

Natural England Commissioned Report NECR312

Whitsand and Looe Bay MCZ 2018 Survey Report

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Foreword

Natural England commission a range of reports from external contractors to provide evidence and advice to assist us in delivering our duties. The views in this report are those of the authors and do not necessarily represent those of Natural England.

Background

Following designation, Natural England started a baseline monitoring programme across all marine protected areas.

This report was commissioned as part of an inshore benthic marine survey of the Whitsand and Looe Bay MCZ.

This report should be cited as:

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Further information

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Whitsand and Looe Bay MCZ 2018 Survey Report

Project Code: MB0129

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M. Marsh	Natural England Marine Ecological Specialist
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1. Introduction

Following the introduction of the Marine and Coastal Access Act in 2009, the UK Government is creating an ecologically coherent network of Marine Conservation Zones (MCZs) in British waters. The MCZ network will exist alongside other Marine Protected Areas (MPAs), including Special Areas of Conservation (SACs), Special Protection Areas (SPAs), Sites of Special Scientific Interest (SSSIs) and Ramsar sites to help conserve marine biodiversity, in particular habitats and species of national importance.

Forming part of this network, the Whitsand and Looe Bay MCZ was formally designated on the 21st November 2013¹, protecting eight habitats including intertidal sediment features, subtidal sediment features, seagrass beds and a number of Species Feature of Conservation Importance (FOCI). Following designation, Natural England* have started a programme of monitoring and the initial datasets gathered will be used along with all other available information, to assess the condition of the features in the site, using Natural England marine condition assessment methodology. The method uses attributes set out in the site supplementary advice on conservation objectives to form an overall decision about the condition of the features, and this work will inform the assessment of specific attributes (Section 1.2). The results from the condition assessment will inform future condition monitoring planning, and management of the site.

*England's inshore Statutory Nature Conservation Body

1.1 Site Description

Whitsand and Looe Bay MCZ is an inshore site located off the south coast of Cornwall (Figure 1). The landward site boundary follows the coastline along the mean high water mark, from Hore Stone near Talland Bay in the west, to a point between Queener Point and Long Cove on Rame Head in the east. The seaward boundary is formed by a straight line across the bay, with a small extension jutting out to the south around Looe Island. The site covers an area of 52 km² and is 25 metres deep at its deepest point. The site partially overlaps the Plymouth Sound and Estuaries SAC (Figure 3).

The MCZ is designated for eight habitats and four species FOCI (Table 1), offering specific protection for Pink sea-fans (*Eunicella verrucosa*), a slow-growing soft coral

¹ This report was produced before the Tranche 3 designation announcement on 31st May 2019 and as such all content was correct at the time of writing.

which attaches to rocky reefs or other hard substrates (Natural England, 2013). Sea-fan anenomes (*Amphianthus dohrnii*) which live on or around Pink sea-fans are also protected within the site. Both species are particularly vulnerable to physical damage. Stalked jellyfish, small cnidarians which attach to seaweed or seagrass, are also designated features of the site, along with the Ocean quahog (*Arctica islandica*), a very slowly growing bivalve.

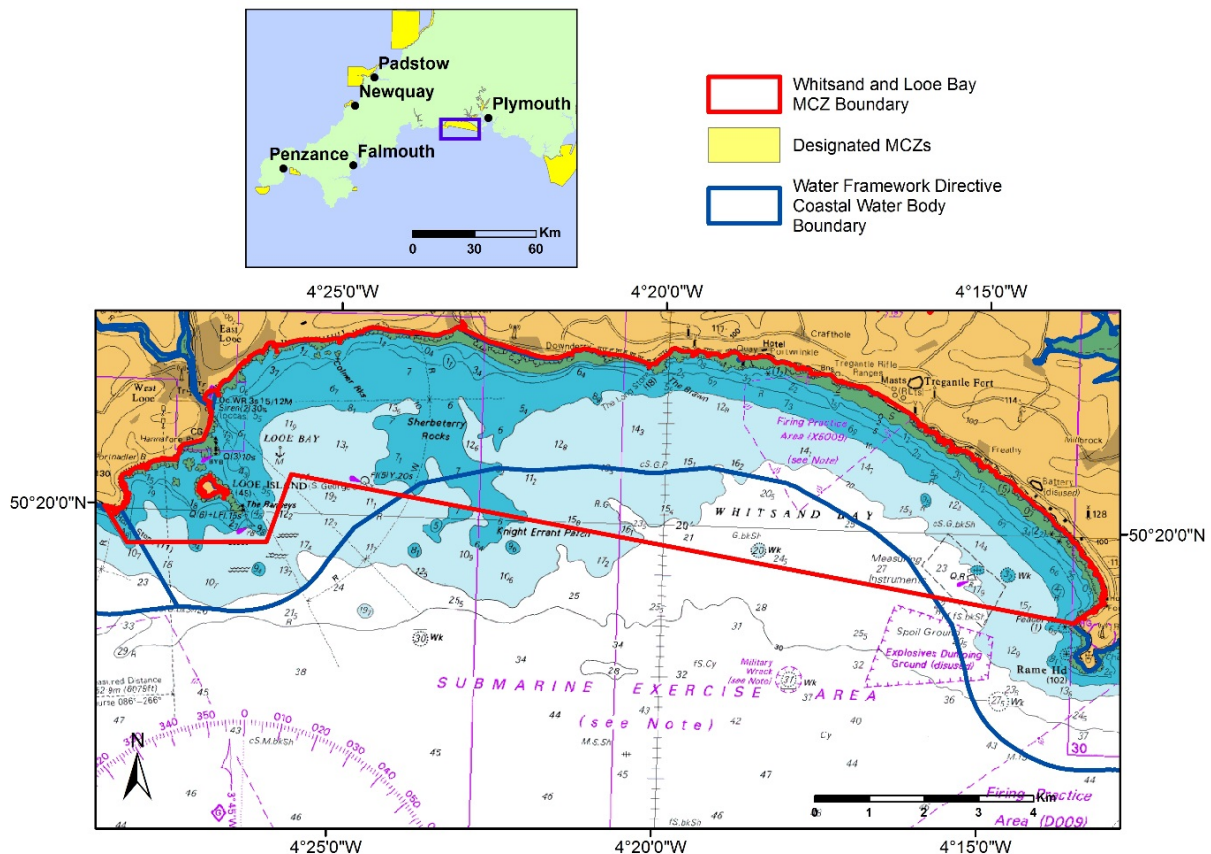


Figure 1. Location of the Whitsand and Looe Bay Marine Conservation Zone (MCZ) in the context of other MCZs off the southwest of England.

The Features of Conservation Importance protected under the MCZ designation order are presented in Table 1 alongside the current general management approach for each. The survey planned here will focus on those features indicated by blue shading (Table 1).

The Whitsand and Looe Bay Marine Conservation Zone (Fishing Restrictions) Byelaw 2018 prohibits the use of bottom towed gear in a marine area located within the Whitsand and Looe Bay MCZ. This protects features of the MCZ by prohibiting the use of bottom towed gear such as dredges and some trawls in the majority of the site.

Further details of Cornwall Inshore Fisheries and Conservation Authority's (CIFCA) byelaws can be found at https://www.cornwall-ifca.gov.uk/Byelaws_Regulations.

Table 1. Designation status and the current General Management Approach (GMA) for the Features of Conservation Importance present in the Whitsand and Looe Bay Marine Conservation Zone. The survey described here focuses on those features indicated by blue shading.

Feature Type	Features Present	Designated	GMA
Broadscale Habitat (BSH)	High energy intertidal rock	✓	Maintain in favourable condition
	Intertidal coarse sediment	✓	Maintain in favourable condition
	Intertidal sand and muddy sand	✓	Maintain in favourable condition
	Low energy intertidal rock	✓	Maintain in favourable condition
	Moderate energy intertidal rock	✓	Maintain in favourable condition
	Subtidal coarse sediment	✓	Maintain in favourable condition
	Subtidal sand	✓	Maintain in favourable condition
Habitat Features of Conservation Importance	Seagrass beds	✓	Maintain in favourable condition
Species Features of Conservation Importance	Ocean quahog (<i>Arctica islandica</i>)	✓	Maintain in favourable condition
	Pink sea-fan (<i>Eunicella verrucosa</i>)	✓	Recover to favourable condition
	Sea-fan anemone (<i>Amphianthus dohrnii</i>)	✓	Recover to favourable condition
	Stalked jellyfish (<i>Haliclystus auricula</i>)	✓	Maintain in favourable condition

1.2 Survey Aim and Objective

To undertake a survey of Whitsand and Looe Bay MCZ designated features (Table 1) to obtain new evidence which can be used by Natural England, alongside all other relevant information, to detect change over time and ascribe condition to inform future monitoring and management measures.

