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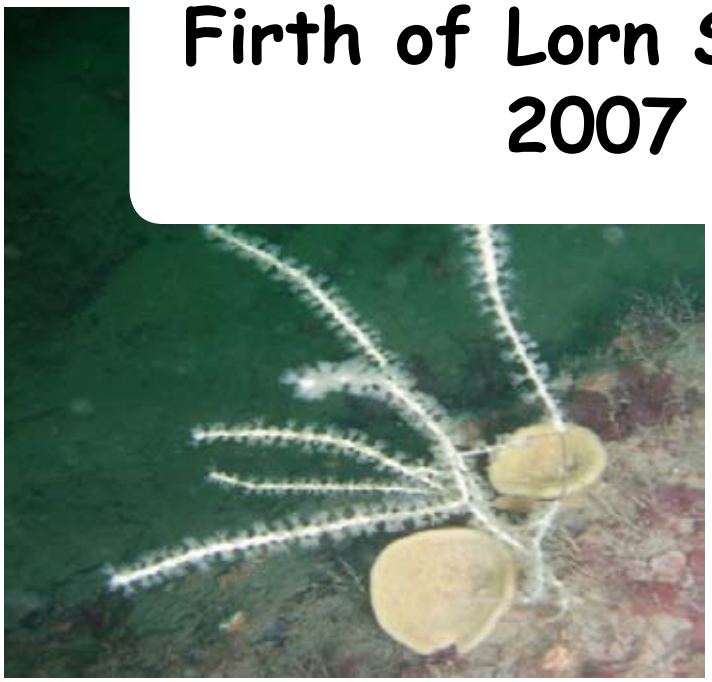
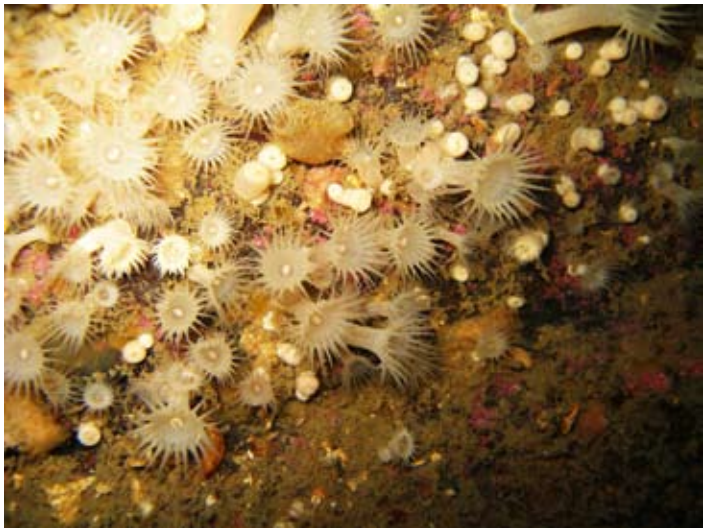
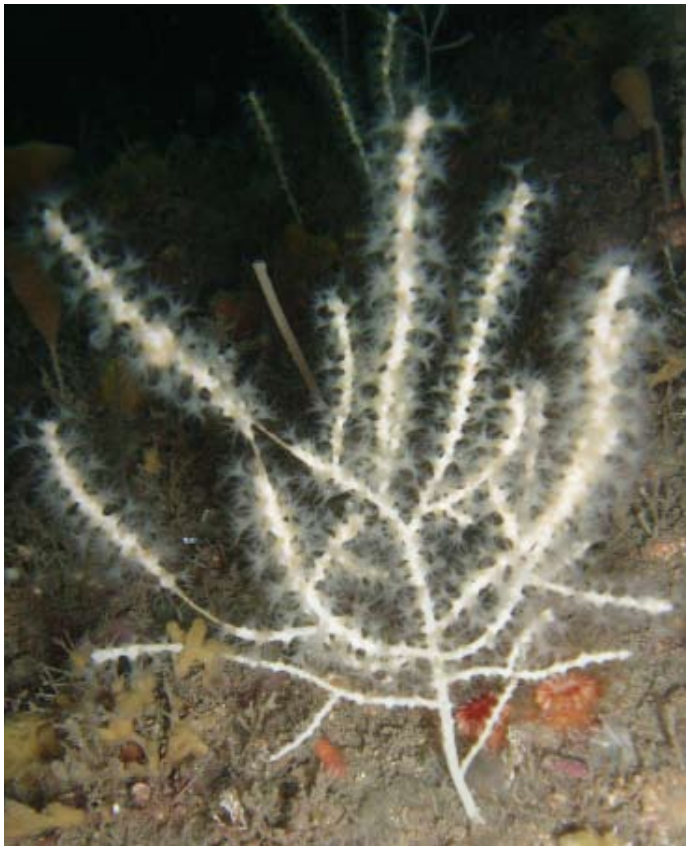
Firth of Lorn Sea Fan Surveys 2007 - 2009





The Northern Sea Fan Project



Multi-branched example of a Firth of Lorn seafan

Why record sea fans?

Northern sea fans (*Swiftia pallida*) form slender colonies up to 20cm tall but usually 7-10cm. Unlike their southern cousin *Eunicella verrucosa*, *Swiftia* is not protected under the Wildlife and Countryside Act but it is now included in the UK Biodiversity Action Plan (UK-BAP). In common with pink sea fans, *Swiftia* play host to the sea fan anemone *Amphianthus dohrnii*, which is also subject to a UK-BAP.

