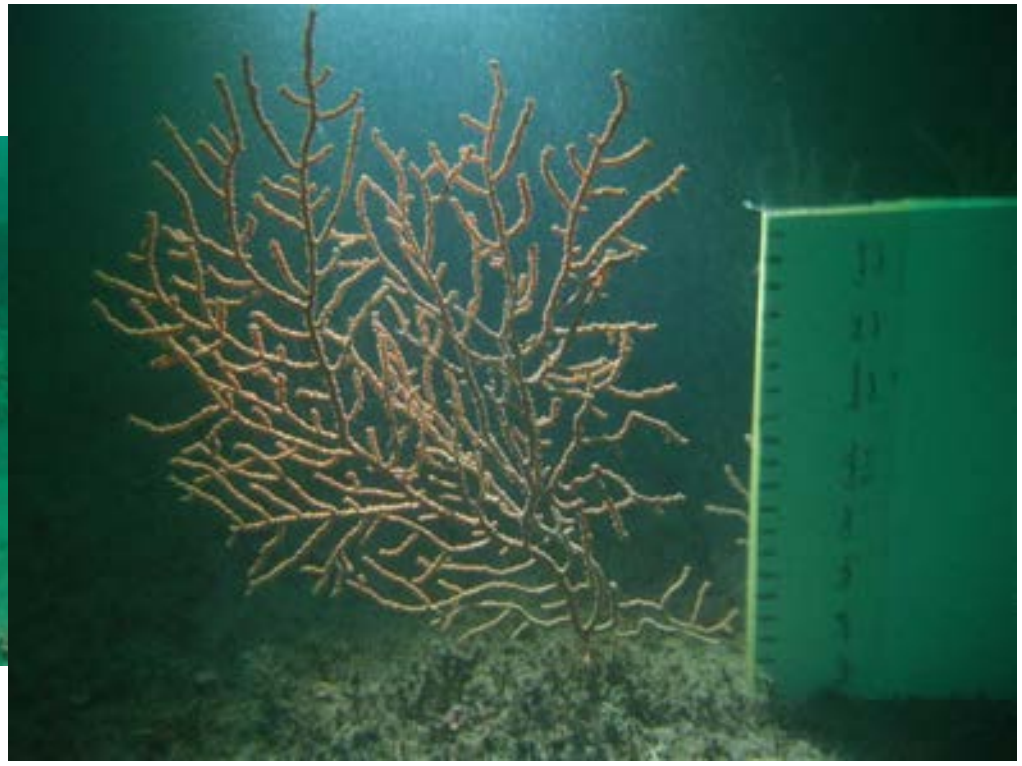
Pink Sea Fan Survey

27-30 March 2017

Paul Ritson



Introduction

The definition of an expedition is "a journey with a purpose". A BSAC diving expedition is simply a group of divers going diving for a purpose. The purpose in this case was a group of divers putting into practice the First Class Diver (FCD) expedition plan module of one member of the group.

The FCD expedition plan proposed a 4-day trip based in Plymouth whose aims were to:

- Survey pink sea fans at a range of dive sites around Plymouth and establish whether previously established locations of pink sea fan anemones are still in existence.
- Compare the results with earlier surveys in order to assess the health of the sea fans.
- Try to determine the effects of recent dredging activity along the south coast.
- Endeavour to identify the presence of the sea fan anemone, sea fan nudibranch and false cowdrie.

Given the amount of work that putting together an expedition plan entails, it made sense to put the planning into practice and also gain a clear comparative understanding of the difference between theoretical planning and its practical application.

The aim of this project was to use previous Seasearch reports and compare data gathered in order to establish the health of the pink sea fan population in comparison to previous years and to try to work out whether recent dredging activity along the south coast has had an effect on the pink sea fan colonies.

Seasearch

Seasearch was established during the 1980s by Dr. Bob Earll and Dr. Roger Mitchell, who recognised the potential of capturing the enthusiasm and knowledge amongst recreational divers. Since that time, Seasearch has grown to become a widely recognised and respected organisation co-ordianted by the Marine Conservation Society but working with a large number of partner organisations.

Seasearch operates largely through volunteer recreational divers providing survey data from their normal dives that helps to map the marine life and seabed. Over time, the significant amount of data captured enables conservationists and other interested parties to develop an accurate picture of the changes in marine habitats and marine life, as well as their health and the impact of human activities.

Pink sea fans

The pink sea fan (eunicella verrucosa) is classified as a horny coral (a gorgonian), belonging to the marine invertebrate group known as Cnidaria. Cnidarians are distinguished by the fact that they possess stinging cells, which are used both for defence and capturing prey. These stinging cells contain a long, hollow, coiled thread that shoots out and uncoils under water pressure; discharge is triggered by touch or chemical stimulus. Different threads have different functions and, when thousands are triggered together, they can have a powerful effect.

Pink sea fans are essentially the same type of creature as sea anemones. Like sea anemones they exist as polyps; sea fans are easily recognised as they branch profusely; the branches are covered in warty bumps. Being filter feeders, the polyps come out of the warty bumps along the branches to feed on zooplankton (floating food) as it passes. They are colonial beings, with gelatinous chalky skeletons with embedded calcareous spicules which give the skeleton strength and some rigidity and are able to form huge reefs if left undisturbed.

Colonies orient themselves at right angles to the prevailing current, such that their largest surface area faces the current. They fix themselves to the substrate with a 'holdfast' (similar to that of kelp), below 20m, and never move once attached.

Reproduction is not clearly understood in pink sea fans. The current belief is that they can be either male or female. New clonal polyps bud off from parent polyps to expand the existing colony or begin new colonies; this is understood to happen when the parent polyp reaches a certain size and continues throughout its life. Massive numbers of eggs and sperm are released into the water, joining to form free-floating, or planktonic, larvae called planulae, about 2 mm long. These planulae sink or are carried on the ocean current to a new location, to settle and develop the holdfast before growing. Pink sea fans grow at a rate of approximately 10mm per year; they have been known to reach 80cm high, although more usually they will be around 25cm. Size depends on age, food supply and environmental factors, such as human interference. The age of pink sea fans can be determined (destructively) from counting growth rings in the axis, with one growth ring per annum, like a tree (Keith Hiscock, unpublished studies).

Although it is called the pink sea fan, the colour can vary from pink to white.

The pink sea fan provides an important habitat for other animals. The rare sea fan anemone (Amphianthus dohrnii) lives on the sea fan and the sea fan sea slug (Tritonia nilsohdneri) feeds on it. As the sea slug can match its body colour to the colour of its host sea fan, they can be very hard to spot.

In the past, sea fans were collected as souvenirs and today suffer damage from trawling and scallop dredging over the flat rocky habitat in which they thrive.

As the pink sea fan is nationally rare it is now protected under provisions in the Wildlife and Countryside Act 1981 and it is a Biodiversity Action Plan Priority Species.

The dive vessel

The group chartered the hard boat Abyss, based in Yacht Haven Marina for the four days of the expedition.

Navigation

The skipper navigated using global positioning system (GPS), using the latitude and longitude readings from previous Seasearch reports and the local expertise of the Seasearch workers in the group.

On location, a shotline was deployed to mark the site; the first buddy pair confirmed shot location (no adjustment was necessary). It had been proposed that an indicator would be sent to the surface (a DSMB up the shotline) to confirm accuracy, but this was considered ultimately unnecessary. The last buddy pair down the shotline put some air into lifting bag attached in order to ease shot retrieval at the end of the dive.

Data collection

Seven sites were dived, recording data on 126 sea fans. Data was recorded on pre-prepared slates for later transfer to Seasearch observation forms, along with photographs. GoPro video was planned but the camera proved not to be working when this was tried. After diving finished each day, the group gathered to compare results, transfer data to the paper forms, discuss progress and plan the following day.

A standard magnifying glass proved invaluable in looking for nudibranchs, anemones and false cowries

Pre-prepared slates allowed divers to measure the height and width of the pink sea fans

Following each day's diving, the group convened to transfer the data for the day's observations and check the marine life books for the identity of particular species also seen.

Pink Sea Fan Recording Form

seasearch
www.seasearch.org.uk

About you

Name: CHRIS WEBB + LINDA RITSON

Address:

Postcode:

Email:

About your dive

Site Name: PERSIER WRECK

General Location: BIG BUOY BAY DEVON.