Objective:

A survey focusing on the Pink sea-fan feature to assess the following attributes from Natural England's Supplementary Advice on Conservation Objectives (Natural England, 2017):

- 1) Population structure** – Population size is the number of individuals within a population that are able to contribute to the species viability at a local, national and bio-geographic scale. Population size relates to the abundance of a species. It should include all the populations of a species within the site.
- 2) Population: recruitment and reproductive capability** – Recruitment and reproductive capability reflect the health and success of the population in terms of maintaining and/or restoring numbers. A reduction in the availability of individuals able to successfully reproduce, and survival rates, may impact the overall size and age-structure of the population.
- 3) Presence and spatial distribution of the species** – The presence describes the species occurrence, with the spatial distribution providing a more detailed overview of the location(s) and pattern of occurrence within a site. It is important to consider the various life stages of a species as this may influence its distribution. Disturbance caused by human activities should not adversely affect the species.
- 4) Supporting Processes: physico-chemical properties and water quality (dissolved oxygen, turbidity)** - The physico-chemical properties that influence the species include salinity, pH and temperature. These abiotic factors can affect the species in different ways depending on species-specific tolerances. Temperature and salinity are closely linked and can act either alone or in combination and can ultimately determine the success of a population, most notably in coastal habitats. Changes in any of these properties, as a result of human activity, may also impact the supporting habitats and the food favoured by the species.

Dissolved Oxygen (DO) levels affect the condition and health of species. A reduction in oxygen concentration may cause some individuals of a Pink sea-fan population to die (Readman and Hiscock, 2017).

Water turbidity is a result of material suspended in the water, including sediment, plankton, pollution or other matter washed into the sea from land sources. In coastal environments turbidity levels can rise and fall rapidly as a result of biological (e.g. plankton blooms), physical (e.g. storm events) or human (e.g. coastal development) factors. Prolonged increases in turbidity could affect the ability of the species to feed and respire (Readman and Hiscock, 2017).

Incidental information may be gathered on the Sea-fan anemone (*Amphianthus dohrnii*) species FOI, which occurs in association with Pink sea-fans (the Sea-fan anemone is extremely difficult to observe from video and still images).

1.3 Survey Team

The Whitsand and Looe Bay MCZ survey took place between the 23rd and 25th July 2018. The survey team was a collaboration of marine monitoring specialists from the Environment Agency and Natural England. The coastal survey vessel *Solent Guardian*, staffed and operated by Briggs Marine (Figure 2, Annex 7.1) was used to conduct the survey work.



Figure 2. Coastal survey vessel *Solent Guardian*, operated by Briggs Marine.

2. Survey Design and Methods

2.1 Survey Design and Planning Phase

An MCZ verification survey was undertaken in 2013 within Whitsand and Looe Bay MCZ using 0.1 m² Mini-Hamon Grab and camera (Jenkins and Curtis, 2014). An updated habitat map was produced using existing acoustic data, video and still images and grab data. Video and stills images were taken at 72 groundtruthing stations. Grab sampling for infauna was successful at 23 out of 72 stations, with PSA collected at 36 stations. Pink sea-fans were observed 89 times at 15 groundtruthing locations.

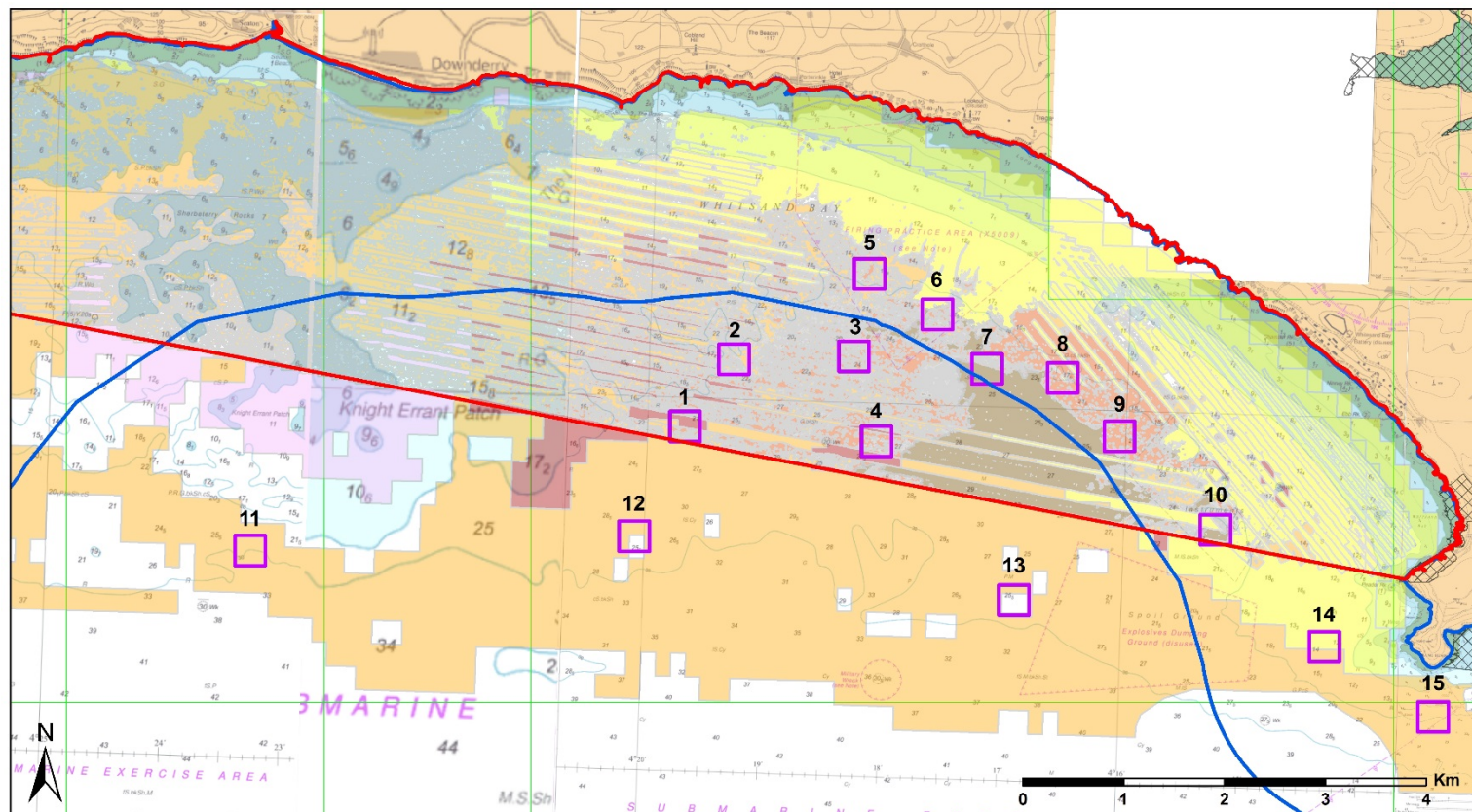
In addition to the 89 records of Pink sea-fans from the verification survey (Jenkins and Curtis, 2014), further records within the MCZ were obtained from the SeaSearch datasets extracted from the National Biodiversity Network Database (NBN, 2018). The SeaSearch dive survey records showed that Pink sea-fans have been frequently recorded in the circalittoral rock habitat within the eastern section of the MCZ. The species has also been recorded outside the MCZ boundary, especially near wrecks.

Fifteen fixed-position, 300 x 300 m survey boxes were selected for the survey:

- **10 boxes** (1-10) were drawn around the historical records of Pink sea-fan within the MCZ boundary, in order to resample areas where Pink sea-fans had been previously recorded to provide temporal monitoring data on this MCZ feature.
- **5 boxes** (11-15) were placed outside the MCZ boundary, with two boxes drawn around historical records (boxes 11 and 15) and the remaining three boxes placed on a suitable habitat as indicated by the Broadscale Habitat map. When resampled in the future, the fixed boxes outside the MCZ boundary will provide an opportunity for a Before-After-Control-Impact (BACI) study.
- No survey boxes were placed around historical Pink sea-fan records that were older than 10 years.