Where do northern sea fans occur?

Northern sea fans are filter-feeders and they are found on rocks and boulders in areas with some current, often in association with Devonshire cup corals and axinellid sponges. They are normally found deeper than wave surge to avoid damage, in the range of 18-60m. The northern sea fan as its name suggests is found in the north of Britain, namely western Scotland and also some sites in western Ireland. In Scotland, it has been recorded in the Firth of Lorn, more exposed western sites on the Isle of Mull, the mouth of Loch Sunart, the Small Isles, around the Isle of Skye and along the east coast of the Western Isles. However, the comparatively low number of records will be largely due to the lack of data from exposed rocky sites.

The sea fan anemone

The sea fan anemone, *Amphianthus dohrnii,* rarely exceeds 1cm across and is generally attached to the branches of sea fans, though it may also occur on other tall features such as hydroids and worm tubes.

Since *A.dohrnii* normally reproduces by basal laceration, where small fragments of tissue tear off from the anemone and regenerate into tiny anemones, its distribution can be patchy and changeable. Where one occurs there will often be others nearby.

Although the sea fan anemone is thought to be very rare, due to its small size it can be easily overlooked. It has been recorded on *Swiftia* in the Firth of Lorn area, namely at Ardnoe Point at the entrance to Loch Crinan, southwest Insh Island, southeast Lunga and Sgeir Mhogalach, a rock east of Eilean Dubh Mor.

The Northern Sea Fan Project

In April 2006, a team of Seasearch divers visited a number of sites in the the Firth of Lorne looking for Northern sea fans and the sea fan anemones. They measured a total of 195 colonies and found *Amphianthus dohrnii* at two of the sites. Following this expedition, the locally based Dalriada Sub Aqua Club and Argyll Seasearch carried out further surveys in May 2007 and April 2009 using the Seasearch methodolgy pioneered in 2006. During these surveys a further 224 colonies were measured and *Amphianthus dohrnii* recorded at one site.

Survey Methodology

Each team of divers carried a pre-marked survey slate and recorded the following information when they came across seafans.

1) Site Information

This included the following: site name, site location, depth range in which seafans found, habitat where sea fans found and density of seafans.

2) Colony Length

Many of the colonies were branched and the length of the longest branch was measured using the markings etched on to the end slate. Four categories were recorded; up to 5 cm, 6 cm to 10 cm, 11 cm to 15 cm and over 15 cm.

3) Number of Branches

This is self explanatory though some of the bushier specimens presented something of a challenge to the divers.

An example of a colony with significant fouling (3) at Conger Reef

4) Colony Condition

This was recorded using the following scale:

D = Dead,
1 = Colony almost dead and/or fouled,
2 = Colony with major damage or fouling,
3 = Colony significantly damaged or fouled,
4 = Colony showing minor damage or some fouling,
5 = Completely clear colony.

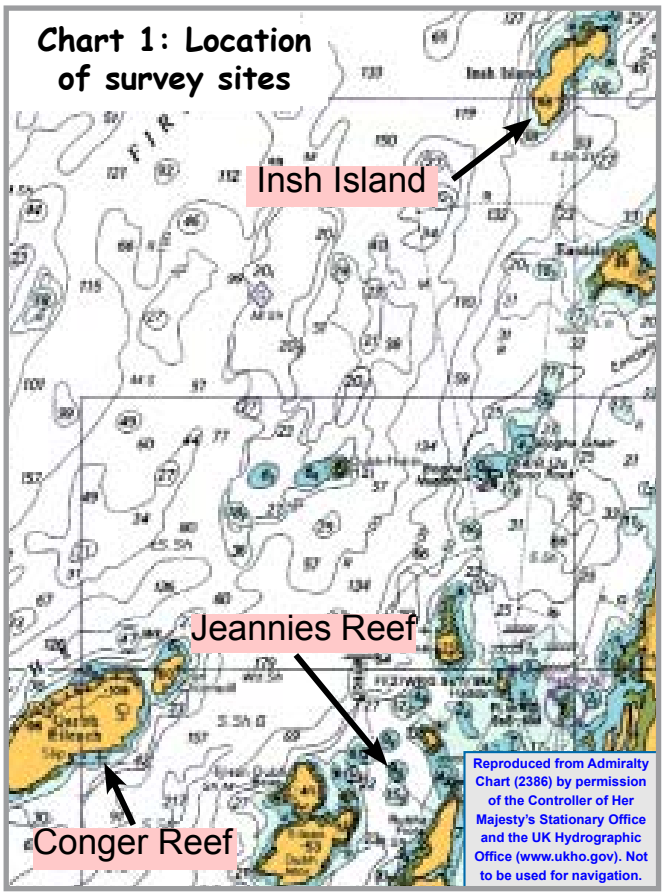
5) Feeding

This was simply recorded as feeding or not feeding.

The dive teams also carried out surveys using standard Seasearch methodology.

Survey Sites

Three sites were surveyed, SW Insh Island, Jeannies Reef and Conger reef. The positions of these sites are shown on the accompanying charts. All positions were obtained using a GPS set to WGS 84 datum.



