Natural England Commissioned Report NECR300

Chesil Beach and Stennis Ledges MCZ 2018 Survey Report

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NATURAL ENGLAND

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 Chesil Beach and Stennis Ledges MCZ.

This report should be cited as:

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Natural England Project Manager – Mike Fraser, Senior Specialist
Mike.Fraser@naturalengland.org.uk

Contractor - Ed Stevens, Katie Pryor and Clare Miller, Environment Agency

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Further information
This report can be downloaded from the Natural England Access to Evidence Catalogue: **http://publications.naturalengland.org.uk/** . For information on Natural England publications contact the Natural England Enquiry Service on 0300 060 3900 or e-mail **enquiries@naturalengland.org.uk**.

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Chesil Beach and Stennis Ledges MCZ

2018 Survey Report

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Chesil Beach and Stennis Ledges MCZ 2018 Survey Report

Project Code: MB0129

Authors: E. Stevens, K. Pryor and C. Miller

Produced by:

Environment Agency
Estuarine and Coastal Monitoring and Assessment Service
Kingfisher House
Orton Goldhay
Peterborough
Cambridgeshire
PE2 5ZR

Email: enquiries@environment-agency.gov.uk
Website: www.gov.uk/environment-agency

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B. Green	Natural England/Environment Agency Marine Technical Specialist
M. Marsh	Natural England Marine Ecological Specialist
C. Miller	Natural England/Environment Agency Marine Technical Specialist
S. Pengelly	Southern Inshore Fisheries and Conservation Authority (SIFCA) Inshore Fisheries and Conservation Officer

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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 Chesil Beach and Stennis Ledges MCZ was formally designated on the 21st November 2013[1]. The site was created to protect 'A1.1 High energy intertidal rock', 'A2.1 Intertidal coarse sediment', the Native oyster (*Ostrea edulis*) and Pink Sea-Fan (*Eunicella verrucosa*). 'A3.1 High energy infralittoral rock' was designated as an additional feature in January 2016, to protect the habitat upon which the Pink Sea-Fan normally resides. 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 sites 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. The results from the condition assessment will inform future monitoring planning and management of the site.

*inshore Statutory Nature Conservation Body

1.1 Site Description

The Chesil Beach and Stennis Ledges MCZ is an inshore site located off the Dorset coast (Figure 1). It runs along the section of Chesil Beach from Abbotsbury, to Weston on the Isle of Portland in the south-east. The site covers an area of approximately 37 km^2 and extends seawards to include the reefs of the Stennis Ledges, an area of rocky ridges and rugged seabed.

The site offers specific protection for the Pink Sea-Fan, a slow-growing soft coral which attaches to rocky reefs or other hard substrates (Natural England, 2013). Sea-Fan Anemones (*Amphianthus dohrnii*) which live on the delicate branches of Pink Sea-

[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.

Fans are consequently afforded the same protection. Both species are extremely vulnerable to physical disturbance.