Position (degrees and decimal minutes)

Lat 50°17.090 N Long 03°58.130 W

Date: 27.3.17 Start time: 9:41

Depth range of sea fans: 27.5 to 27.8

Habitat of sea fans ✓

Sloping rock	Flattish rock	Wreck	Sediment covered rock	Boulders	Other (specify in notes)
		✓			

Density of sea fans ✓

Forest	Common	Occasional	Rare
✓			

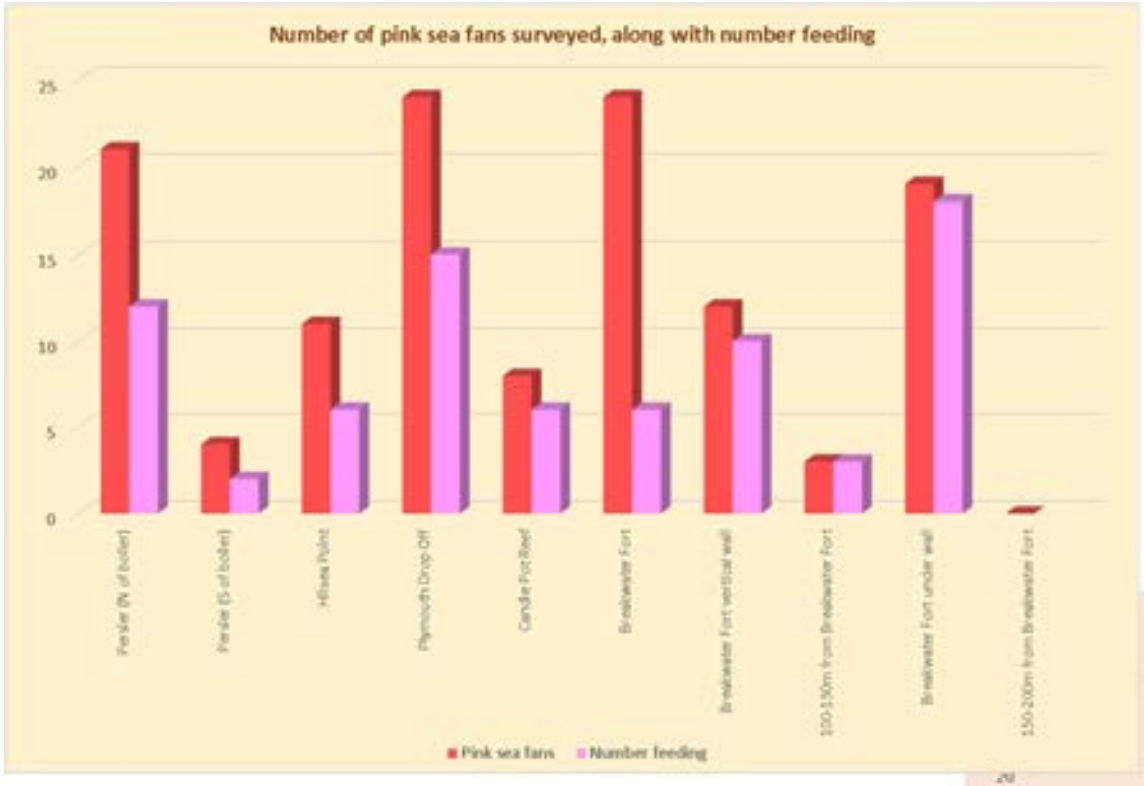
Additional notes on sea fans at this site

measured fans
N of boats

Return completed form to:
Seasearch, Marine Conservation Society, Over Rose House, Rose Park, Ross-on-Wye, HR9 7QQ.

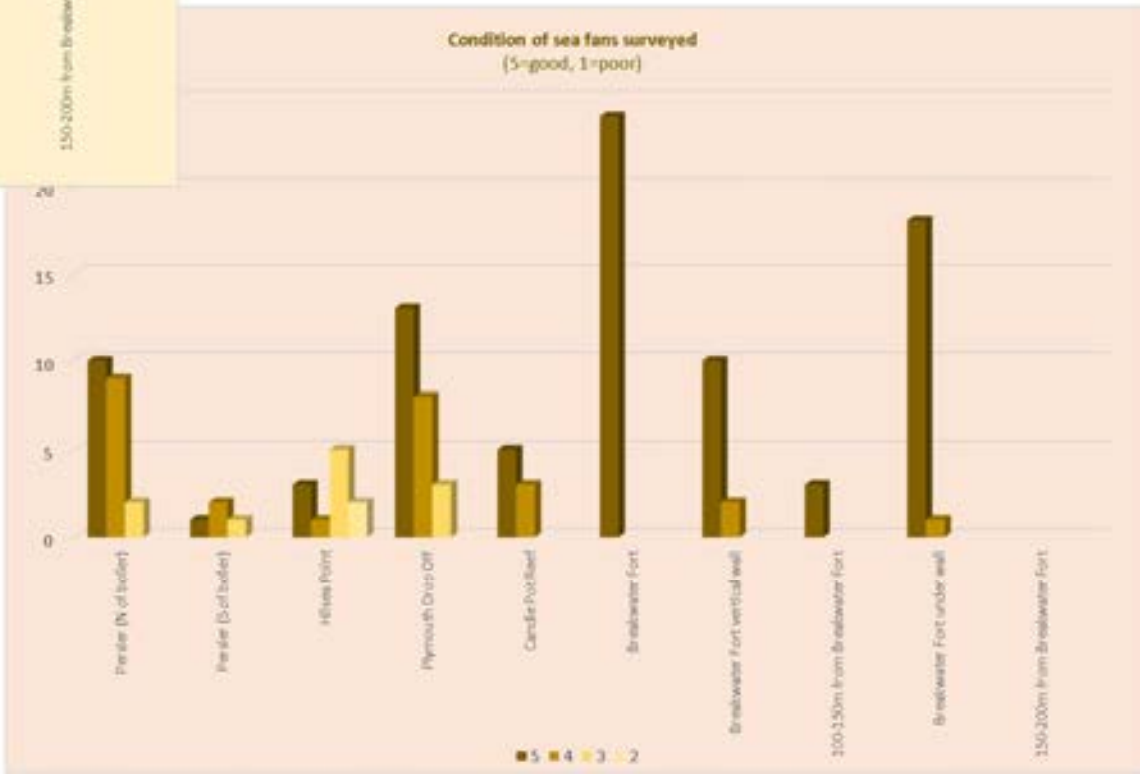
Details of individual sea fans

	Width cm	Height cm	Feeding Y/N	Colour P/W	Condition 0, 1-5	Fouling Species list	Fishing debris list	number of: Sea fan anemones	Sea fan nudi adults/eggs	False corals adults/eggs
1	20	20	Y	P	5	hydroid			1	
2	15	17	N	P	5					
3	20	20	Y	P	4					
4	21	20	Y	P	5					
5	18	24	N	P	5				1	
6	4	20	Y	P	4		—			
7	14	24	Y	R	4					
8	1	10	Y	P	5					
9	6	10	Y	P	5					
10	10	8	Y	P	5					
11	20	18	Y	P	5				1	
12	19	18	N	P	5					
13	16	20	Y	P	4					
14	7	15	Y	P	5					
15	4	14	N	P	4	hydroid? (unidentified)				
16										
17										
18										



The greater number of pink sea fans were in areas where there is potentially less human interference, that is at deeper depths and closest to the breakwater wall.

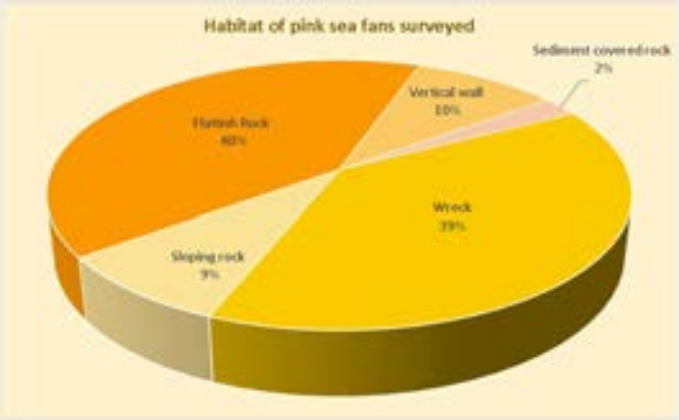
Most of the pink sea fans surveyed were feeding.