Site 1: South West Insh Island

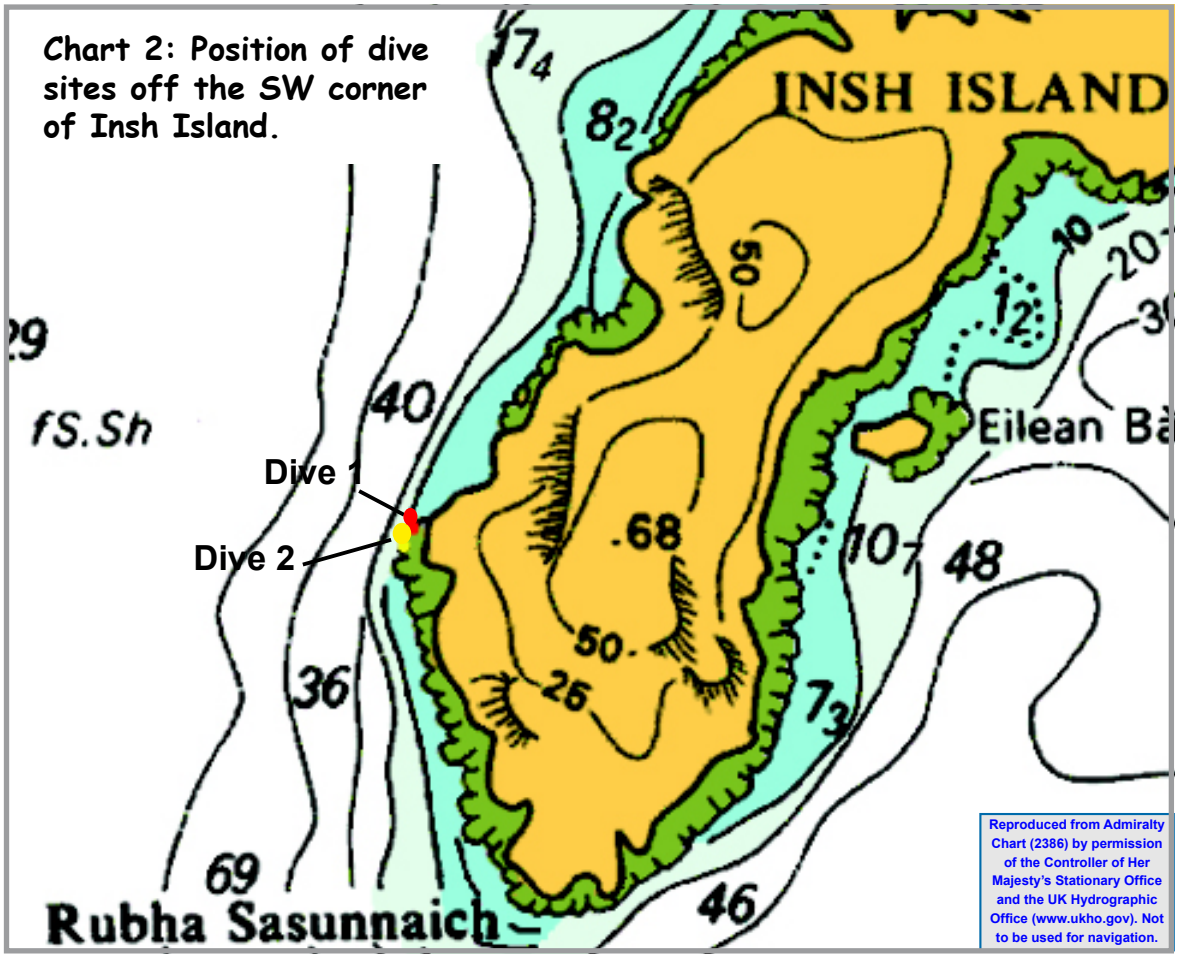
(56^0 18.666 N 005^0 40.596 W)

This site was surveyed on Saturday 5th of May 2007 by a small team of Dalriada SAC divers. Previous surveys had recorded the northern sea fan along with the sea fan anemone at this site. The aim of the survey was to introduce the divers to the survey methodology and confirm the continued existence of the sea fan anemones at the site.

Two dives were carried out at the position shown on the chart. The dives were close together but duplication of effort was avoided by the first pair of divers swimming north after descending and the second pair of divers being dropped to the south of the first dive site.

Dive 1:

At this site the divers found a rock wall descending steeply to 30 metres with a boulder slope continuing downwards. Thirty four sea fans were surveyed occurring between 17 metres and 30 meters. However, no sea fan anemones were seen. Cup corals were abundant and axinellid sponges were also present. A large Ballan wrasse followed the divers for much of the dive.