In each sample box, measurements were requested for near-seabed salinity, DO, temperature and turbidity using an Idronaut probe.

Marine specialists from the Environment Agency and Natural England reviewed the plan. The following hazards were identified from the UKHO Admiralty charts: underwater cables, shallow water depths and underwater obstructions. Sampling stations and boxes were relocated to avoid these hazards as far as possible. A 'Notification of an exempt activity form' for 'samples and investigations' was submitted to the Marine Management Organisation prior to the survey being carried out.



Whitsand and Looe Bay MCZ 2018 Survey Plan













- | | | |
|---|--|--|
|  300 m x 300 m survey box | 2013 Interpreted Broadscale Habitat |  A5.1 Sublittoral coarse sediment |
|  Whitsand and Looe Bay MCZ Boundary |  A3.1 High energy infralittoral rock |  A5.2 Sublittoral sand |
|  Water Framework Directive Coastal Water Body Boundary |  A3.3 Low energy infralittoral rock |  A5.3 Sublittoral mud |
|  Special Areas of Conservation (SAC) |  A4.1 High energy circalittoral rock |  A5.4 Sublittoral mixed sediments |
| |  A4.2 Moderate energy circalittoral rock | |

Figure 3. Whitsand and Looe Bay MCZ Summer 2018 survey plan, mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

2.2 Sample Collection Methodology

Drop video camera equipment (Annex 7.2.2 and 7.2.3) was deployed in accordance with the MESH 'recommended operating guidelines (ROG) for underwater video and photographic imaging techniques' (Coggan *et al.*, 2007). The Subsea Technology and Rentals (STR) SeaSpyder camera system was deployed from the stern of the survey vessel, as shown in Figure 4. Real time navigation data acquisition and manual position fixing when the gear contacted the seabed was captured via Trimble® HYDRO*pro*™ software and logged by the survey officer. The mid-point of the vessel's stern gantry was used as the default offset for position fixing (see Annex 7.2.1 for further details). Video files and digital still images were transmitted via the sea cable and saved directly to a computer in the survey cabin. The video footage was annotated with time and position using a GPS (SIMRAD MX512 DGPS) referenced video overlay (uncorrected position data).

The procedure for surveying Pink sea-fans involved completing five randomly distributed video tows within a 300 x 300 m pre-selected survey boxes. The video tows were undertaken across the survey box, with a minimum tow length of 150 m (as per MESH guidance). The video tows did not cross one another. Video was recorded for the duration of the tow, with images taken every 5 seconds. The camera system was towed at a maximum speed of 1.5 knots speed over ground and hovered at a maximum height of 50 cm above the seabed. The drop frame depth was controlled by a winch operator receiving instructions from the survey cabin. For further deployment details please see the 'Pink sea-fan and Fragile sponge and anthozoan communities DC Survey Guidance' in Annex 7.6.

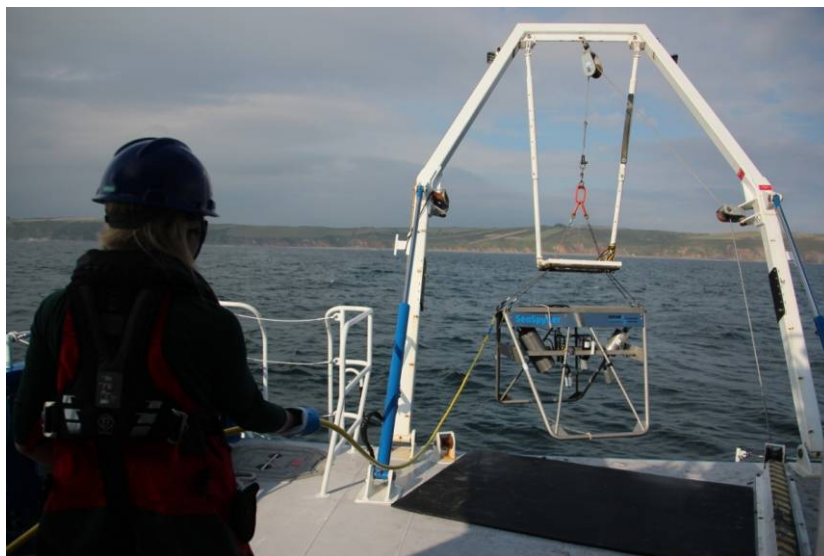


Figure 4. STR SeaSpyder drop camera system being deployed from the stern of the coastal survey vessel.

During each drop camera deployment, a member of the survey team continuously monitored the real-time video feed, recording general station notes, underwater visibility (Annex 7.4), habitat information and fauna observations. See Annex 7.5 for an example of the video logsheet.

3. Survey Narrative

Between the 23rd and 25th July 2018, the Whitsand and Looe Bay MCZ survey took three days 'on-task' days to complete (Table 2). Daily progress reports are available from the Environment Agency on request.

Table 2. Summary of equipment deployments during the 2018 Whitsand and Looe Bay Marine Conservation Zone survey.

Equipment	Dates	Duration
Drop Camera deployments	23 rd to 25 th July 2018	Three days

On Sunday 22nd July, *Solent Guardian* departed Torquay Harbour at 06:00 UTC and arrived alongside at 13:00 UTC in Plymouth Marina ready in preparation for the Whitsand and Looe Bay MCZ survey.

Following a vessel safety briefing for the scientific staff on the morning of the 23rd July, the vessel departed the marina at 05:30 UTC and headed out towards the MCZ survey area. EA personnel were joined by a Marine Lead Advisor from Natural England and a Plymouth University student for the day. With a smooth sea state (0.3 m swell) the vessel arrived on station at 06:15 UTC. Throughout the day, the team captured digital images and video footage at 30 tows (survey boxes 7, 8, 9, 10, 14 and 15) within the Whitsand and Looe Bay MCZ. Camera survey operations ceased at 15:30 UTC and the vessel returned to Plymouth Marina, arriving alongside at 16:00 UTC.

The following morning, with a smooth sea state (0.3 m swell) the vessel arrived on station at 07:00 UTC to discover that the drop camera was not functioning correctly. After discussion with technical assistance the survey team were ready to commence the survey at 10:00 UTC. Throughout the day, the team captured digital images and video footage at 21 tows (survey boxes 2, 3, 5 and 6) within the Whitsand and Looe MCZ. Static fishing gear interrupted the survey at tow 33 (in survey box 6), this tow was aborted and an extra camera tow was completed in the survey box (Figure 5). Plastic debris and rope were observed during tows 34, 35 and 36 (within survey box 6). Camera survey operations ceased at 16:00 UTC and the vessel returned to Plymouth Marina, arriving alongside at 17:00 UTC.

The remaining 25 camera tows (survey boxes 1, 4, 11, 12 and 13) were completed between 06:45 and 12:30 UTC on Wednesday 25th July. Due to a fault with the camera, tow 61 was aborted and an extra camera tow was taken in survey box four (Figure 5). *Solent Guardian* returned to Plymouth Marina at 13:30 UTC. A summary of the samples collected is presented in Section 4 of this report.