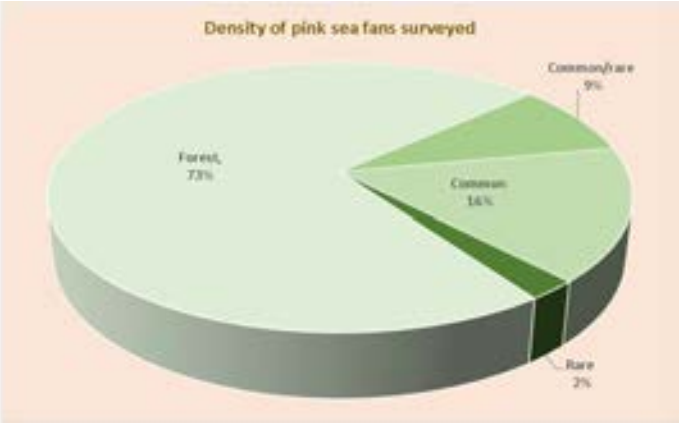


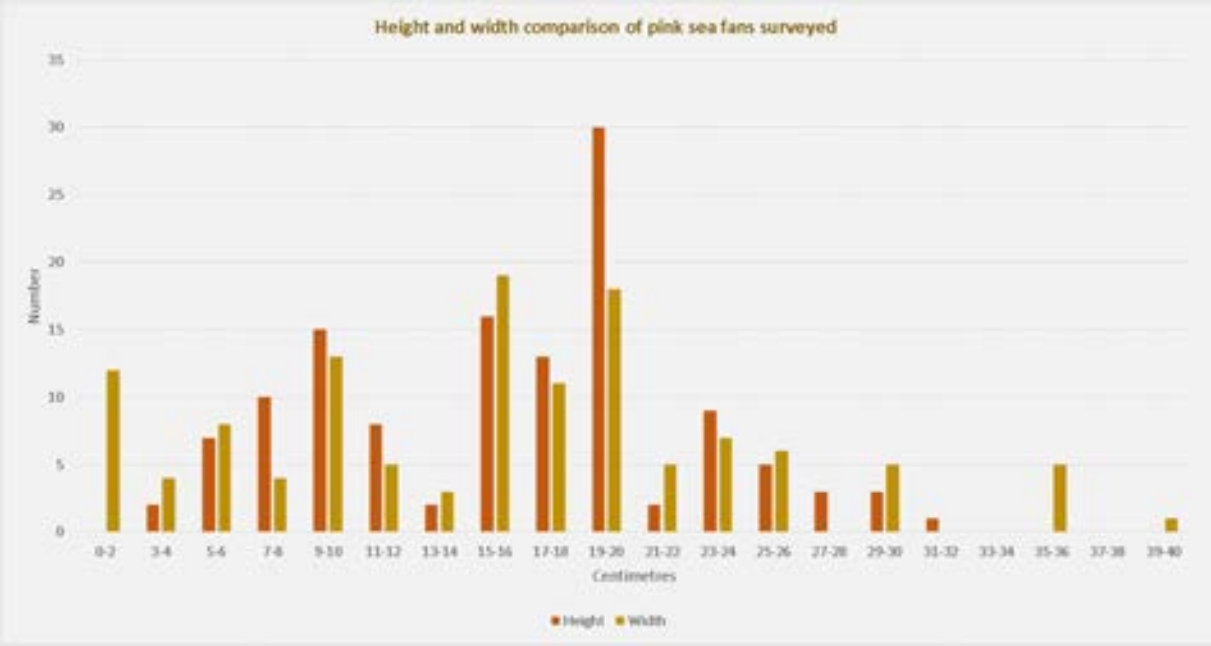
Almost all the pink sea fans were healthy, rated 4 or 5 on the scale. It was noted that almost no fans were seen that would be rated 1 or 2.

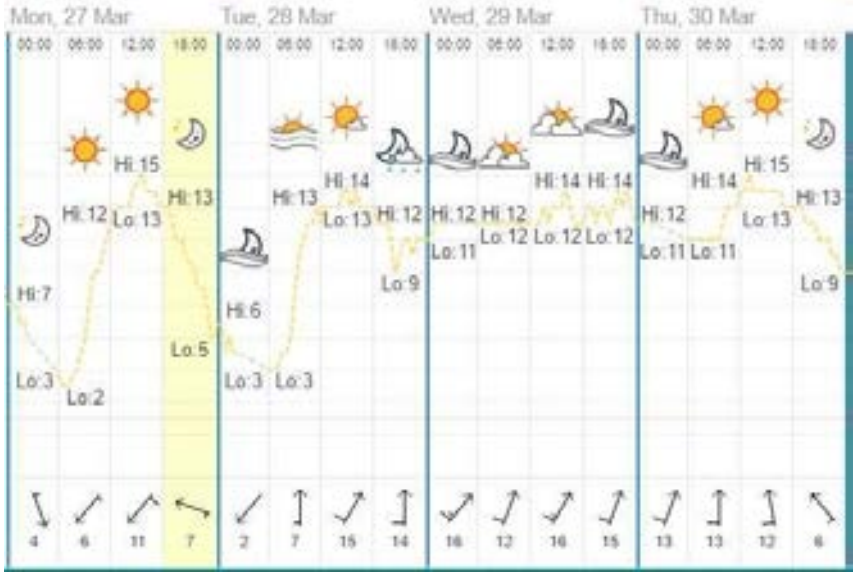
The picture on the right shows a pink sea fan feeding, whereas the picture below shows a pink sea fan that is not feeding.

They feed by growing at right angles to the current, so that the largest surface area faces the current, and use anenome-like polyps to capture zooplankton (floating food) from the surrounding water.









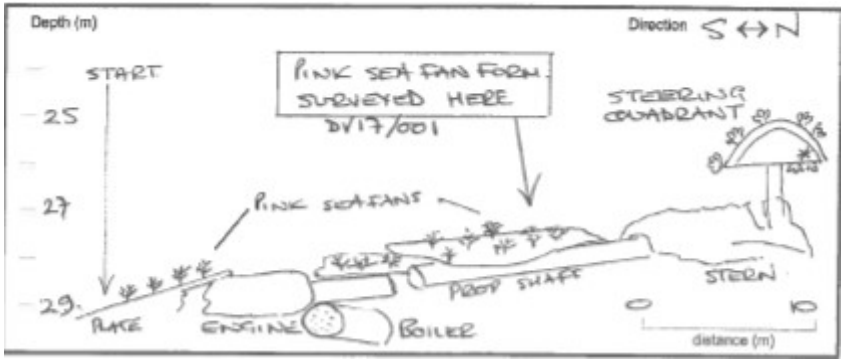
Diving and the dive sites

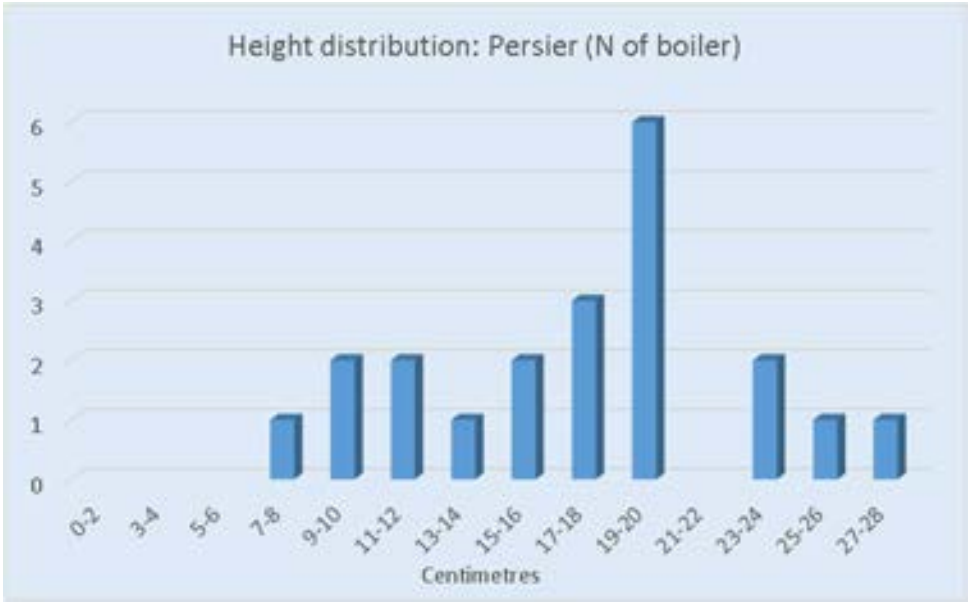
The weather over the four days was variable, with the winds strengthening as the week progressed.