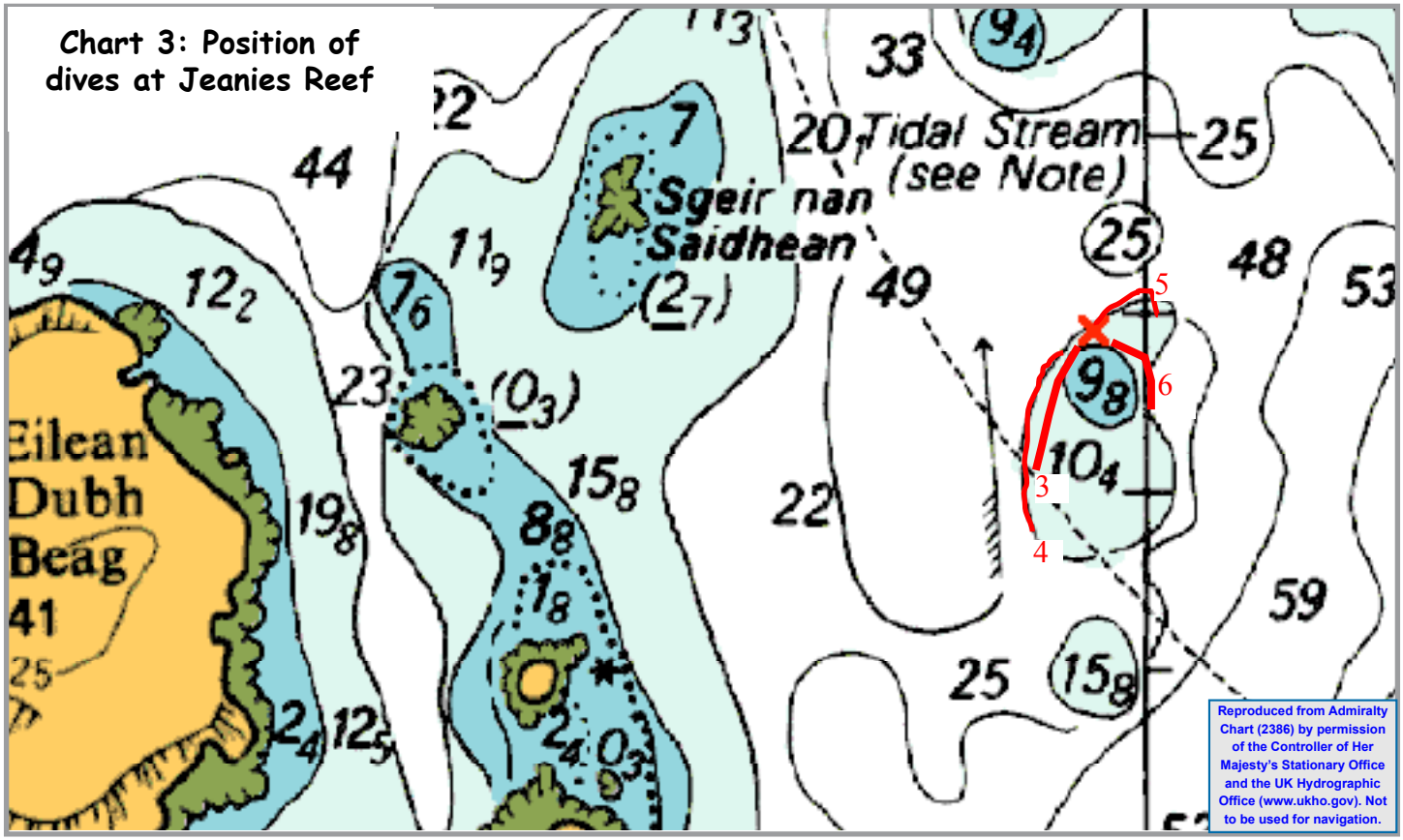
Dive 2:

Just to the south of Site 1, the divers found kelp forest on a steep rock face down to 18 metres then bedrock and very large boulders continued downwards. Shortly after descending, a large area of bedrock jutting out at right angles to the island was found. This rockface had large numbers of sea fans on its vertical south face at depths of 20 to 30 metres with many more visible in deeper water. Over 20 sea fans were surveyed on this rockface with no anemones found. However just to the north of this rockface a large, car-sized boulder was also covered in sea fans and cup corals. On the southern face of this boulder one sea fan was recorded with 4 anemones on it. On the northern face a further three separate sea fans, each with one anemone were recorded within a space of 0.5 metres.

In all 67 sea fans were surveyed, a fraction of those present at this site.

A.dohrnii on Swiftia (photo: Rohan Holt)

Sea Fan Forest at Jeannies Reef, depth approx. 28 metres on eastern side. The density of seafans found at Insh Island was similar.



Jeannies Reef - The approximate areas surveyed are shown on the chart as red lines. Two groups of divers investigated the west side of the reef the first at a depth of 15 to 20 metres and the second at 20 to 30 metres. A third pair investigated the north end while the fourth group swam over the top of the reef and investigated the eastern side. The three deeper diving groups all found sea fans at depths of 20 to 30 metres.

Site 2: Jeannies Reef

(56° 14.385 N 005° 42.137 W)

This survey took place on the 18th April 2009 from the dive boat Porpoise and involved 9 divers from Dalriada BSAC, Oban SSAC and Campbeltown SSAC. Jeannies Reef is a well known dive site with video of the site used during Seasearch training courses. The team split into four groups with three of the dive pairs surveying the usually dived western side of the reef and one group of three swimming over to the less often dived eastern side of the reef.

Cotton Spinner on Jeannies Reef

Dive 3:

This dive was on the west side of reef going south at 18 to 20 metres. The divers encountered a steep rock face covered in colourful cup corals, dead mans fingers, elephant ear sponge, sea squirts and occasional cotton spinners. Ballan wrasse and crayfish were also recorded. No sea fans were encountered in the depth band surveyed.

Dive 4:

This pair of divers also surveyed the west side of the reef but at a depth of 22-28 metres. Seafans were recorded as common on sloping rock from 22 metres on. Thirteen colonies were measured but no anemones recorded. The rich life recorded by the shallower divers at this site continued with the addition of cluster anemones, plumose anemones, Axinellid sponges and feather hydroids.