4. Data Acquisition

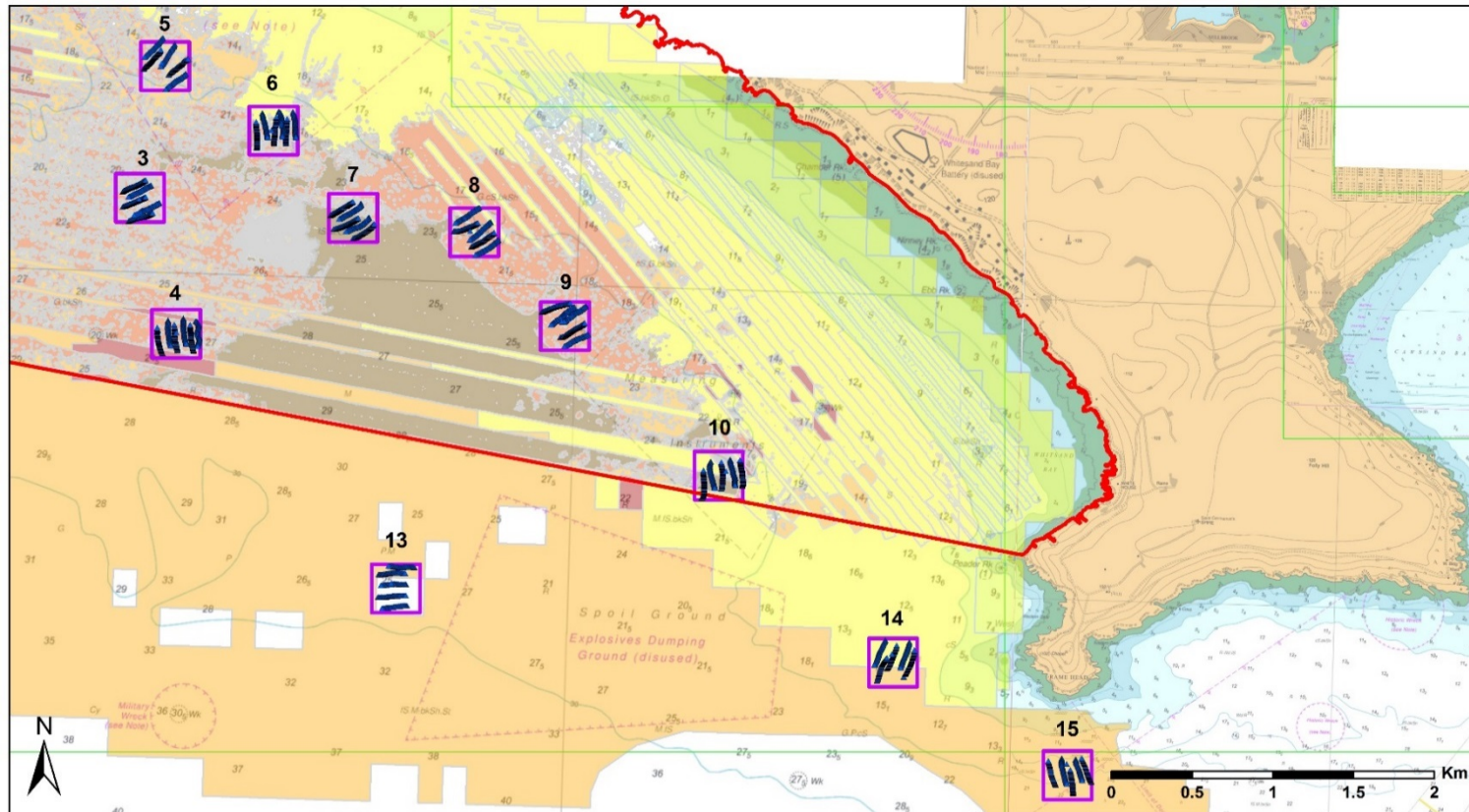
4.1 Sample collection summary

Samples collected during the 2018 Whitsand and Looe Bay MCZ survey are summarised in Table 3.

Table 3. Summary of samples collected during the 2018 Whitsand and Looe Bay Marine Conservation Zone survey.

Equipment	Data Type	No. of samples
Drop Camera	Video and still images	15 x survey boxes surveyed (with 5 tow lengths in each box) 77 videos captured 5948 still images

Video footage and digital still photographs of the seabed were captured to assess the presence, population structure, condition and spatial distribution of Pink sea-fans along 50 tow lengths within the Whitsand and Looe Bay MCZ boundary and 25 tow lengths outside of the MCZ boundary (Figure 5 and 6). EUNIS Level 3 BSH classifications and species identifications will be assigned to each tow following detailed independent analysis of the usable video footage and stills.



Whitsand and Looe Bay MCZ 2018 Survey Results - East

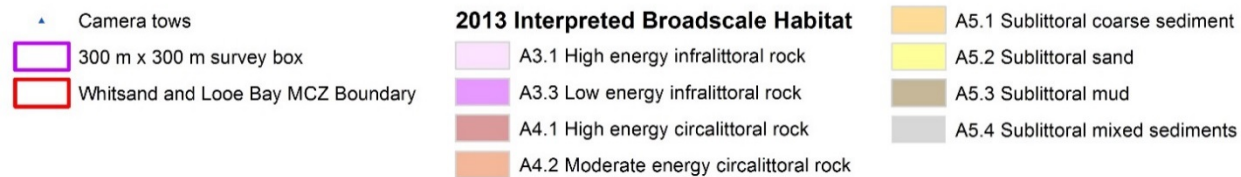
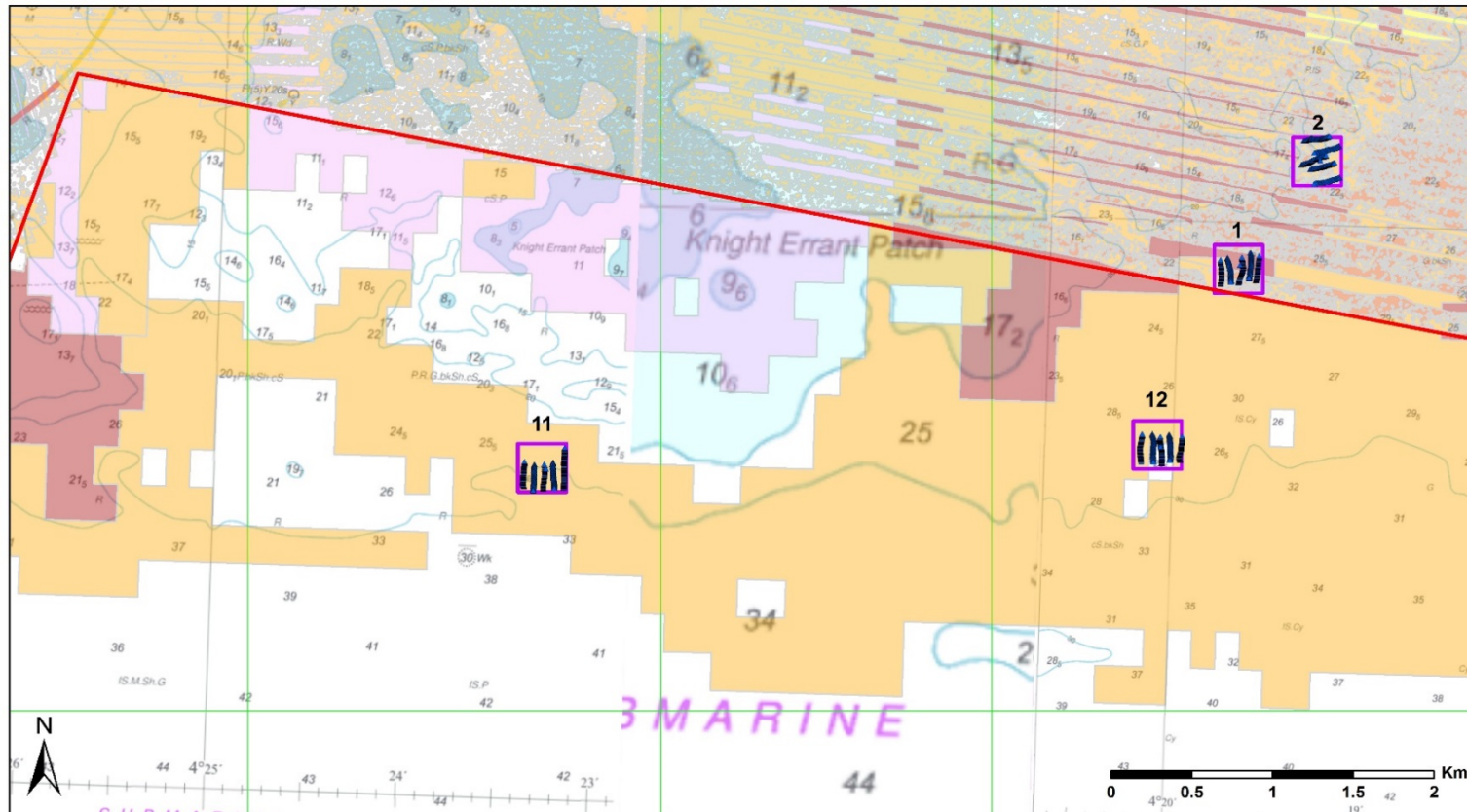


Figure 5. Drop Camera (DC) data acquired during the Whitsand and Looe Bay MCZ Summer 2018 survey (East), mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).