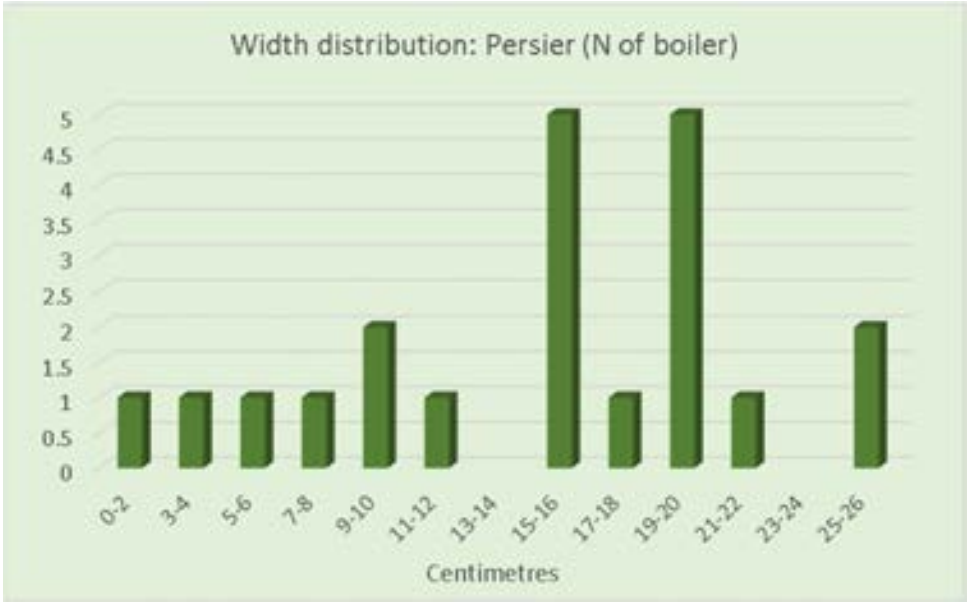
DAY ONE

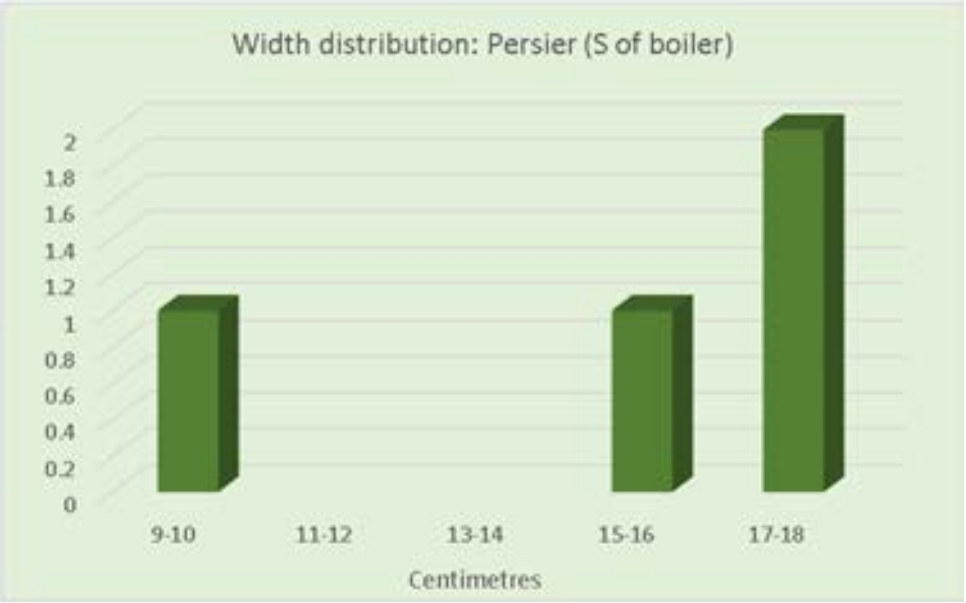
Persier ~ Latitude/longitude: 50°17'.090N / 04°58'.130W ~ 26-28 metres

The shot was located on the central boiler. The group decided to survey north and south of the boiler in order to establish whether there was any difference in the density and health of the pink sea fans over the two location. The density in both locations was noted as 'forest', with no difference in density. It was noted that the forests of pink sea fans are on the plates that would have formed the sides of the vessel.



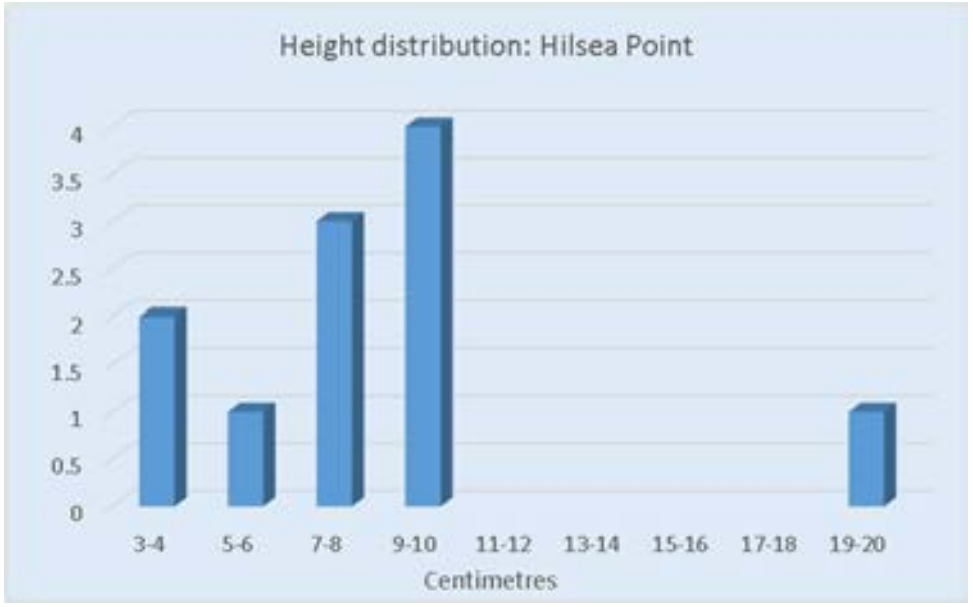






Hilsea Point ~ Latitude/longitude: 50°17'.337N / 04°02'.686W ~ 18-25 metres

There was a strong drift on the dive, which made surveying the pink sea fans in detail quite difficult. Again, the group decided to try to survey two different areas in order to compare the two direction. There were fewer pink sea fans noted.



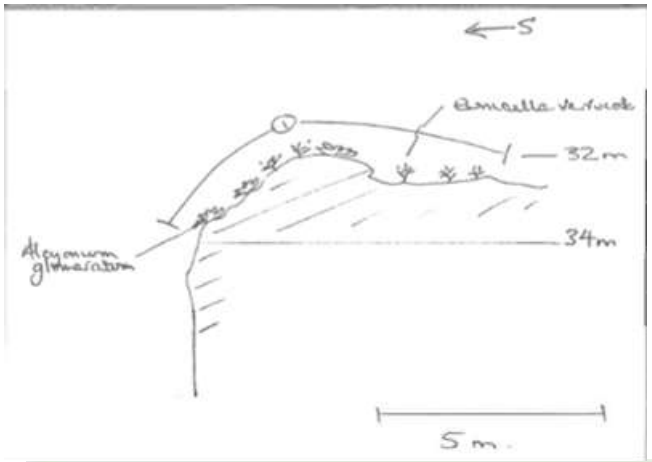
In addition to the pink sea fans, the divers noted the presence of dead man's fingers, cat sharks, crawfish, spider crabs.

