carna and Ardnamurchan which experiences similar currents, Caol Charna is much shallower. It has a maximum depth of around 10 metres in the basin just to the south of the rocky reef which almost completely blocks the northern end of the narrows.

The basin supports a dense brittle star bed, with a mixture of *Ophiocomina nigra* and *Ophiothrix fragilis.* Dense beds of *O. fragilis* tended to be on the flatter gravel areas while *O. nigra* dominated on the rock and amongst the kelp. The gravelly sediment was reminiscent of maerl gravel though no live maerl was found. There were extensive patches of encrusting pink algae as well as numerous “hedgehog stones”, so it was a little surprising that no live maerl was found.

The *O. nigra* occurred in two distinct colour forms, the usual black and a distinctive tan coloured form which caused some confusion in earlier surveys.

In amongst the brittle stars were the usual predators, such as spiny starfish (*Marthasterias glacialis*), sun stars (*Crossaster papposus*) and seven-armed starfish (*Luidia ciliaris*).

At either end of the narrows, horse mussels (*Modiolus modiolus*) were present but not in any great number.

Spoon worms, *A.eddystonense,* were surprisingly common around the pontoon

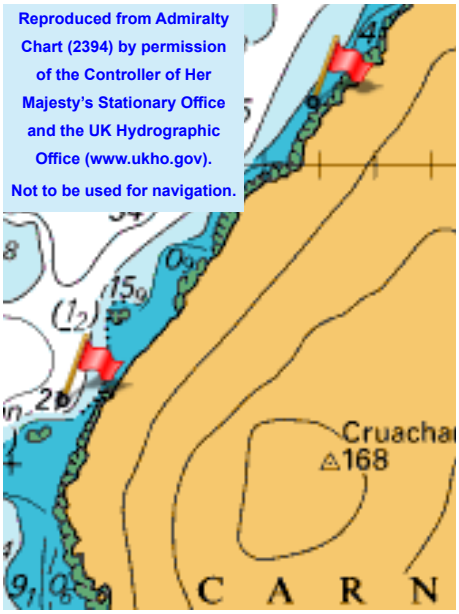
O.fragilis brittlestars seemed to dominate the flatter sediment areas of The Narrows

A tan coloured brittlestar, *O.Nigra,* with a more typical black variety just visible behind

Horse mussels were well hidden amongst cobbles at the southern end of The Narrows

O.nigra, in contrast to *O.fragilis,* seemed to prefer the boulders or kelp areas in The Narrows

A spiny starfish - one of several predatory starfish recorded on the brittlestar bed



West Carna

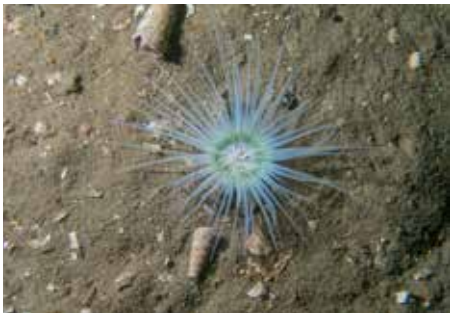
Forms: 41, 55, 65, 136

Only two dives were carried to the west of Carna.

At the northern site, the divers encountered a rocky reef which gave way to scattered boulders, then a gently sloping sediment plain at around 15 metres. The shallows were dominated by kelp in some areas and keelworms in others. Deeper down plumose anemones, dead man's fingers and the branched hydroid, *Nemertesia ramosa,* took over. Around the boulders the surveyors recorded brown crabs, swimming crabs and long clawed squat lobsters as well as spiny starfish and urchins. The sediment areas were noteworth for the large numbers of the burrowing anemone, *Cerianthus lloydii.*

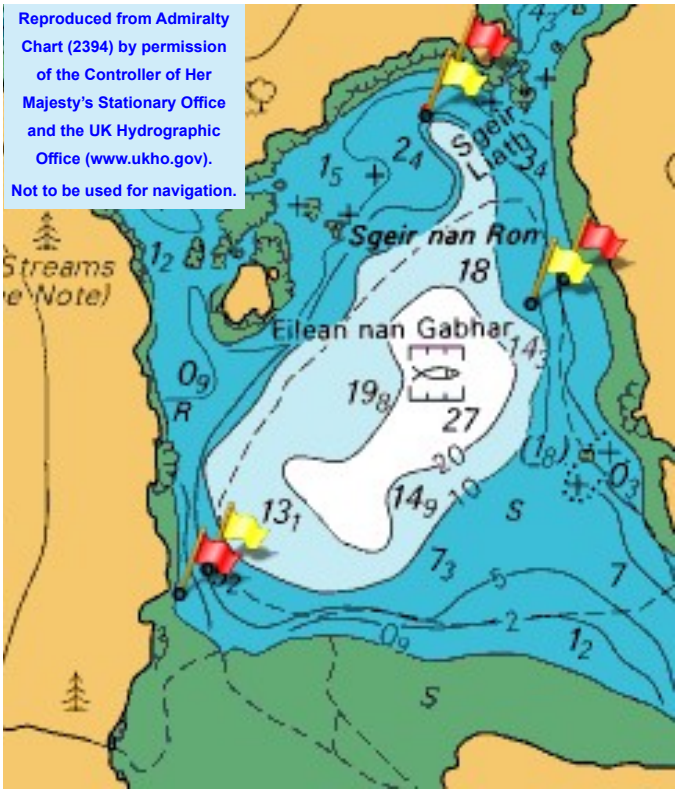
Painted topshells, *Calliostoma zizyphinum,* feeding on the bryozoan *Membranipora membranacea,* were common amongst the kelp to the west of Carna