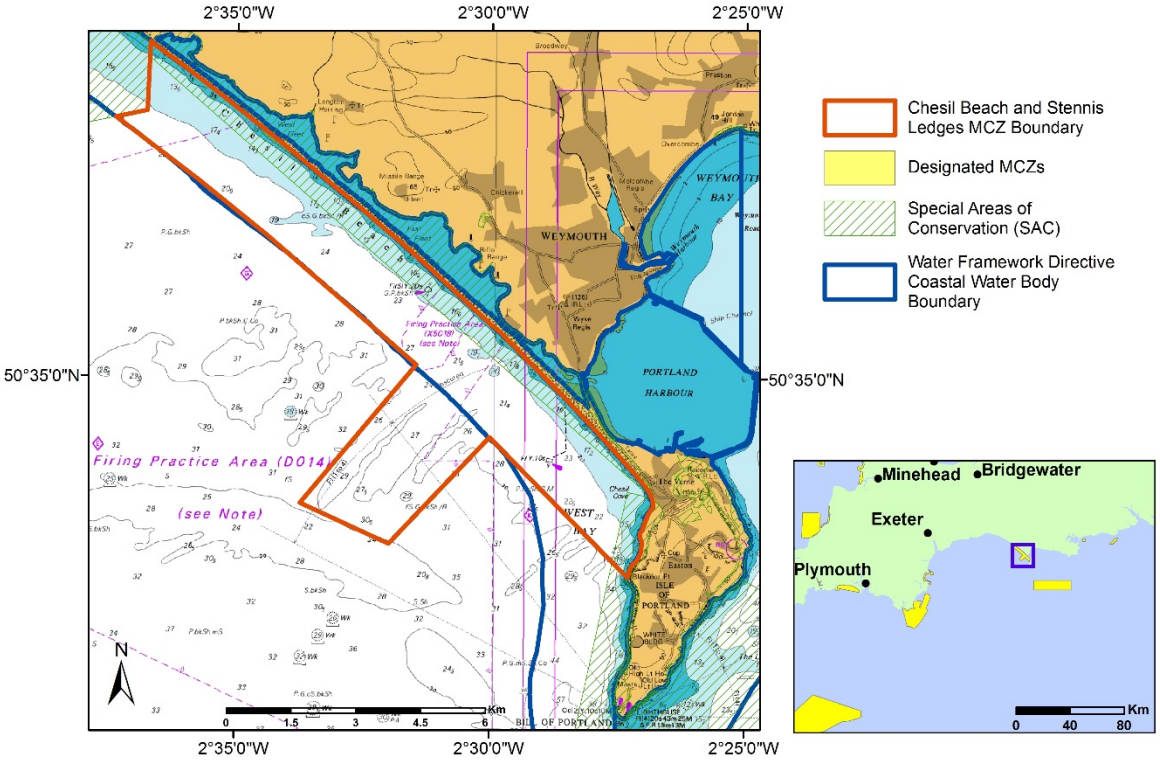

Figure 1. Location of the Chesil Beach and Stennis Ledges Marine Conservation Zone (MCZ) in the context of other MCZs southwest of the English coast.

The Features of Conservation Importance (FOCI) protected under the MCZ designation order are presented in Table 1 alongside the general management approach. The survey described here focused on those features indicated by grey shading (Table 1).

There are three areas of the MCZ currently closed to bottom-towed fishing gear (Bottom Towed Fishing Gear byelaw 2016), focusing on areas of supporting reef habitat for Pink Sea-Fans (Figure 3 and further details below). There is also the Fishing Under Mechanical Power Closed Area byelaw which prohibits trawling activity in a set time period in a designated area in the west of the MCZ. Further details of Southern Inshore Fisheries and Conservation Authority's (SIFCA) byelaws can be found at http://www.southern-ifca.gov.uk/byelaws .

1. The eastern 'Portland' closure covers approximately 2.6 km^2 of rock outcrops in the Chesil Cove area of the site and extends east to the site boundary. This

closed area continues round Portland Bill, covering most of the Portland area of the Studland to Portland SAC.

2. The central ‘Stennis Ledges’ closure covers approximately 11.3 km^2, almost the entire Stennis Ledges circalittoral rock area of the MCZ up to the site boundary.

3. The western ‘Lyme Bay East’ closure covers approximately 2.28 km^2 in eastern Lyme Bay of rock outcrops and mixed sediment.

In addition, the western boundary of the site adjoins the Lyme Bay and Torbay SAC, which also has a large area closed to bottom-towed fishing gear adjacent to the MCZ boundary.

Table 1. Designation status and the current General Management Approach (GMA) for the features of conservation importance present in the Chesil Beach and Stennis Ledges Marine Conservation Zone. The survey described here focuses on those features indicated by grey shading.

	Features Present	Designated	GMA
Broadscale Habitat (BSH)	High energy infralittoral rock	✓	Maintain
	Intertidal coarse sediment	✓	Maintain
	High energy intertidal rock	✓	Maintain
Species Feature of Conservation Importance	Pink Sea-Fan *(Eunicella verrucosa)*	✓	Recover
	Native Oyster (*Ostrea edulis*)	✓	Recover

1.2 Survey Aim and Objectives

To undertake a survey of Chesil Beach and Stennis Ledges 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 1: Collect data to investigate the population structure of the MCZ feature (Table 1.)