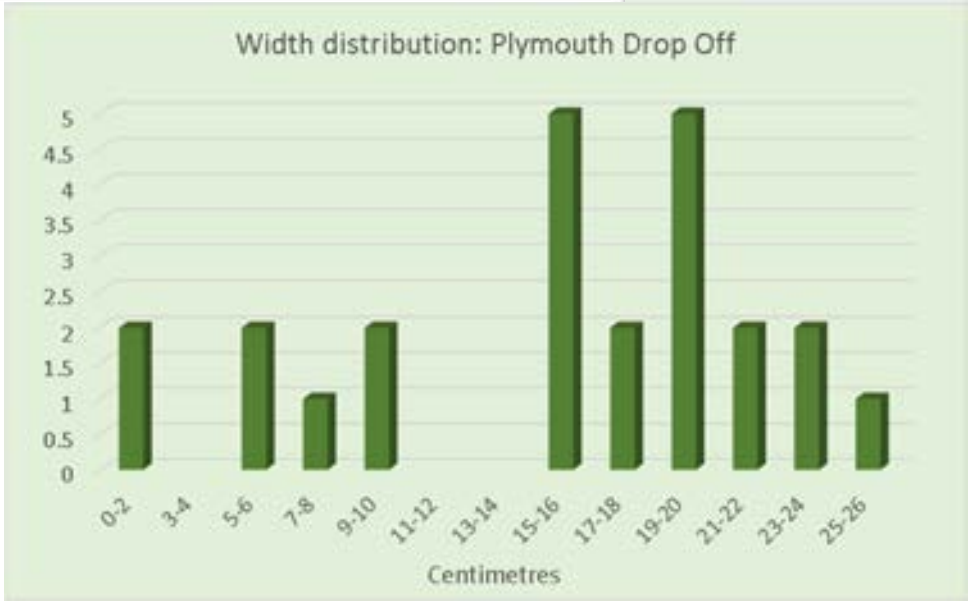
DAY TWO

Plymouth Drop Off ~ Latitude/longitude: 50°17'.653N / 04°09'.084W ~ 32 – 33 metres

The dive pairs spread across different areas of the drop off shelf to compare density, which was noted as 'forest'.

In addition to the pink sea fans surveyed, the divers also noted octopus, ling, conger, crawfish, pipe fish, sponges and cat sharks. These creatures were also noted on the Seasearch forms to inform the general monitoring of marine life presence and health; crawfish are also the subject of a separate Seasearch monitoring project.

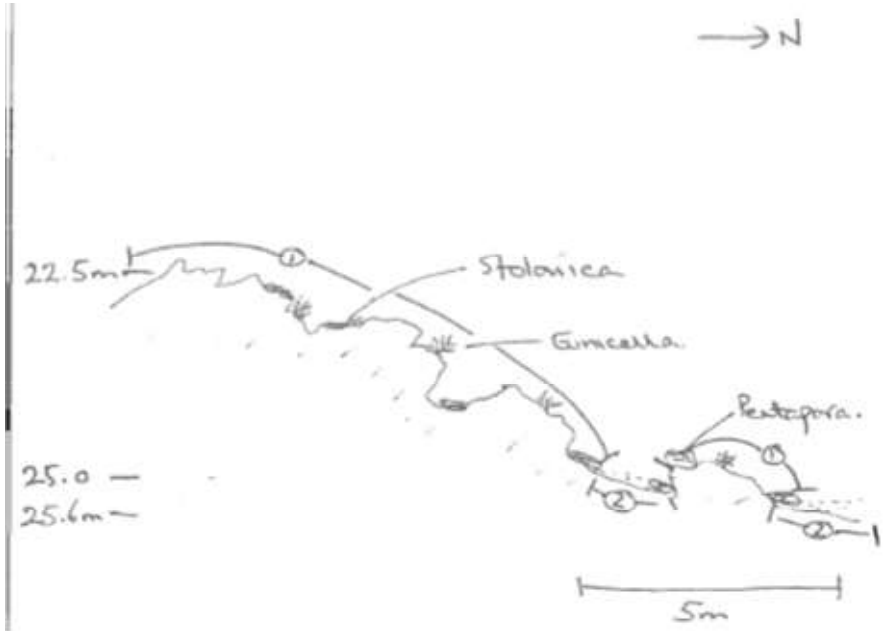


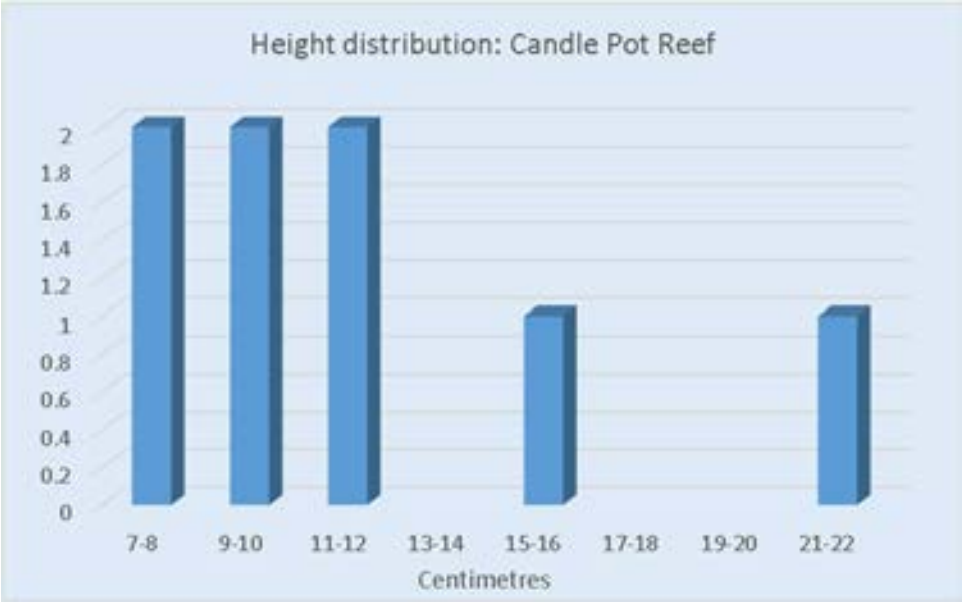


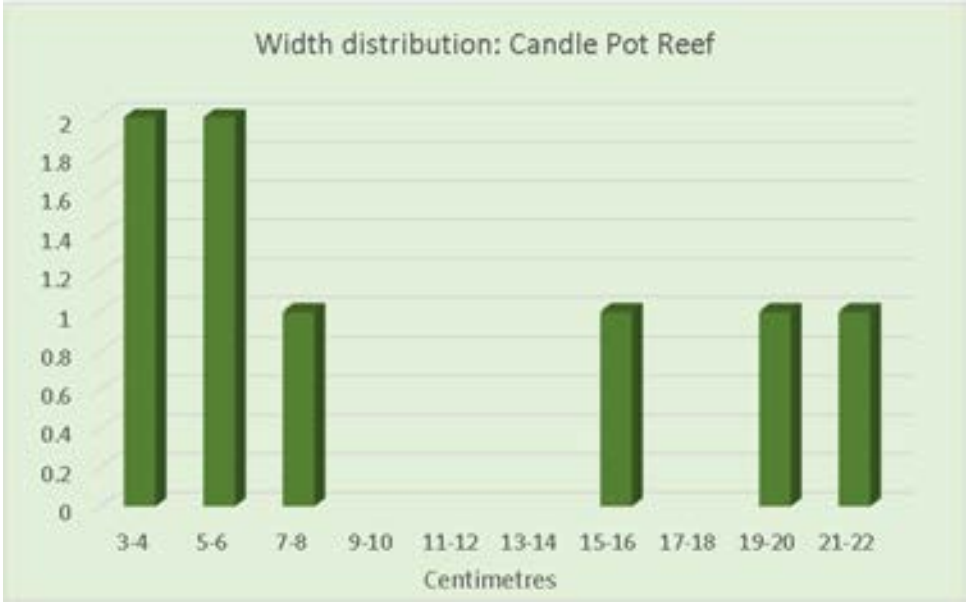
Candle Pot Reef ~ Latitude/longitude: 50°18'.347N / 04°09'.172W ~ 22 – 25 metres

This was a completely new site to Seasearch, close to Plymouth Drop Off. The density of the pink sea fans was noted as 'common'.

In addition, the divers noted a large number of (approximately) 10 inch artillery rounds along the shelf. One pair of divers spent much of their bottom time releasing a spider crab that had become entangled in a fishing net; it was noted that scissors were a much more effective tool to cut the net than a traditional dive knife.