The hydroid *Nemertesia ramosa,* was recorded on boulders in deeper water



Cerianthus lloydii
- tube dwelling anemones were common to the west of Carna

Below the kelp, large plumose anemones, *Metridium dianthus,* were recorded



`Outer Loch Teacuis

``Forms: 145, 148, 150

Three dives were undertaken in outer Loch Teacuis during the October expedition. On the western shore (Form 145) the divers found a gently sloping mud slope covered in a diatom film with *Philine quadripartita* sea slugs and slender sea pens (*Virgularia mirabilis*). There was also an area of bedrock and boulders supporting a dense population of feather stars and sea squirts. A number of small fish were recorded at this site including Yarrell's blenny, reticulated dragonet and Norwegian topknot. This is one of the few sites surveyed where there was a noticeable amount of rubbish on the seabed including tyres, bottles, gaz cylinders and a large net, presumably left over from previous aquaculture operations.

At the second site (Form 148) on the eastern side of the loch, the divers found another gently sloping seabed, but this time the mud was covered in a dense mat of Trailiella filamentous algae and the red algae *Phyllophora crispa,* to a depth of 12m. The occasional sea whip (*Chorda filum*) was recorded poking out of the mat ,while patches of clear sediment amongst the algal mat revealed Cerianthus burrowing anemones, common starfish (*Asterias rubens*) and hermit crabs.

Slender sea pens occured in unusually shallow water in Outer Loch Teacuis

Slightly deeper, from 12-17m, the algal mat disappeared to be replaced by muddy sand, hosting a dense population of the spoon worm *Amalasoma eddystonense*. Large patches of drift kelp, mainly *Sacharina latissima,* were noted lying on the sea bed, presumably washed down from shallower water. Below 17 metres there was a flatter area of seabed made up of pebbles and gravel, with a sparse fauna of long clawed squat lobsters (*Munida rugosa*) and *Antedon bifida* feather stars.