A survey focussing on the Pink Sea-Fan feature only 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 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*), which occurs in association with the Pink Sea-Fan (the Sea-Fan Anemone is extremely difficult to observe from video and still images).

1.3 Survey Team

The Chesil Beach and Stennis Ledges MCZ survey took place between the 16th and 21st July 2018. The survey team comprised of 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 reported here.

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 using 0.1 m^2 Mini-Hamon grab and camera within the Chesil Beach and Stennis Ledges MCZ. Thirty stations yielded valid video data. Grab sampling for infauna was successful at 25 stations, with Particle Size Analysis (PSA) samples collected at 32 stations. A BSH map was creating using existing acoustic data collected by the Maritime and Coastguard Agency (MCA) (Godsell, 2014; Rance & Barrio-Frojan, 2015). Pink Sea-Fans were observed at two stations during the survey. These data were used to aid the design of the 2018 survey.

In addition to the two records of Pink Sea-Fans from the verification survey (Rance & Barrio-Frojan, 2015), most records within the MCZ were from SeaSearch datasets extracted from the National Biodiversity Network database (NBN, 2018). SeaSearch dive surveys showed that Pink Sea-Fans have been recorded previously throughout the site, including several areas on the Stennis Ledges and in the west of the site in Lyme Bay. Records of Pink Sea-Fans older than 10 years, or those found at wreck sites were disregarded from the site selection process.

There was little information available on the presence of Pink Sea-Fans outside of the MCZ, so a full Before-After-Control-Impact (BACI) design was not possible for this feature. However, a BACI design survey of limited sample boxes was attempted. Four boxes were positioned outside the MCZ in areas predicted to be rock (after consulting the Dorset Integrated Seabed Study (DORIS) bathymetry data) and in areas known to be fished, following advice from the Southern Inshore Fisheries Conservation Authority (SIFCA). SIFCA closed areas and historical Pink Sea-Fan records from the National Biodiversity Network (NBN) have been used to inform the survey planning process.

15 fixed-position, 300 x 300 m sample boxes were selected for the survey (Figure 3):

- One box (1) was positioned inside the MCZ based on SeaSearch records, but outside of any areas closed to bottom-towed fishing gear.
- Two boxes (2 and 3) were positioned inside the MCZ to resample areas where Pink Sea-Fans had been recorded in the 2013 verification survey, both boxes were inside the Lyme Bay East areas closed to bottom-towed fishing gear.
- Five boxes (4 – 9) were positioned inside the MCZ based on SeaSearch records, in the Stennis Ledges area closed to bottom-towed fishing gear.

- Two boxes (eight and 10) were positioned in areas closed to bottom-towed fishing gear (Stennis Ledges and Chesil Cove), in areas of rock where Pink Sea-Fans had not been previously recorded, to observe potential recovery following a period of closure.
- One box (11) was positioned inside the MCZ based on SeaSearch records, in the Portland area closed to bottom-towed fishing gear.
- Four boxes (12 – 15) were positioned based on SeaSearch records. All were positioned outside of the MCZ boundary and outside of areas closed to bottom-towed fishing gear. These contribute to the limited Before-After-Control-Impact (BACI) design.

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.