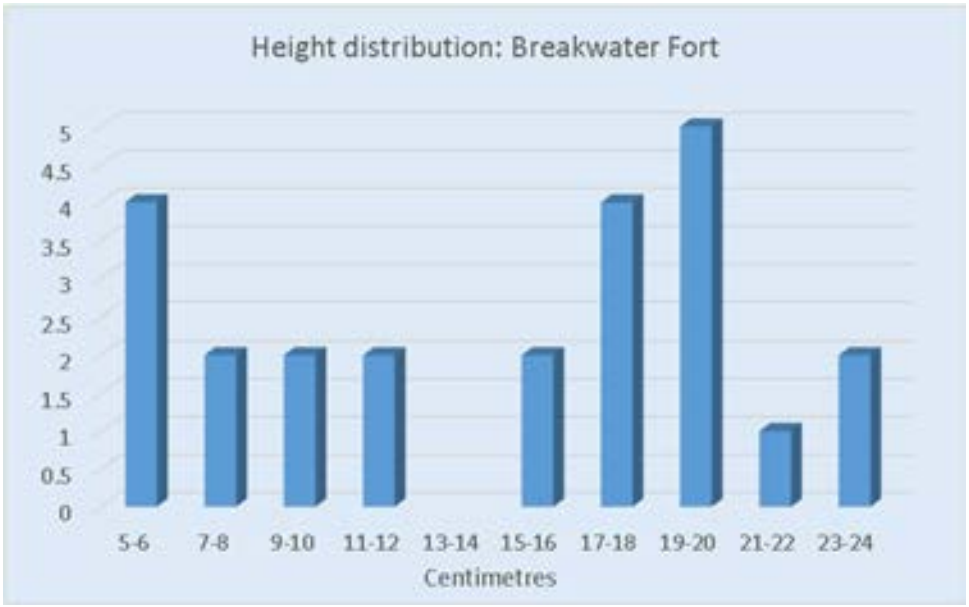
DAY THREE

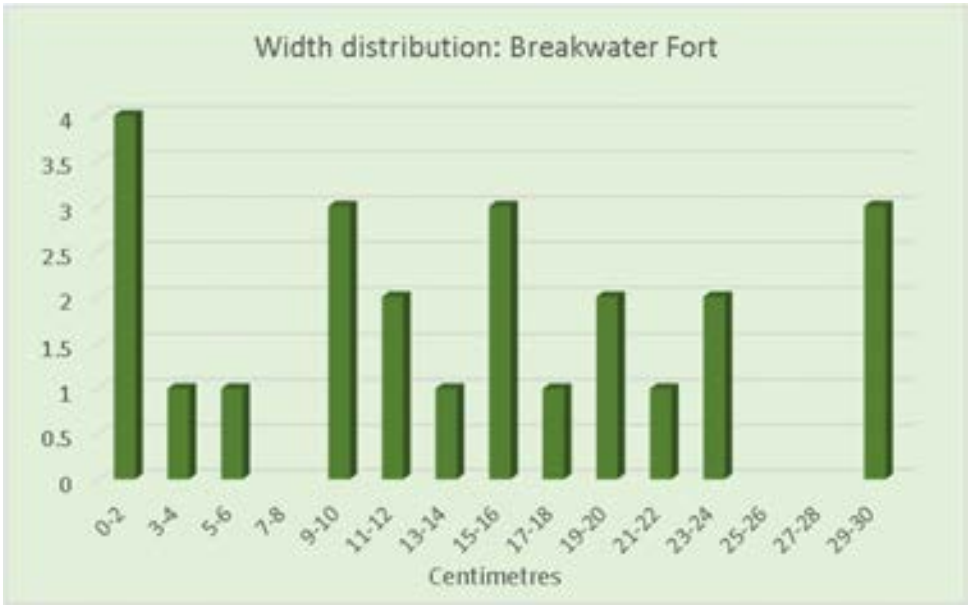
Breakwater Fort ~ Latitude/longitude: 50°20'.074N / 04°08'.940W ~ 10 – 16 metres

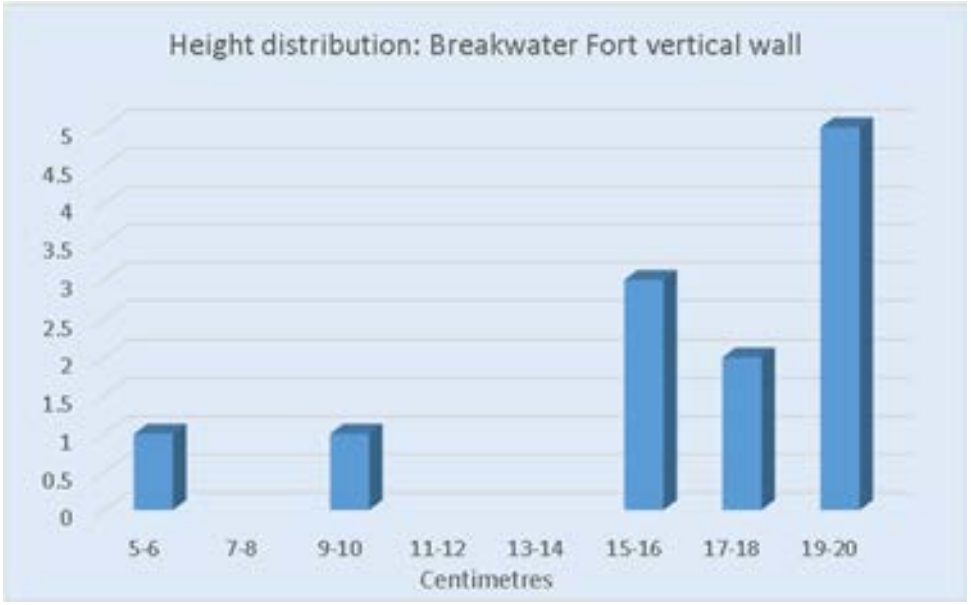
The weather deteriorated overnight into the third day, so it was not possible to head out beyond the breakwater. The group therefore surveyed different areas around the Breakwater Fort, with two surveys close to Fort and two surveys heading west along the breakwater wall. The greatest density of pink sea fans was noted on the vertical wall of the Fort and amongst the human debris immediately below it, then decreasing density the further west the divers went.

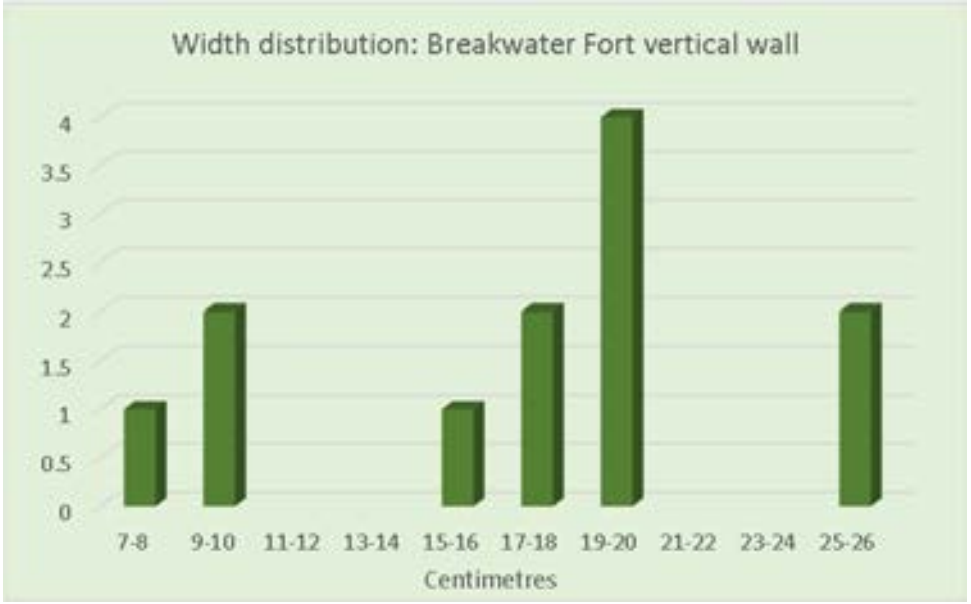
Yellow staghorn sponge and small octopus were also noted as being present, as well as the egg cases of cat sharks.