Whitsand and Looe Bay MCZ 2018 Survey Results - West

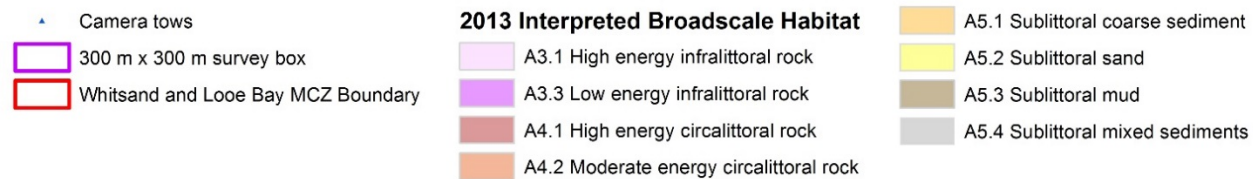


Figure 6. Drop Camera (DC) data acquired during the Whitsand and Looe Bay MCZ Summer 2018 survey (West), mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

4.2 Evidence of anthropogenic activities

Static fishing gear was spotted in survey box 15 at tows 2, 3 and 4, but the vessel was manoeuvred to avoid them. However, the camera caught on a pot line in survey box 6 (tow 3) so the camera was recovered and disentangled. The vessel was relocated by approximately 100 m to avoid a similar incident with the gear. On tow 4 at survey box 6 plastic litter was observed.

5. References

Coggan, R., Mitchell, A., White, J. and Golding, N. (2007) Recommended operating guidelines (ROG) for underwater video and photographic imaging techniques. Mapping European Seabed Habitats (MESH) video working group report v.11.2 [Online]. Available from: http://www.emodnet-seabedhabitats.eu/PDF/GMHM3_Video_ROG.pdf [Accessed 08/11/2018].

Jenkins, C. and Curtis, M. (2014). Whitsand and Looe Bay MCZ Summary Site Report: Centre for Environment, Fisheries and Aquaculture Sciences (Cefas).

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Readman, J. A. J. and Hiscock, K. (2017). Eunicella verrucosa Pink sea fan. In Tyler-Walters H. and Hiscock K. (eds) Marine Life Information Network: Biology and Sensitivity Key Information Reviews. Plymouth: Marine Biological Association of the United Kingdom. [Online]. Available from: <https://www.marlin.ac.uk/species/detail/1121> [Accessed 13/09/2019].

6. General List of Abbreviations

BSH	Broadscale Habitat
Cefas	Centre for Environment, Fisheries and Aquaculture Science
CHP	Civil Hydrography Programme
CS	Camera Sledge
CSV	Coastal Survey Vessel
DC	Drop Video Camera
Defra	Department for Environment, Food and Rural Affairs
DG	Day Grab
EA	Environment Agency
ECMAS	Estuarine and Coastal Monitoring and Assessment Service
ENG	Ecological Network Guidance
EUNIS	European Nature Information System
FOCI	Features Of Conservation Importance
IFCA	Inshore Fisheries and Conservation Authority
MCZ	Marine Conservation Zone
MESH	Mapping European Seabed Habitats
PSA	Particle Size Analysis
REC	Regional Environmental Characterisation
RSG	Regional Stakeholder Group
SAC	Special Area of Conservation
SAD	Site Assessment Document
SNCB	Statutory Nature Conservation Body
SOP	Standard Operating Procedure
SPA	Special Protection Area
SSSI	Site of Special Scientific Interest
STR	Subsea Technology and Rentals
UTC	Coordinated Universal Time

7. Annexes

7.1 Coastal Survey Vessel General Information



Briggs Marine and Environmental Services Ltd.
 Seaforth House, Seaforth Place, Burtisland, Fife, KY3 9AX.
 Tel: +44(0)1592 872939
 Email: marketing@briggsmarine.com
 Website: www.briggsmarine.com



Solent Guardian

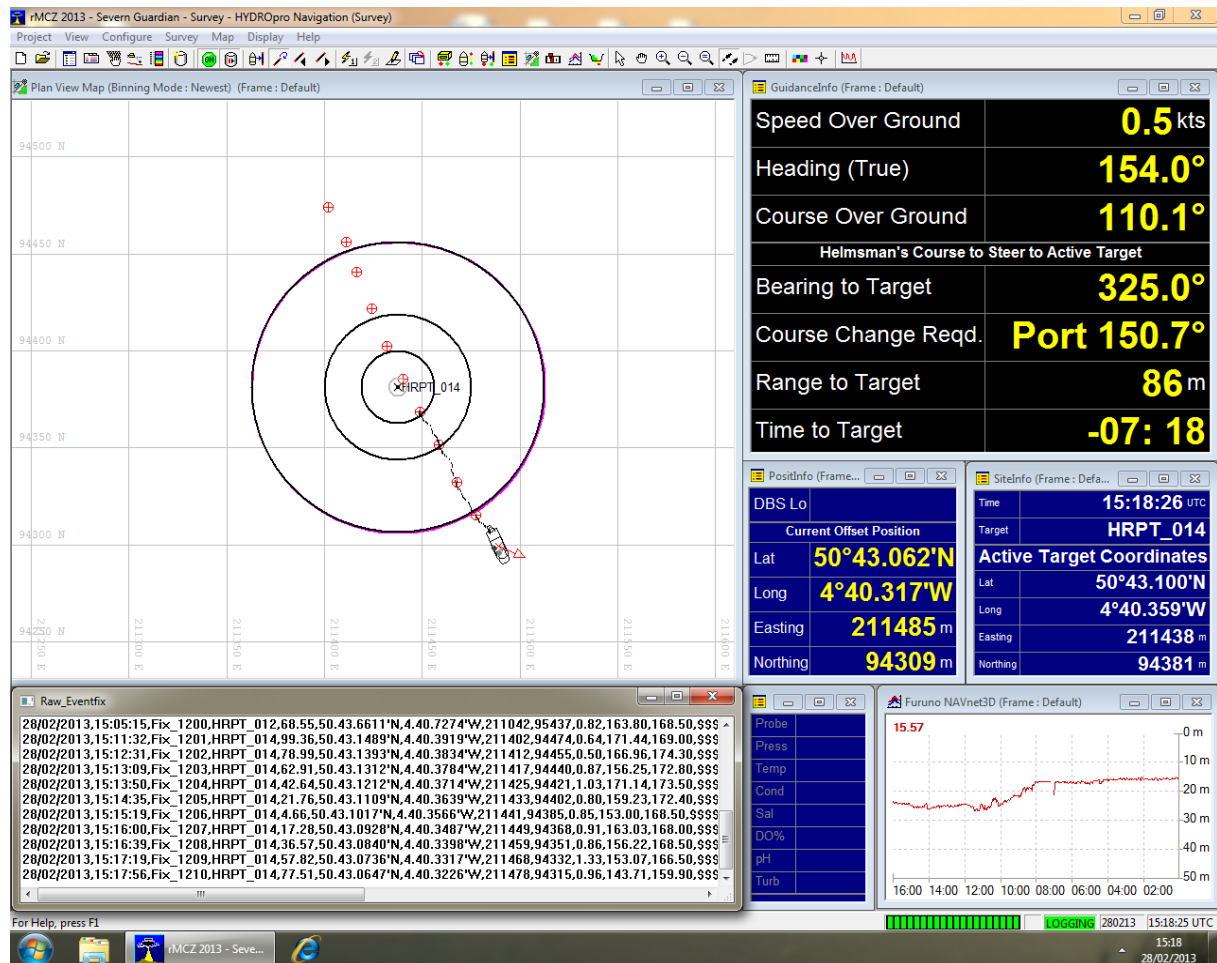
General Information
Length: 18.3 m
Beam: 6.3 m
Draft (baseline): 1.15 m
Draught (skegs): 2.2 m
Displacement (light ship): 22 T
Displacement (full load): 30 T
Service Speed: 16 knots
Maximum Speed: 18 knots

Main Equipment
Main Engines: 2 x Volvo D9-MH 261 bkW @ 2200 rpm. Twin Disc MGX-5075 integral vee-drive
Crew: 7
Scientific Officers: Up to 10
Accommodation: 3 x twin cabins and mess
Data network to share information around vessel
Wet lab/bench for processing water, sediment and ecology samples
Fridge/freezer for sample storage
Dry lab space for two computers and data processing
Large aft deck working area
A frame – 2 T SWL
Double Independent Drum Trawl Winch – 2 T SWL
Hydraulic crane