One of several Crayfish seen during the survey

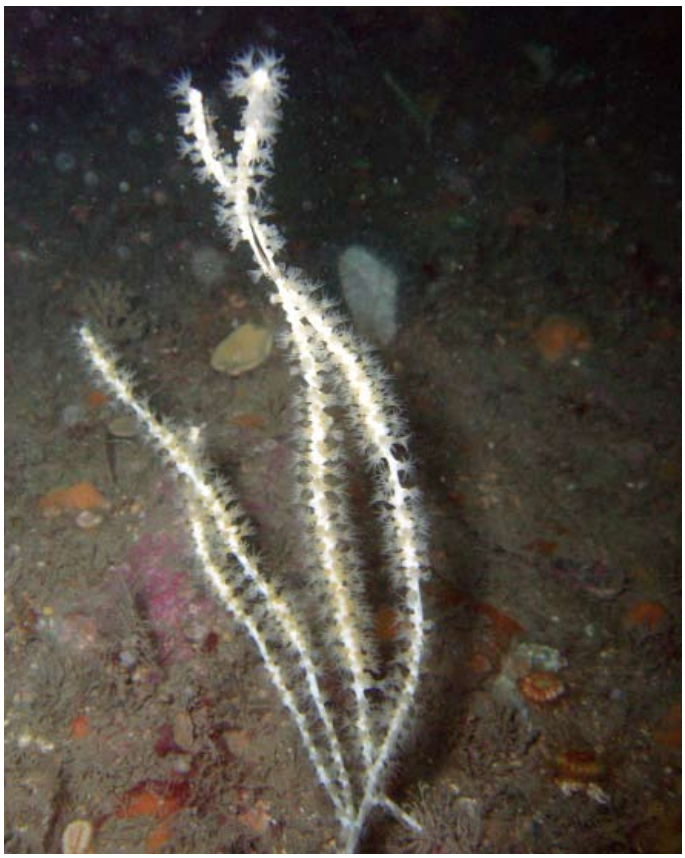
Dive 5:

This dive was on the west side of reef heading northwards at 20 to 33 metres. This was the deepest site surveyed with sea fans encountered in a narrow band at a depth of 29-30 metres. This contrasts to Dive 4 where the sea fans were spread out in a wide band from 22 to 28 metres. Thirteen colonies were measured during this dive and once again no anemones were seen. For much of this dive, only a short distance from Dive 4, no sea fans were seen at all. Life recorded on the reef was similar to Dives 4 and 5 with the addition of jewel anemones, lobster and football sea squirts.