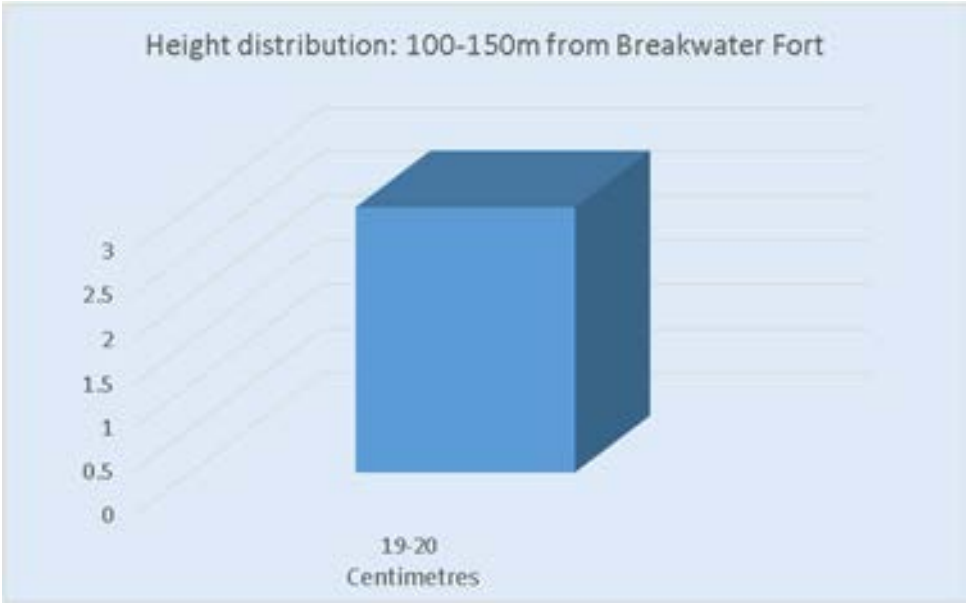
For safety reasons in the strong wind, each pair of divers deployed a delayed surface marker buoy throughout the dive; this was hard to manage in the wind and it was noted that a traditional marker buoy would offer a smaller surface area to the wind, which would be easier for the divers to handle.


Height distribution: Breakwater Fort
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
5-6
7-8
9-10
11-12
13-14
15-16
17-18
19-20
21-22
23-24
Centimetres


Width distribution: Breakwater Fort
4
3.5
3
2.5
2
1.5
1
0.5
0
0-2
3-4
5-6
7-8
9-10
11-12
13-14
15-16
17-18
19-20
21-22
23-24
25-26
27-28
29-30
Centimetres


Height distribution: Breakwater Fort vertical wall
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
5-6
7-8
9-10
11-12
13-14
15-16
17-18
19-20
Centimetres


Width distribution: Breakwater Fort vertical wall
4
3.5
3
2.5
2
1.5
1
0.5
0
7-8
9-10
11-12
13-14
15-16
17-18
19-20
21-22
23-24
25-26
Centimetres


Height distribution: 100-150m from Breakwater Fort
3
2.5
2
1.5
1
0.5
0
19-20
Centimetres


Width distribution: 100-150m from Breakwater Fort
1
0.8
0.6
0.4
0.2
0
15-16
17-18
19-20
Centimentres


Height distribution: Breakwater Fort under wall
4
3.5
3
2.5
2
1.5
1
0.5
0
5-6
7-8
9-10
11-12
13-14
15-16
17-18
19-20
21-22
23-24
25-26
27-28
29-30
Centimetres

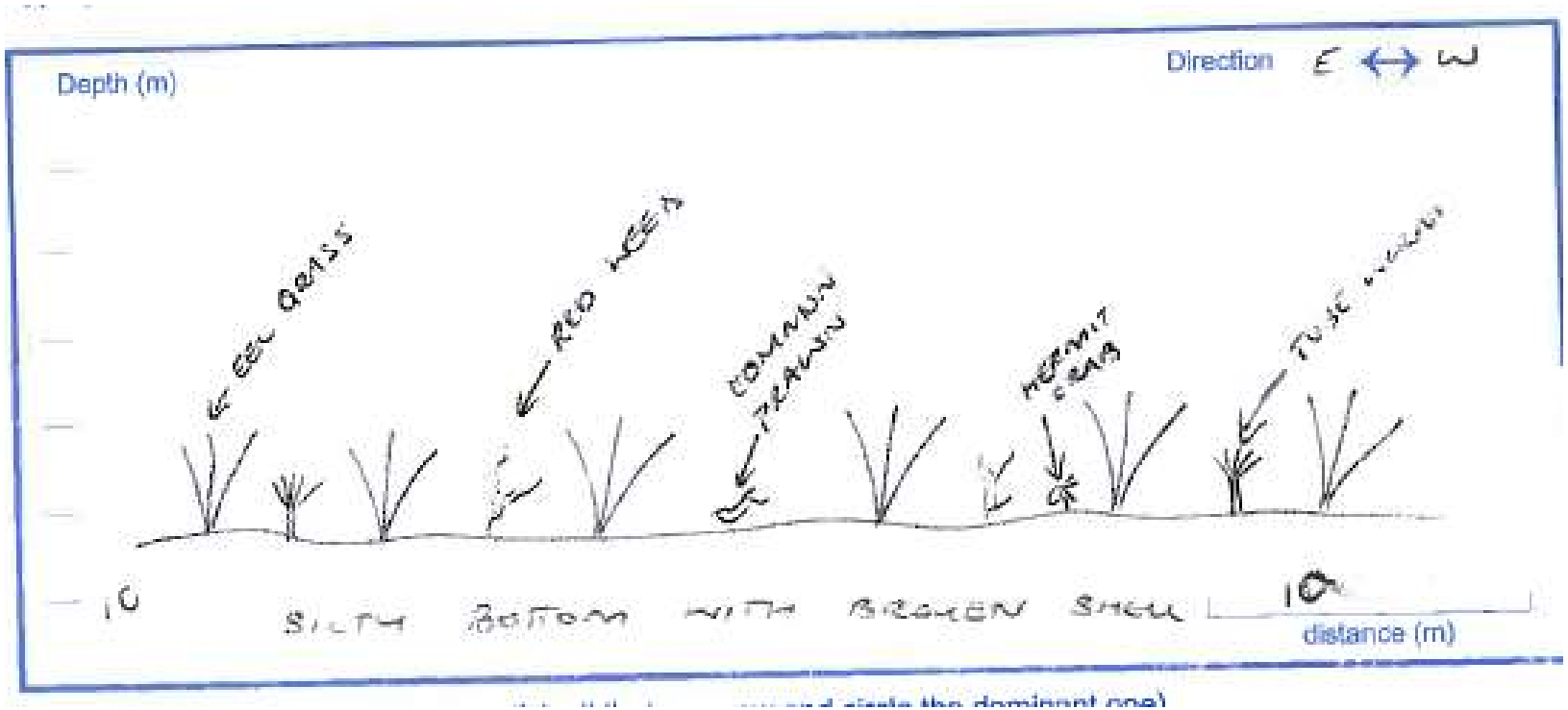

Width distribution: Breakwater Fort under wall
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
0-2
3-4
5-6
7-8
9-10
11-12
13-14
15-16
17-18
19-20
21-22
23-24
25-26
27-28
29-30
31-32
33-34
35-36
37-38
39-40
Centimetres

DAY FOUR

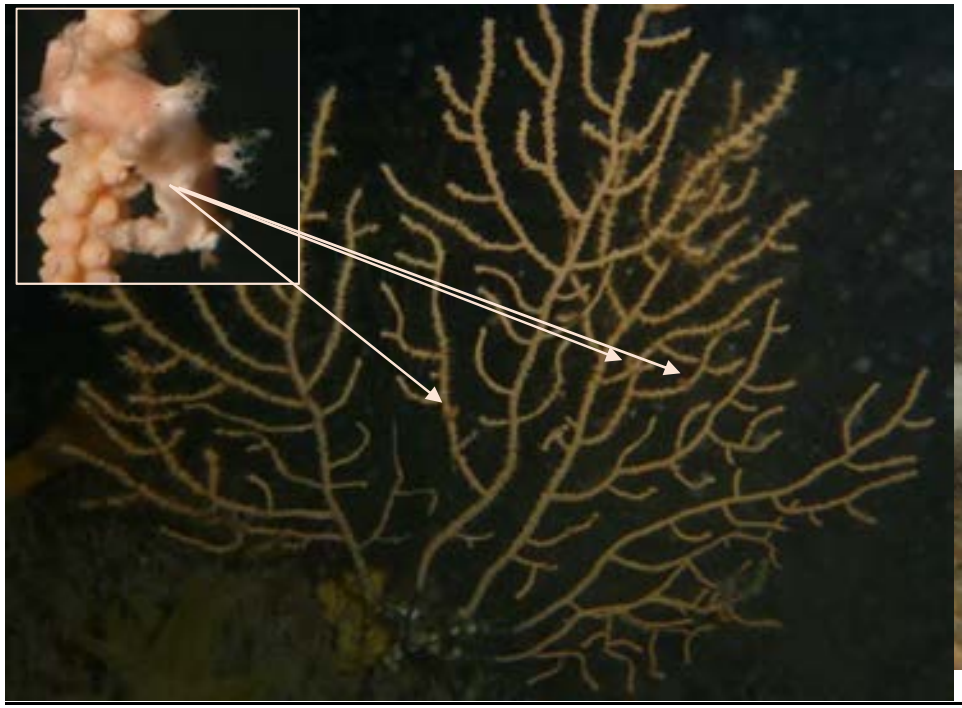
Cawsands Bay ~ Latitude/longitude: 50°19'.724N / 04°11'.756W ~ 9 – 11 metres

The wind on the last day was stronger than the day before, making it impossible to head out of the breakwater. Rather than repeat the surveys of the previous day, the group agreed to survey the sea grass beds in Cawsand Bay to gather other data for Seasearch research.