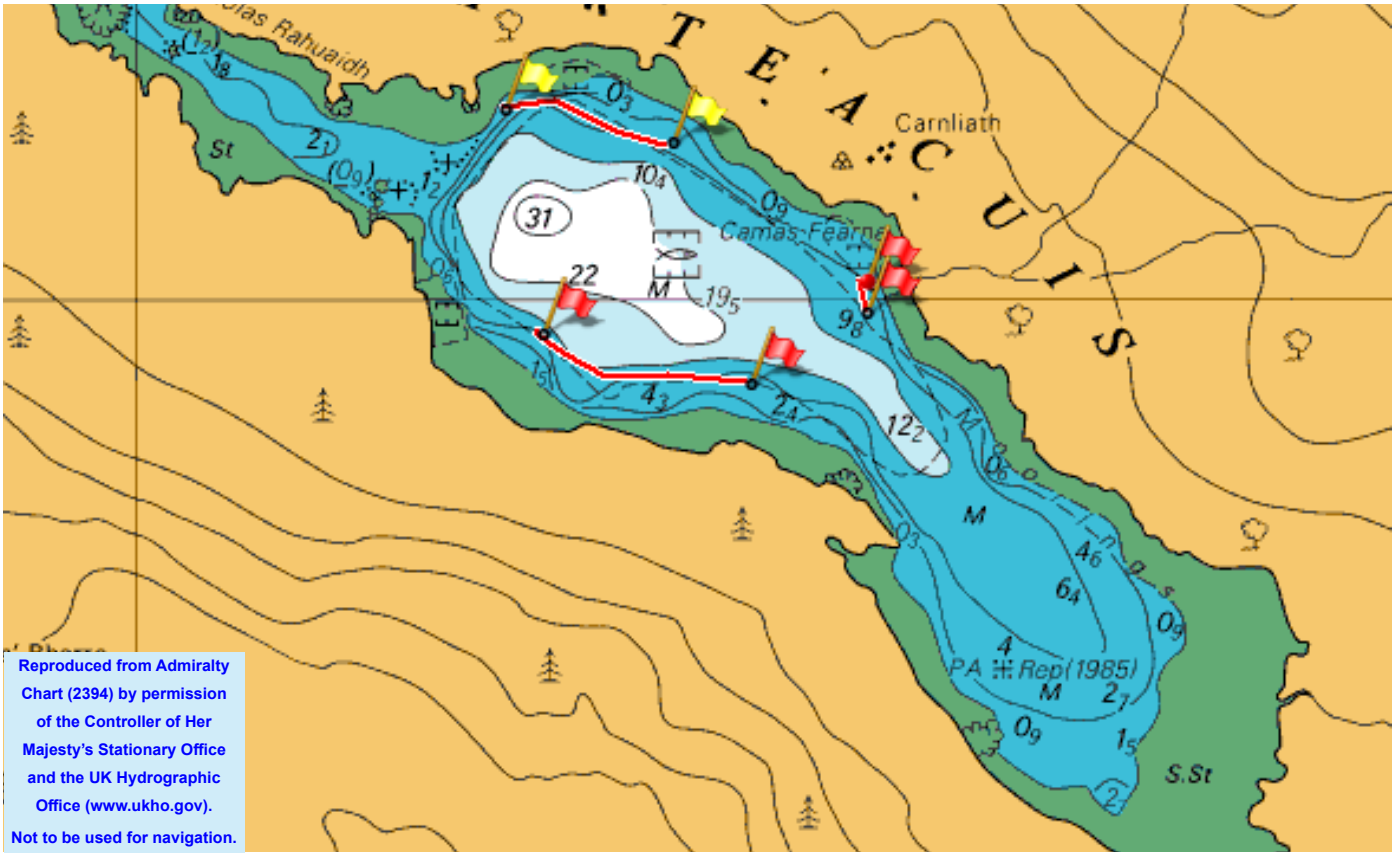
The third site (Form 150) at the south end of Carna, was shallower but similar to the second site, with a dense mat of Trailliella and Phyllophora, this time up to 7cm thick with anoxic mud beneath. Spoon worms were again present, but not as abundant as at the second site. Overall, species abundance and diversity seemed low at this site, with only a few species recorded such as spiny starfish (*Marthasterias glacialis*), shore crabs (*Carcinus maenas*) and long clawed squat lobsters.

Common dog whelks. common scavengers in Loch Teacuis

A cerianthus burrowing anemone poking out from a dense mat of fillamentous red algae

A *philine* sea slug leaving it's characteristic trail along the seabed

Several species of hermit crab were recorded during the surveys including this anemone hermit crab (*Pagurus prideaux*) with its associated cloak anemone (*Adamsia palliata*)



Inner Loch Teacuis showing areas surveyed, Red flags show the June survey and yellow flags the October survey.The red lines are the GPS track of the divers

A relict serpulid reef

Live serpulids surrounnded by reef fragments

Inner Loch Teacuis

Forms: 42, 48, 56, 61, 66, 71, 137

Loch Teacuis is a side branch of the main Loch Sunnart, and runs roughly SE from the southern end of Carna, which lies at it entrance. The loch is about 3 miles long, with two basins, separated by a tidal narrows at Caolas Rahuaidh. The outer basin has a maximum charted depth of 27 metres and the inner basin 31 metres, though much of the loch is shallower. In 2006 serpulid reefs were discovered in the upper basin and this resulted in the area being designated to protect this rare biotope. Unfortunately, the reefs began to deteriorate, possibly following a bout of severe weather and a recent survey by SNH found few healthy reefs.

In total, 7 dives were carried out during the June and October surveys. Some of the dives were tracked using GPS trackers on SMB floats and these are shown on the accompanying chart. The June surveys are marked by red flags and the October survey by yellow flags. In June, the divers concentrated on the southern shore with some surveying in the NE, while in October they concentrated on the NW shore, where historically the reefs were most abundant.

Best surviving serpulid reef example

Close-up of surviving serpulid reef

Relict serpulid reef and fountain anemone

The Loch Teacuis fireworks anemone and myxicola worms

The results were disappointing. In the south, two pairs of divers covered nearly 500 metres of seabed, in depths of 5 to 9 metres. They found a gently sloping soft mud seabed with patches of boulders and cobbles towards the western end. No live reefs were encountered though several relict reefs were noted, lying on, or just buried in, the sediment. A few scattered serpulids were noted on the cobbles but no live reef structures were encountered. Otherwise, the basin had a fairly typical shallow soft mud fauna with hermit crabs, shore crabs and swimming crabs noted. Psammechinus urchins , virgularia sea pens and cerianthus anemones were also recorded, as was the large polychaete *Aphrodita*, the sea mouse.