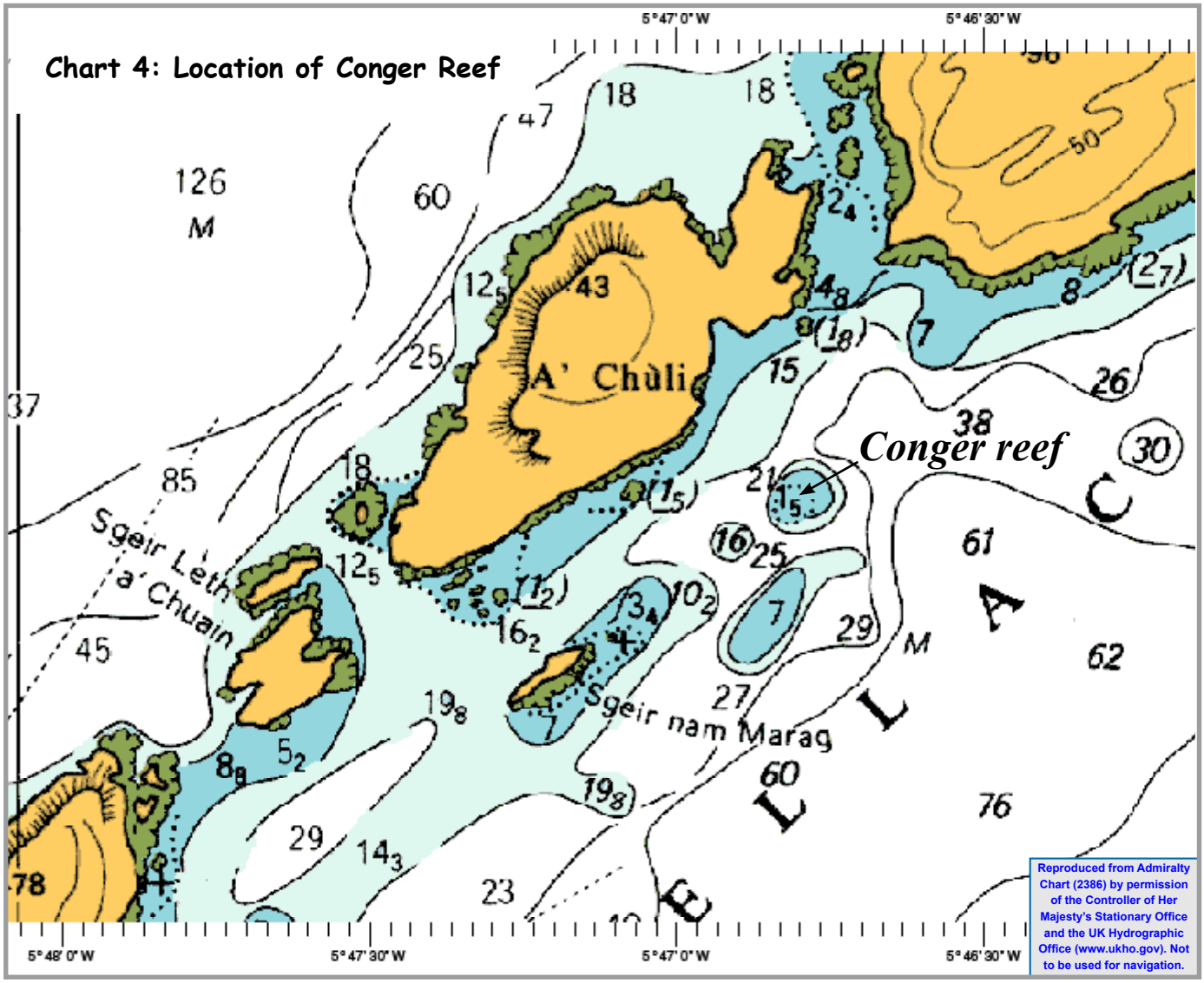
Red Sea fingers on Jeannies Reef

Dive 6:

This dive was to the east of reef in depth of 15 to 25 metres. Jeannies Reef is a popular dive site but most dives take place on the spectacular west wall. The remaining dive team swam away from the wall first east and then south. Initially they encountered rock reef and boulders which gradually became steeper until at the southernmost point they were surveying steeply sloping rock and boulders. No sea fans were seen until the latter half of the dive when large numbers were encountered at a depth of 24 –26 metres continuing down into the depths. By the time the sea fans were encountered bottom time was limited but 13 sea fans were examined ranging in size from 3 to 20 cm long. No anemones were seen but the surveyors commented on the large number of very small sea fans present. Other life recorded on the eastern side of the reef included red sea fingers, cup corals, crawfish, cotton spinners, hydroids and *Actinithoe sphyrodeta* anemones.



Sea fan showing minor damage, Jeannies Reef



Site 3: Conger Reef

(56° 13.996N 005° 46.815W)

The sea fan surveys took place on this reef on both the 18th and 19th of April, once again diving from the dive boat, Porpoise. The dive site location is shown on Chart 4. All though the chart depicts an almost circular reef, the reality on the seabed is a linear reef running roughly north-south. The top of the reef was found to be covered in dense kelp forest turning into kelp park at around 10 metres. The multiple dives on the reef are divided into dive groups.

Dive Group 7: Western Side

The west side of the reef was found to be a vertical wall dropping from around 5 metres to 18 metres, with a sediment plain stretching out from the base of the cliff towards the west. The depth of the base of the cliff gradually increased to the south. The cliff was covered in cup corals, hydroids, plumose anemones, dead mans fingers and, in places, jewel anemones. Close to the base of the cliff, there was a dense bed of sea pens (*Virgularia mirabilis*) and burrowing anemones (*Cerianthus lloydii*). The sea pens stopped abrubtly about 6 metres from the base of the cliff and the anemones became scarcer the greater the distance from the cliff. The burrowing anemone *Peachia cylindrica* was also present close to the cliff. No sea fans were recorded on the western side of the reef.

Dive Group 8: Southern Cliff

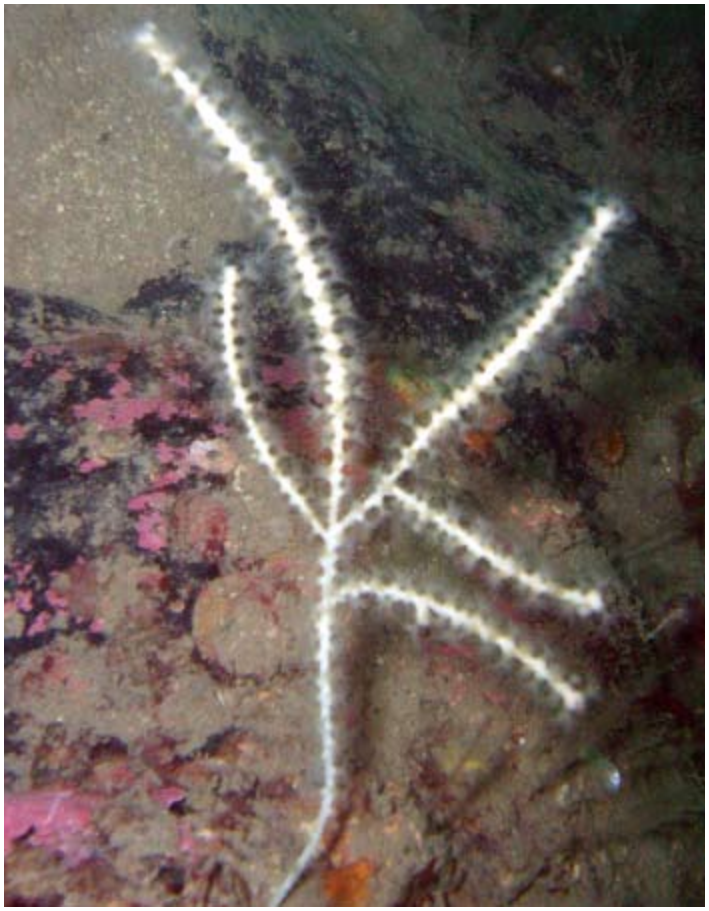
This area held a spectacular cliff dropping vertically to below 30 metres. The rockface was covered in a dense population of dead mans fingers, horseman anemones and cup corals. Cotton spinners were also noted in this area. No sea fans were recorded. Due to bottom time limitations only limited surveying was carried out on the cliff but the cliff was an excellent example of the type of underwater scenery which attracts divers from throughout Scotland and beyond.