7.2 Survey Equipment

7.2.1 Navigation and Positioning

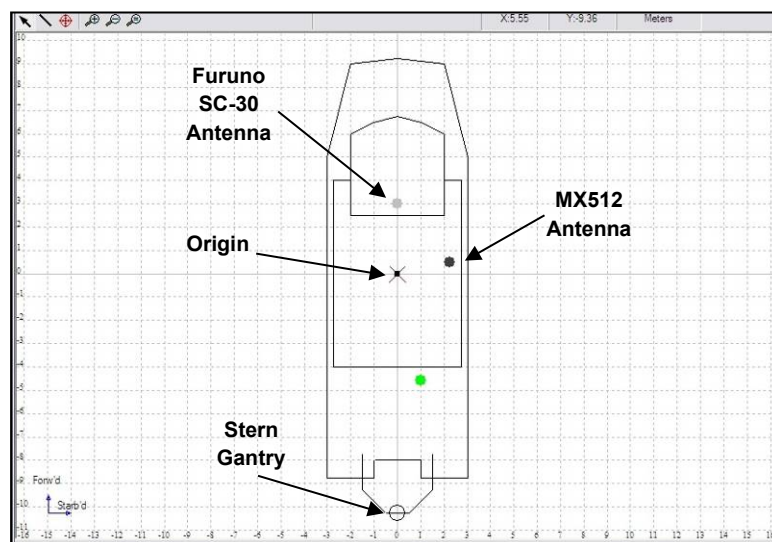
Trimble® HYDROpro™ software is utilised for real-time navigation and survey data acquisition.



Trimble® HYDROpro™ software screen grab displaying real-time navigation and survey data acquisition for a MCZ drop camera survey line.

Navigational and survey equipment offsets on the Coastal Survey Vessel *Solent Guardian* (Environment Agency Estuarine and Coastal Monitoring and Assessment Service).

NMEA Device	Make/Model	Offset Name	Offset (m)		
			X (Starb'd)	Y (Forw'd)	Z +ve (Up)
Gyrocompass	Simrad Robertson RGC50	n/a	-	-	-
Navigation Echosounder	Furuno DFF1, 525ST-MSD transducer	n/a	-	-	-
Survey Echosounder	Kongsberg EA400	n/a	-	-	-
Origin	n/a	Origin	0.0	0.0	0.0
Navigation GPS (Secondary)	Furuno SC-30 DGPS	Furuno SC-30 Antenna	0.0	3.0	0.0
Survey GPS (Primary)	SIMRAD MX512 DGPS	MX512 Antenna	2.25	0.5	0.0
n/a	n/a	Sediment Grab (Stern Gantry)	0.0	-10.25	0.0



Trimble® HYDROpro™ vessel editor screen showing survey equipment offsets from the origin (Environment Agency Estuarine and Coastal Monitoring and Assessment Service).

7.2.2 SeaSpyder Drop Camera System



SEASPYDER DROP CAMERA SYSTEM



The SeaSpyder Underwater Drop Camera System is part of a family of field proven camera systems manufactured by STR for the marine survey and environmental communities. The SeaSpyder is ideally suited for operation in shallow-medium water depths with the standard system having a working depth range of 500m. For applications demanding a deeper rating, a "telemetry" model is offered which operates over longer cable lengths for operation down to 1000m. Both models are fitted with a new generation digital SLR Camera offering high resolution digital stills and HD Video for the highest imagery detail. The high specification digital SLR Camera offers an impressive 18.0 mega pixels resolution and both manual and automatic focus for achieving the sharpest images. The captured digital stills are framed with the aid of dedicated real-time video and can be transferred to the topside 'on the fly' for rapid online review.

A 19" rack mount Surface Control Unit and powerful topside processor give full remote control of the camera via the easy to use SeaView GUI software. As standard, the purpose designed camera deployment frame is fitted with a subsea electronics and camera housing, high power underwater flash, an array of four high intensity LED lamps and dual scaling laser pointers to provide accurate imagery scaling. There is the option to install additional sensors with the availability of three user defined serial interfaces with optional power.

SYSTEM FEATURES

- Latest generation 18 Mega Pixels Digital SLR Camera
- Full remote control of camera functions including automatic and manual focus control
- 'On-the-fly' image download
- Real time HD Video
- High Intensity LED Lamps
- Dual lasers for precise Imagery scaling
- High speed digital telemetry link to camera and sensors
- Additional user defined RS232 ports and 24VDC power interfaces

SEASPYDER SHALLOW WATER CAMERA SYSTEM

SEASPYDER RACK MOUNT PROCESSOR

Hardware:	Standard 19" Rack Mountable
Processor:	Intel i5 3.1GHz Quad-Core
Memory:	4GB DDR3 RAM
Storage:	500GB hard drive
Interface:	DVD-RW, 2 x 1 GigE, 6 x USB, 4 x RS232
Display:	2 x 22" LED HDMI Monitor
Power:	110/240 VAC, 50 Hz (900W)
Dimensions:	19" 3U rack mountable 550 mm (L) x 485 mm (W) x 132mm (H)

SEASPYDER SEAVIEW SOFTWARE

Key Features:

- Remote control of SeaSpyder Digital Stills Camera
- Digital stills and video capture
- "On-the-fly" Image download
- External overlay functions
- Realtime composite video
- HD video capture
- Remote control of lights, scaling lasers and additional sensors

SEASPYDER SURFACE CONTROL UNIT

ELECTRICAL

Power Input:	85 - 264 VAC (47 - 63 Hz) ≈ 500 W max
Cable Power:	+/- 48VDC Nominal (≈ 400W max.) with built in electrical leakage detector

SIGNAL INTERFACE

Cable Interface #1:	High bandwidth VDSL2
Cable Interface #2:	Differential Colour Composite Video with automatic cable length compensation

MECHANICAL

Dimensions:	19" 2U rack mountable 550 mm (L) 485 mm (W), 88 mm (H)
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SEASPYDER SUBSEA ELECTRONICS

ELECTRICAL

Power Output:	24VDC Output (200 W Max Subsea Power)
Interface:	1 x SeaSpyder Camera & Underwater Flash 4 x 24VDC LED Lamps 2 x RS232 Ports with 24VDC 1 x RS232 Port with 12 VDC/ 24VDC 1 x Dual Scaling Lasers

MECHANICAL

Diameter:	200mm
Length:	409mm
Standard Housing:	Hard Anodised Aluminium
Depth Rating:	500m

SEASPYDER 18 MEGA PIXELS UNDERWATER DIGITAL STILLS CAMERA

ELECTRICAL

Image Size:	JPEG (720 x 480) to (5184 x 3456)
Image Size:	RAW (5184 x 3456)
Video:	Full HD (1920 x 1080)
ISO Sensitivity:	Auto (100 - 6400), 100 - 12800
Sensor Type:	22.3 x 14.9mm CMOS
Aspect Ratio:	3:2
Shutter Speed:	30 - 1/4000 Sec
Interface:	Ethernet

OPTICAL

Standard Lens:	10 - 24mm
Macro Mode:	F/3.5 - 4.5
Zoom:	Fixed
Focus:	Manual & Automatic mode
Angle of View:	≈65° In water
Vertical View:	≈1m ² @ 80cm In water

SEASPYDER COLOUR VIDEO CAMERA

ELECTRICAL

Image Resolution:	600 TV Lines
Video Format:	PAL Composite Colour Video
Sensitivity:	0.01 Lux
Sensor Type:	1/3 Sony Super HAD CCD
Frame Rate:	50 FPS
Video Output:	≈1.3Vpp Into 75Ω

OPTICAL

Lens Type:	3.6 mm Wide Angle
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SEASPYDER HIGH POWER CAMERA FLASH

ELECTRICAL

Control:	TTL control via digital stills camera
Power Input:	Power supply via stills camera

MECHANICAL

Diameter:	150mm
Length:	230mm
Weight in Air:	7.6kg
Weight in Water:	3.54kg
Standard Housing:	Hard Anodised Aluminium
Depth Rating:	3000 m

SEASPYDER 20W LED LIGHT

ELECTRICAL

Lighting:	LED Lamp
Luminous Flux:	1500Lm
Wavelength:	Neutral White
Power Input:	24 VDC @ 1.1 A (Built in thermal protection)