As expected, there were no pink sea fans to be measured, but over very small distances, the group made macro surveys of the marine life to be found, such as common prawns, small hermit crabs and tube worms.



Anemones, nudibranchs and false cowries



The picture on the left shows nudibranchs and the picture below shows an anemone, all identified during the survey dives.

Over the seven sites, three anemones were identified, on the Persier, Hilsea Point and Plymouth Drop Off, and seventeen nudibranchs were identified, on the Persier, Plymouth Drop Off and the Breakwater Fort.

Conclusions

The pink sea fans surveyed appear to be mainly in good health, particularly the colonies in areas not as subject to human interference, such as the deeper depths of Plymouth Drop Off and the Persier, or on the vertical wall and amongst the human debris at the bottom of the Breakwater Fort wall. The deeper depths are also noted in Seasearch reports as protecting the pink sea fans from the effects of sea storms.

The different Seasearch reports are not presented in a consistent format to enable exact 'site on site' matching, but a general perspective can be drawn.

Site name	Position		Habitat	Density	No. pink sea fans	2001-02 report	2003	2004-06	2006-12	2014
	latitude	longitude								
Persier (N of boiler)	50°17'.090N	03°58'.130W	Wreck	Forest	21	Dense average condition 4.43	4.9	abundant	Rare to frequent	good condition with an average condition score of 4.28
Persier (S of boiler)	50°17'.090N	03°58'.130W	Wreck	Forest	4					
Hilsea Point	50°17'.337N	04°02'.686W	Sloping rock	Common/rare	11			common	Rare	overall the populations were in good condition with an average condition score of 4.41
Plymouth Drop Off	50°17'.653N	04°09'.084W	Flattish Rock	Forest	24		4.4		abundant	
Candle Pot Reef	50°18'.347N	04°09'.172W	Flattish Rock	Common	8					
Breakwater Fort	50°20'.074N	04°08'.950W	Wreck	Forest	24			common		
Breakwater Fort vertical wall	50°20'.074N	04°08'.950W	Vertical wall	Common	12					
100-150m from Breakwater Fort	50°20'.074N	04°08'.950W	Sediment covered rock	Rare	3					
Breakwater Fort under wall	50°20'.050N	04°08'.985W	Flattish Rock	Forest	19					
150-200m from Breakwater Fort	50°20'.050N	04°08'.985W	Sediment covered rock	Rare	0					

The aims of the expedition were achieved:

1. Survey pink sea fans at a range of dive sites around Plymouth and establish whether previously established locations of pink sea fan anemones are still in existence.
   Only one dive was at a site not previously visited by Seasearch divers. Evidence from the data gathered indicates that in the locations previously visited by Seasearch the colonies of pink sea fans are still in existence.
2. Compare the results with earlier surveys in order to assess the health of the sea fans.
   The data gathered shows that the colonies of pink sea fans are generally very health and thriving in their present locations. The pink sea fans surveyed were graded mainly 3 and above, and most were feeding.

3. Try to determine the effects of recent dredging activity along the south coast.
   On the limited data collected by this expedition, it appears that there is no undue detrimental effect to the pink sea fan populations by the recent dredging.
4. Endeavour to identify the presence of the sea fan anemone, sea fan nudibranch and false cowdrie.
   Pink sea fan anemones and sea fan nuidbranchs were identified (3 and 17 respectively), and although no false cowries were identified, this may be due to the inexperience of the largely amateur survey group as opposed to none being present.

The group

Christine Webb	BSAC Direct	Advanced Diver
Geoff Bacon	Bingham SAC	Advanced Diver
Gordon Procter	Worcester SAC	Advanced Diver
John Armstrong	Alfreton SAC	Advanced Diver
Linda Ritson	East Midlands SAC	Advanced Diver
Paul Ritson	East Midlands SAC	Advanced Diver
Richard Croft	Lincoln & District SAC	Advanced Diver
Sally Sharrock	BSAC Direct	Advanced Diver
Will Schwarz	Plymouth Sound SAC	First Class Diver
Also providing support and guidance:		
Andy Jarvis	National Instructor	
Ginge Crook	National Instructor	

Costs

Accommodation	£668.00	
Boat	£1,800.00	
Gas	£244.00	
Evening food & drink*	£540.00	*estimated as the group ate in a local pub and paid cash
Lunches for group	£40.00	
	£3,292.00	
BEGS grant	(-£500.00)	
Balance met by group	£2,792.00	

Issues overcome

1. The expedition was planned during the winter months for execution as early as possible in the dive season; the original intention was for this to be an East Midlands regional expedition and therefore the planned group included a number of BSAC national instructors who were ultimately unable to join the expedition because of conflicting BSAC commitments. The final group undertaking the expedition enabled people from a wider range of memberships to work together.

2. During the week, the weather prevented the full planned dive sites to be accessed and therefore the group had a list of 'back up' sites, drawn mainly from the knowledge of the two Seasearch group members.
3. The weather on the final day prevented the boat from heading out of the breakwater, but having already surveyed the breakwater the day before, there seemed little point in repeating the survey area again. Thus, the group dived to survey Cawsand Bay in order to gather other data for Seasearch projects, surveying very small areas in great detail. This also allowed three of the group members to complete their required dives for the Seasearch Observer course, enabling them to be of future use in gathering Seasearch data.

Lessons learned

Whilst serving a need for Seasearch, there were number of important lessons learned to enhance the ability of the group members in future similar dive projects:

1. A survey of the general area first, before focussing in on a particular smaller scale site adds a lot to the overall understanding of the site and the context of the data gathered.
2. Rulers and slates float away, something heavier marked up for measuring would be more useful (lead flashing around the dive slate or a flat stone with markings were the best suggestions made).
3. A magnifying glass for fully studying the microlife is essential, particularly when visibility proved more challenging or when the diver would normally wear glasses for close work.
4. It is important to reflect on work undertaken throughout an expedition, in order to adapt survey techniques according to different dive conditions (such as slack water, drift dives).
5. It is not necessary to spend the whole dive time focussed on the project, but to also take time to 'dive' the site, getting a more expansive perspective to contribute to the survey.
6. Guidance is essential for novices, the enthusiasm of experts is infectious and novices gain a better sense of their achievements through being mentored in the project work.
7. With photography, top lighting of the subject seems to be better when there is a lot of particulate in the water.
8. It is important to consider the ultimate outcomes of the project and prepare for those, such as to take photographs of the group members 'doing', as well as focussing on the data collection.
9. The close concentration and the frequent frustration of data collection and photography definitely require a positive attitude, a good sense of humour and lots of cake!

Additional achievements

1) Three members of the group were able to complete their training observation dives and become qualified as Seasearch observers.
2) The recording of species not previously (or rarely) identified on the Plymouth Drop Off:
   - Crawfish – there is a specific Seasearch project to record crawfish; as the largest crustacean found in British and Irish waters, their numbers have decreased dramatically in recent years and they have now been identified as a Biodiversity Action Plan species.
   - Octopus
   - Pipefish
   - Sea pens
3) A site previously unknown and therefore unrecorded by Seasearch was identified and named (Candle Pot Reef).

Special thanks

The group owes a special thanks to:

- The Mount Batten Watersports Centre, which opened especially to provide accommodation for the expedition.
- The staff of In Deep, who came into the gas station on the two days that the business is officially closed to fill cylinders for the group members and performed emergency suit repairs overnight to allow members to continue diving.

Without the support of these people, the expedition would have faced much more complicated arrangements in order to achieve its objectives.
Thanks are also due to:

- Chris Webb and Sally Sharrock, whose extensive marine biology and Seasearch knowledge and experience was invaluable. Thanks are also due to them for the excellent site sketches included in this report.
- Plymouth Sound Sub-Aqua Club, who extended a warm welcome to the group members on the their club night.

Appendices

Log sheets
Receipts

I hereby confirm that the expedition did proceed as planned and that the expedition report is a true reflection of the expedition.

Signature of Expedition Leader — Date

_____ _ _ / _ _ / _ _

Signature of Mentor — Date

_____ _ _ / _ _ / _ _