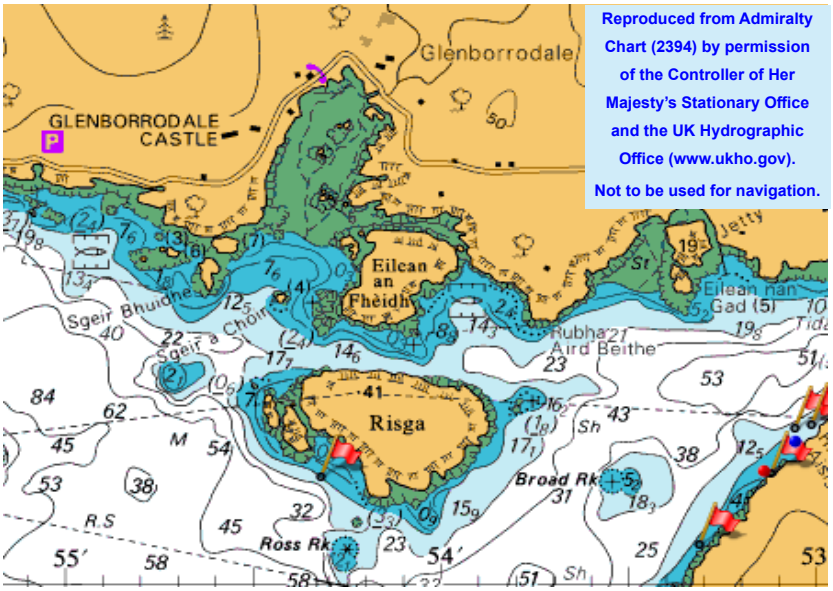
In the NE, the three divers didn't cover as much ground, partially due to the poor visibility encountered. They were a little shallower at 6m. Again no live reefs were encountered, though scattered serpulids were noted on cobbles. Sugar kelp and *Chorda filum* were recorded down to 2 metres, then a soft mud fauna took over, with philine sea slugs, hermit, shore and swimming crabs, and occasional suberites sponges and cerianthus burrowing anemones.

At both of the above sites scattered horse mussels were noted.

In October, the divers concentrated on the NW side of the basin, surveying over 400 metres of seabed. Historically, this area held the highest density of serpulid reefs. One large serpulid reef-like structure was recorded and photographed which appeared to consists of serpula aggregations on a mooring block. Otherwise the story was very similar to the other sites with scattered relict reefs on the sediment or slightly buried and scattered individual serpulids growing on any hard substrata present, mainly cobbles and mooring related debris. The biodiversity in this area seemed higher mainly due to the large amount of mooring related debris and general rubbish including an air rifle which provided a hard substrata for organisms to settle on.

Live Serpulid worms in Teacuis

Celtic feather stars, Risga



Risga

Form : 54

Only one dive was undertaken at Risga, but it produced several interesting records. On a rocky reef area the surveyors found a thriving population of northern sea fans (*Swiftia pallida*), axinellid sponges, cup corals and Celtic feather stars.

Adjacent to the reef area was sloping soft mud, dominated by a dense population of *Cerianthus lloydii* burrowing anemones.

Axinella infundibuliformis sponge, Risga

Northern sea fan, Risga

This survey report is the end result of a great deal of effort by volunteer divers.

The first two expeditions consisted mainly of Bingham Sub Aqua Club members and special thanks are due to Steve and Caroline Bishop. They took on much of the responsibility for organising the first two expeditions, as well as keeping the volunteer divers safe during diving operations and well fed between dives. The third expedition was less fortunate with weather, but produced some impressive data and filled in survey gaps, notably in outer Loch Teacuis.

Thanks also Andy Jackson of the Carna Conservation Initiative and CAOLAS (Community Association of Lochs and Sounds) for logistical support and provision of a compressor.

The Bingham Sub Aqua Club volunteer divers were Caroline Bishop, Steve Bishop, Jill Mellink-Davidson, John Harris, Rebecca Hills, Des Kay, Ian Lowther, Andrew Shipley, Susan Shipley and Mike Verner.

Members of the third expedition included Lin Baldock, Lucy Kay, and Richard Yorke.

My appreciation and thanks go to everyone who helped at Carna in 2018. These surveys would be impossible without the knowledgeable, enthusiastic volunteers who remained cheerful and focussed in often difficult conditions.

Owen Paisley

Seasearch Co-ordinator
West Scotland

Seasearch is a volunteer underwater survey project run by MCS which encourages recreational divers to contribute towards the conservation of the marine environment.

Seasearch in Scotland gratefully acknowledge the financial support provided by Scottish Natural Heritage in 2018 and the logistical assistance provided by the Carna Conservation Initiative during the three expeditions.