MECHANICAL

Diameter:	70mm
Length:	110mm
Weight in Air:	1kg
Weight in Water:	0.58kg
Standard Housing:	Hard Anodised Aluminium
Depth Rating:	3000m

SEASPYDER DUAL SCALING SUBSEA LASERS

ELECTRICAL

Power Input:	8 V - 30VDC; 60 m A @ 24VDC
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LASER

Type:	2 X Class II Safety Classification (<1 milliwatt output)
Beam Shape:	Elliptical (Approx 6 mm Red Dot output)
Beam Divergence:	- 0.75mrad
Wavelength:	650nm
Temperature Range:	-10°C to 40°C

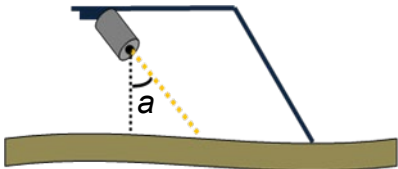
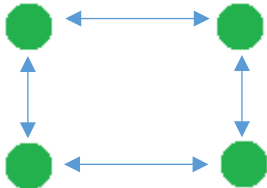
SEASPYDER DROP CAMERA FRAME

MECHANICAL

Length:	2.21m
Width:	1.43m
Height:	1.40m
Weight in Air:	125kg (Inc sensors)

7.2.3 Camera Setup

Underwater Camera Equipment Configuration Record

Survey	
Scientists on board	Richard Pritchard
Date	23/24/25 July 2018
Manufacturer and Model	STR SeaSpyder
Survey Vessel	Solent Guardian
Separate video/stills camera	
Approximate video/stills camera line of sight angle (a)	45
	
Distance of video/stills camera above seabed	60cm
Flash unit angle relative to the seabed (approx.)	45
Number of lights (dimnable?)	4 - No
Distance between horizontal and vertical vertices of FOV scaling laser points	 <p style="text-align: center;"> O 23cm O FIN----20cm 19cm O 22.5cm O </p>
Comments	
Camera settings	
Date and Time	21 July 2018 06:00
Image quality	Large Normal
Flash setup	Auto
Shutter speed	1/80
Aperture size	F7.1
ISO setting	AUTO
White balance	AWB
Light metering mode	
Focus	Auto

7.3 EA underwater video procedure_version 2.5 (STR Systems)

The procedure outlined below has developed through a series of discussions involving the Environment Agency, Cefas and Natural England. Due to the heterogeneous nature of the inshore coastal seabed habitat, strong tidal streams, various underwater hazards and no dynamic positioning system, a flexible approach is recommended for the underwater video camera deployment. The procedure must be used in accordance with the MESH 'recommended operating guidelines (ROG) for underwater video and photographic imaging techniques' (Coggan et al., 2007).

Important points to remember:

- Select stern gantry offset in *HYDRopro*
- Synchronise all survey equipment (camera, laptops, etc.) with primary survey GPS time (UTC).
- Ensure the correct date, station code, STN number, time and position are displayed on the video overlay and clapperboard (if used).

Overlay Example:

EA ECMAS_2018-0622

KNMR_GT017_STN_33_A1 (annotate if station has been attempted on a previous occasion)

UTC: 083912 (real time feed from survey GPS)

Lat: 5043.1189N (real time feed from survey GPS – **uncorrected**)

Lon: 00025.7294W (real time feed from survey GPS – **uncorrected**)



Clapperboard Example:

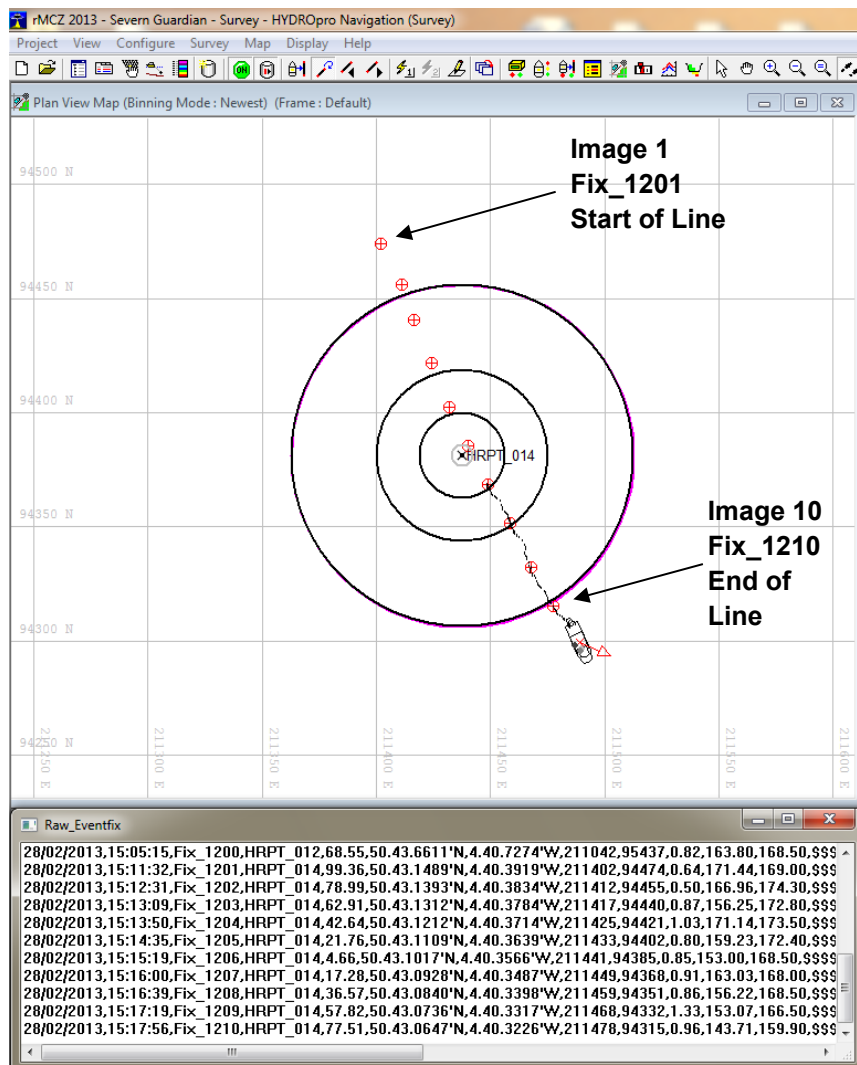


- Alter the stills prefix to the correct station code.



- The field of view scale bar/laser points should be set up/calibrated prior to the survey commencing. Laser pointers are ineffective in moderate/poor visibility conditions; a rope with a visible scale will be required as a replacement
- Set the image resolution to Large Normal (14.7 Mega Pixels, 18 sec upload time)
- Check the camera settings are appropriate for the conditions; the LED lights are on if required and ensure the video is recording throughout the deployment.
- If a Broadscale Habitat (BSH) boundary is detected extend the deployment to gather as much information on habitat extent as possible.
- Take extra stills if habitat/species FOCI are observed – note these in the survey log.
- If possible, work a downhill seabed profile to avoid slack cable during deployment.
- Beware of sudden depth changes when surveying rocky areas.
- Abandon the station if survey conditions are hazardous.

Video Camera Type	Survey Conditions	Deployment
Drop Down	Good visibility SOG <1.5 knots	*Deploy camera initially working across the HYDROpro 75 m radius target area, as shown in the diagram below. Hover/rest camera above/on the seabed; take a still every 15 m. If tide/wind conditions do not allow a survey line to be followed across the bull ring, use the outer circle as a guide to ensure a distance of 150 m is covered (minimum) nearby.
	Poor visibility SOG >1.5 knots	Hover/rest camera above/on the seabed, take a still every 15 m. If the visibility is very poor, retrieve the equipment after taking 3-4 stills.