Conger Reef sea pen forest at the base of the cliff on the western side.

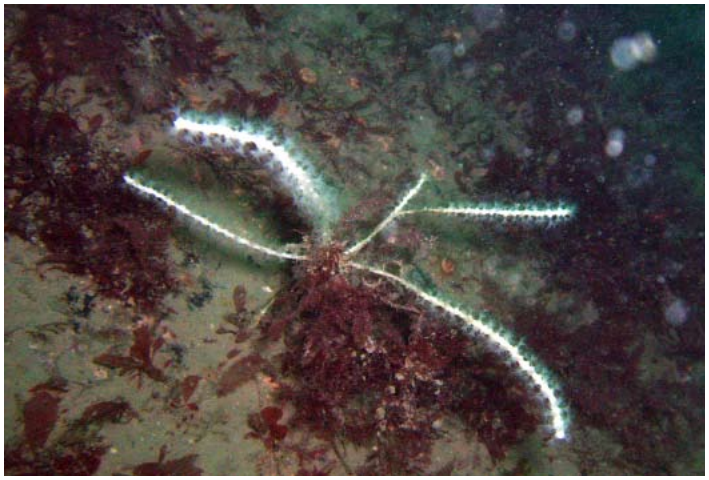
Dive Group 9: Eastern Slopes

In contrast to the western and southern cliffs the eastern side of the reef consisted of sloping bedrock and boulders down to a silty/muddy plain at 24 metres. A dense population of sea fans was encountered between 20 and 25 metres with sea fans present at the sediment/ rock interface. In all, 84 colonies were measured at this site but once again no sea fan anemones were recorded. This was the only site where a number of the sea fans were recorded as being heavily fouled/almost dead though the majority of

Horseman anemone, white cluster anemones and dead mans fingers on cliff at southern end of Conger Reef



Swiftia colony at Conger Reef

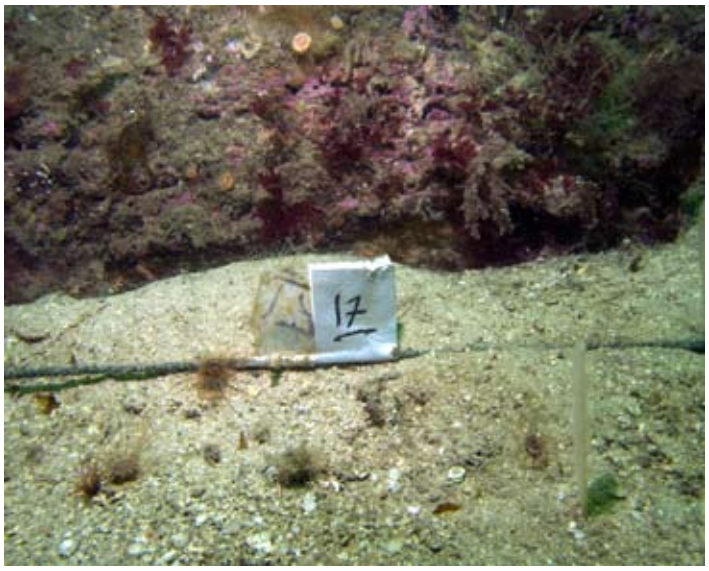


Swiftia fouled by red algae at Conger Reef

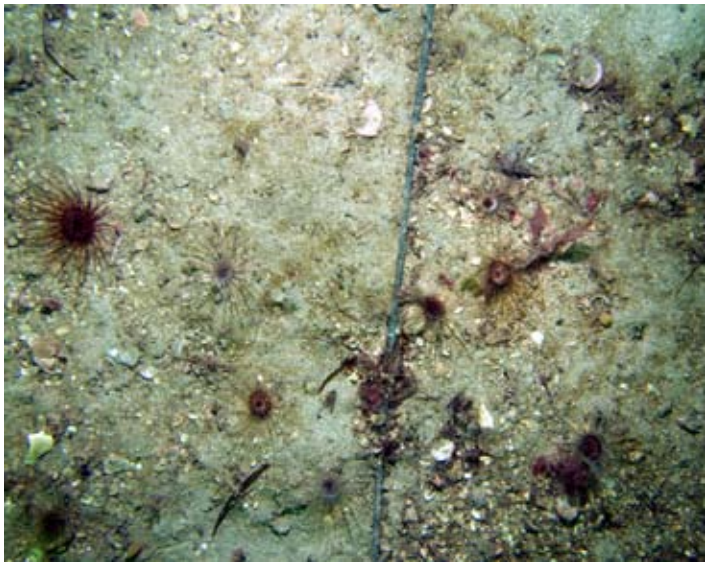
Example of Swiftia fouled with Bryozoans

The Conger Reef Transect

As part of a longer term project, a lead-filled transect line was laid down the cliff on the western side and along the base of the cliff, with a side transect out into the sediment plain. The location of the line is shown on Chart 5. The line was marked at 2 metre intervals and photographs taken at each mark, with the mark in the centre of the frame. Generally, one photograph was taken vertically looking straight down on the line. Along the base of the cliff a second photograph was taken from the side showing both the line and the sediment/cliff interface. Typical photographs are shown below:

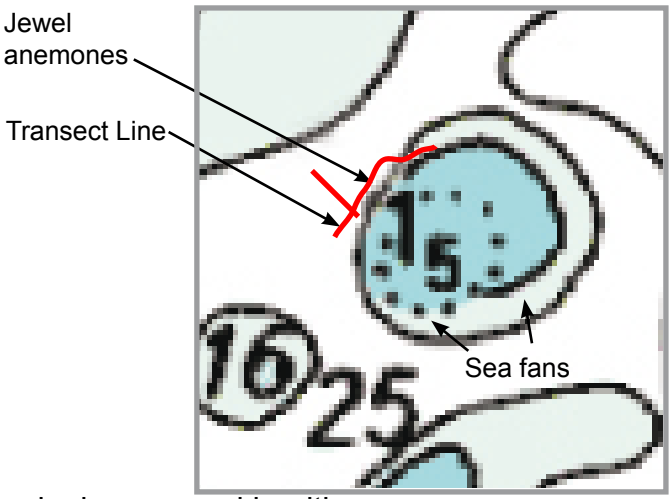


Point 17 on transect showing sediment/cliff interface, seapens and cup corals.



Point 6 on side transect showing dense burrowing anemone bed but no sea pens.

Chart 5: Detail of Conger Reef



colonies seemed healthy.

Results

The results of the measurements are summarised in Table 1.

Colony Length

A wide range of lengths were recorded, from very small, less than 5cm, to large, over 20 cm long.

Of the 3 sites, Jeannies Reef had the highest proportion of very small colonies (33%) and the smallest proportion of large colonies (23%). The number of records from these sites are quite small and it is unlikely that statistically valid conclusions can be drawn. However, if it is assumed that very short colonies are recent recruits and long colonies are older it may be that the Jeannies Reef sea fan population has enjoyed successful recent recruitment. It would be interesting to revisit Insh Island and discover if the proportion of very small sea fans has also increased at that site since the previous survey.

Number of Branches

Of the 67 colonies surveyed, 42% had 5 or fewer branches, 33% had between 5 and 10 branches while the remaining 25% had 11 or more branches. 5 colonies, around 7%, had only 1 or 2 branches and were less than 5cm in length, which may indicate the level of recent recruitment. The maximum number of branches recorded was 23 with a further 3 colonies having 17 branches.

Colony Condition

Of the three sites the Conger Reef population was the only one where near dead or heavily fouled sea fans were found. The Conger Reef

sea fan population was growing on silt covered sloping rock faces. In contrast the other 2 sites were on near vertical rock faces or sloping rock without a covering of silt. It may be that conditions are sub-optimal at the Conger Reef site but having said that the site does support a large population most of which seemed healthy.

Feeding

The surveys all took place around slack water and the vast majority of colonies were recorded as feeding with visible polyps.

Conclusion

The Firth of Lorn sea fans seems to have a very patchy distribution. Where they do occur they can form dense colonies but they are absent from many areas of apparently suitable habitat. In some sites such as Insh Island, colonies could be seen well below 30 metres yet at other sites such as the north west side of Jeannies Reef they were restricted to a narrow band between 29 and 30 metres depth. At Conger Reef they were only found on the apparently sub-optimal habitat on the eastern side and completely absent from apparently suitable habitat on the western side.

Of the colonies surveyed most seemed to be healthy with little evidence of severe fouling or damage. Records of severe fouling were restricted to a small percentage of colonies on Conger Reef, the siltiest site surveyed.

Of the 190 colonies surveyed at the 3 sites, only 4 hosted the sea fan anemone and all 4 were growing within a space of a few metres. It has been suggested that the sea fan anemones are more common on the northern sea fan than on the southern sea fan. This may be so, but the results of these surveys show that the anemones have a very localised distribution and are by no means common in the Firth of Lorn area.

Table 1: Summary of Results

Site Name	**No. of colonies surveyed**				
Insh Island	67				
Jeannies Reef	39				
Conger Reef	84				
Total	190				
No. of branches	**1**	**2-5**	**6-10**	**11+**	
Insh Island	7%	35%	33%	25%	
Jeannies Reef	13%	44%	31%	13%	
Conger Reef	12%	57%	25%	6%	
Length of longest branch	**Up to 5 cm**	**6 to 10 cm**	**11 to 15 cm**	**16+ cm**	
Insh Island	15%	40%	45%		
Jeannies Reef	33%	44%	15%	8%	
Conger Reef	23%	40%	20%	17%	
Colony Condition	**1**	**2**	**3**	**4**	**5**
Insh Island	0	0	6%	16%	78
Jeannies Reef	0	0	5%	15%	79%
Conger Reef	1%	2%	6%	7%	83%
Feeding	**Yes**	**No**			
Insh Island	95%	5%			
Jeannies Reef	69%	31%			
Conger Reef	94%	6%			

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

The surveys were organised by Owen Paisley.

Seasearch divers were:
Jo Beaton, John Beaton, Trevor Davies, Yvonne Davies, Marilyn Franks Trish Grey, Andrew Mogg, Owen Paisley, John Rees, Emily Venables,

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Text by Owen Paisley, Chris Wood and Calum Duncan. Photographs by Yvonne Davies, Trevor Davies, John Rees and Rohan Holt.

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