7.4 Underwater Visibility Scale

Example image	Scale	Definition
	Excellent	clear, sharp images - no suspended particulate matter
	Good	seabed features and epifauna clearly discernible
	Moderate	seabed features discernible - epifauna difficult to discern
	Poor	both seabed features and epifauna difficult to discern, low confidence in preliminary habitat assessment
	Very Poor	no seabed features or epifauna visible

7.5 MCZ Video logsheet

MCZ Video Logsheet (v1)



Station data

Contract Code: C5433 Vessel: Solent Guardian Date: 09/04/2016

MCZ Name: Mounts Bay Station Code: MNTB071

Nav-Log filename: SW 2016-0409 SL_log Sampling Gear: DC Water Depth: 10.5 m

Cable Out: _____ (metres). Speed Over Ground (SOG): 1.0 (knots)

Notes on Station: _____ Position Reference Point: Stern gantry
(including any times & adjustments to Cable Out)

Sample data

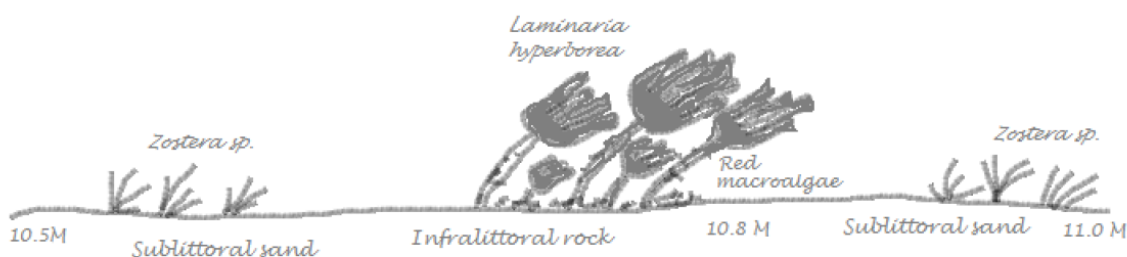
Digital Video Tape label: n/a

Filename on Hard-Drive: MNTB 2GDK70416 GT071 STN 1 A1 153751

No. of camera stills: 14 Stills folder name: GT071 STN 1

	GPS Time hh:mm		Fix No	Position in Lat/Long (WGS84)	DV tape counter	
	Mins	Secs			Mins	Secs
Start of Video (SOV)	15	40	3862	50° 06.3266' N; 5° 32.2924' W	n/a	n/a
End of Video (EOV)	15	45	3875	50° 06.3893' N; 5° 32.2093' W	n/a	n/a

Visual / Video notes: (ground-type, terrain, visibility, species, FOCI, sketch of transect)



Broad-scale habitats observed

Infralittoral Rock	Circalittoral Rock	Sediment habitats	Others
high energy	high energy	subtidal mixed	macrophyte
mod.energy	mod.energy	subtidal coarse	dominated sed's
low energy	low energy	subtidal mud	biogenic reef
		subtidal sand	deep-sea bed

Completed by: K. Arnold

Checked by: N. Godsell

Entered by: K. Arnold

7.6 Pink sea-fan (*Eunicella verrucosa*) and Fragile sponge and anthozoan communities DC Survey Guidance

The procedure outlined below has been developed through a series of discussions involving the Environment Agency, Cefas and Natural England. Due to the heterogeneous nature of the inshore coastal seabed habitat, strong tidal streams, various underwater hazards and lack of dynamic positioning system, a flexible approach is recommended.

The following guidance should be adhered to when undertaking monitoring of these features using the survey box method **only**.

Before Survey

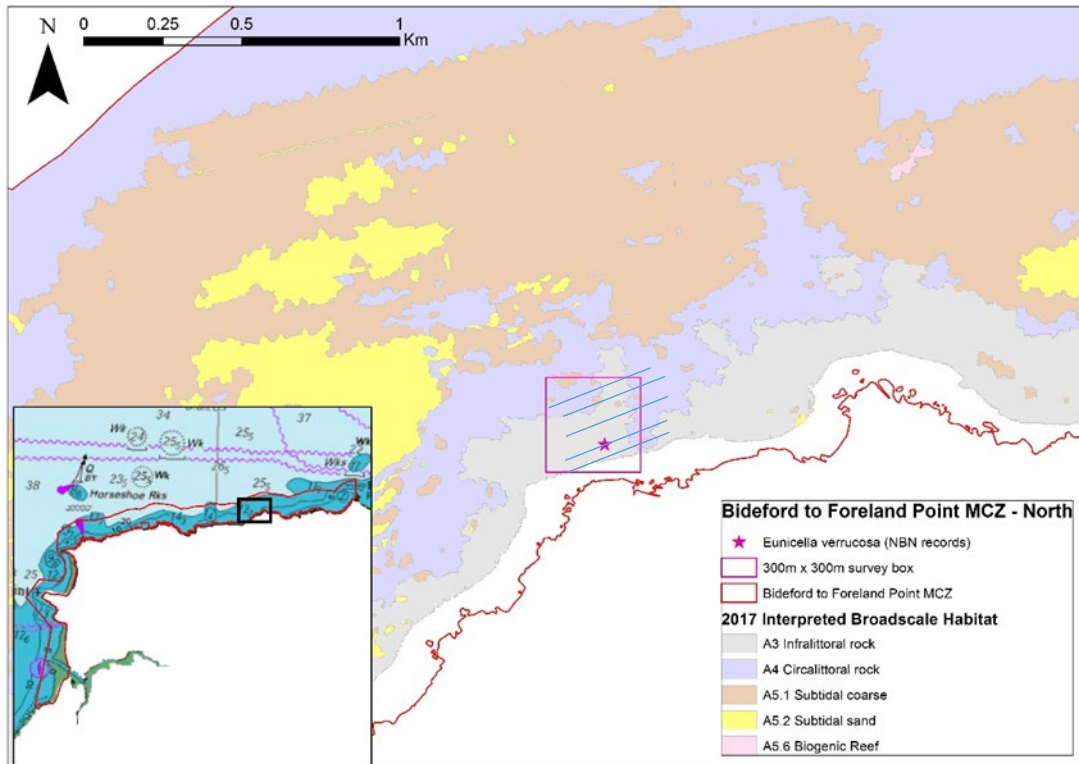
- 300 x 300 m survey boxes have been selected based on historical Pink sea-fan and Fragile sponge and anthozoan community records. The co-ordinates of the four corners of these boxes will be provided to you prior to the start of survey.
- No co-ordinates for the camera tows have been provided prior to the survey, as the tow direction and location will depend on conditions at sea. Survey box co-ordinates should be uploaded to your navigation system (e.g. HYDROpro) to aid camera tow placement.
- Deployment of the video/stills camera (including stills camera mounted on video frame) will comply with guidance developed by MESH: 'Recommended operating guidelines (ROG) for underwater video and photographic imaging techniques' (<http://webarchive.nationalarchives.gov.uk/20101014084033/http://www.searchmesh.net/Default.aspx?page=1739> and http://webarchive.nationalarchives.gov.uk/20101014084849/http://www.searchmesh.net/PDF/GMHM3_Video_ROG.pdf).
- Four (two pairs of) green scaling lasers should be used and the distance between each point measured before the survey. These details should be recorded on the 'camera equipment configuration' sheet.
- Deployment of the camera system and set up should also comply with EA underwater video procedure_version 2.4 (STR Systems).
- For the purposes of MCZ naming conventions, each survey box is considered a station (GT number) and each tow a replicate (STN number). Therefore one station should have 5 camera tow replicates. Follow Cefas guidance 'MPA work – File naming convention – all sample types. Version 2.1 (11 Jan 2013)'.

E.g. CBSL_2GDK70718_GT008_STN_038

Box number Tow number

During Survey

- 5 x randomly distributed video tows should be undertaken across the survey box, with a minimum tow length of 150 m (as per standard tow length) (see example below). Ideally, video tows should not cross each other.



- Position of MCZ features, human activities (e.g. fishing gear) or damage (e.g. broken Pink sea-fans) should be noted on the survey log and locations also recorded using the navigation software (HYDROpro 'fix').
- The SeaSpyder camera should hover just above the seabed at a maximum height of 50 cm. The system should be towed at approximately 1 knot or less, up to maximum 1.5 knots speed over ground (SOG). The camera system should be deployed with the tail fin, buoy and line to facilitate towing.

The video/stills data are used for counts of colonies/individuals of Pink sea-fan and Fragile sponges so the slower and more stable the tow, the better the data quality.

- The video should be recording for the entire tow.

- Still images should also be taken every 5 seconds during the tow.
- One Idronaut reading for near seabed turbidity, O₂, temperature and salinity should be taken within each survey box. Take care with deployment due to the presence of rocky reef and follow EA Idronaut deployment procedure. Contact your Team Leader if unsure on the correct Idronaut procedure.
- Good visibility is vital for video/still analysis. Do not undertake the survey if visibility is less than 'moderate'

7.7 Video Survey Metadata

Please access the attached spreadsheet by clicking the paper clip icon.

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