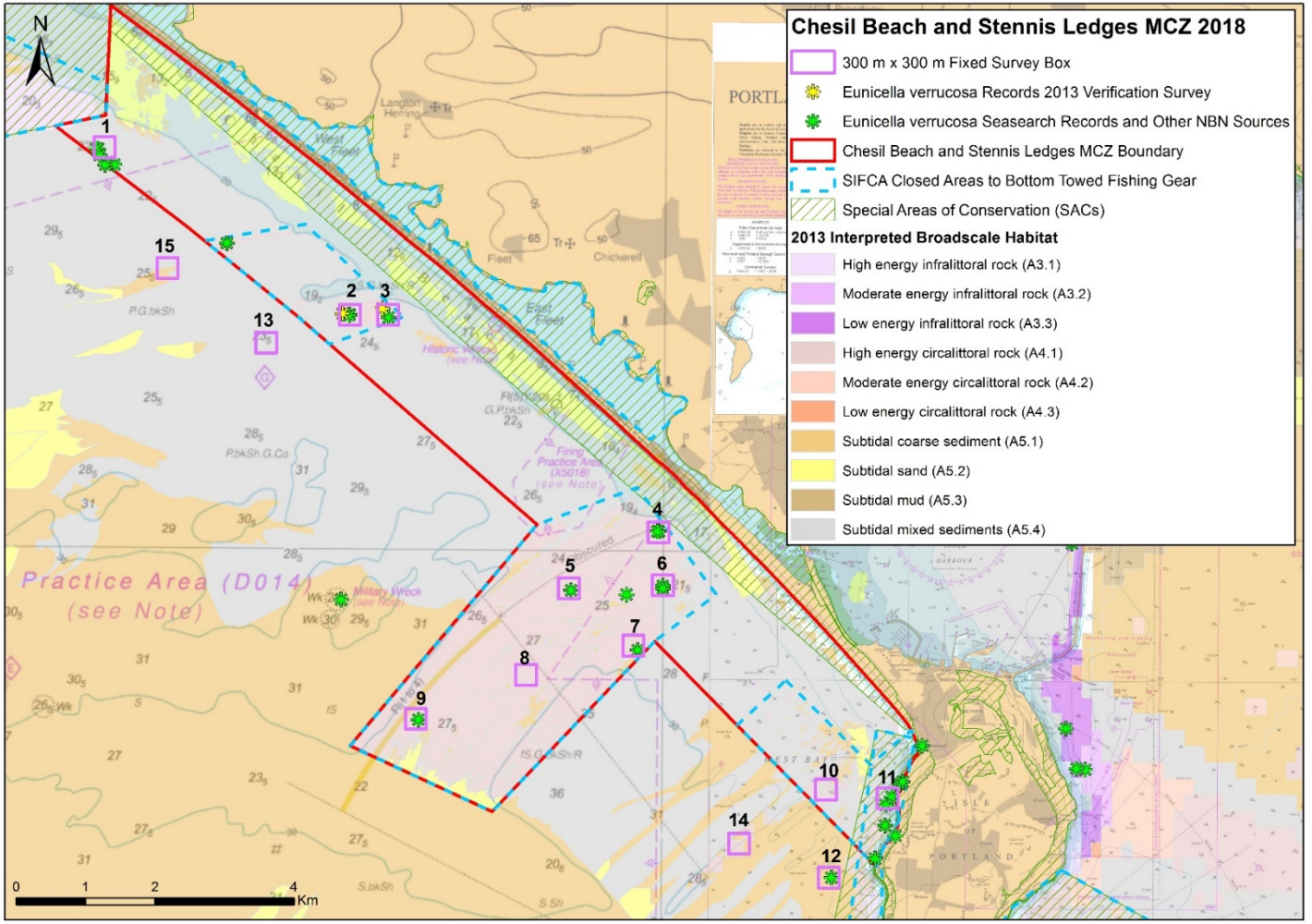

Figure 3. Chesil Beach and Stennis Ledges Marine Conservation Zone 2018 Summer survey plan mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

2.2 Sample Collection Methodology

2.2.1 Habitat Characterisation

Drop Camera (DC) 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 & 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 to be captured 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 and anthozoan communities involved completing five randomly distributed video tows within a 300 m x 300 m pre-selected survey box. The video tows were undertaken across the survey box, with a minimum tow length of 150 m (as per MESH guidance, Coggan et al., 2007). Every effort was made to ensure video tows did not cross one another. Video was recording for the duration of the tow, with images taken every five seconds. The camera system was towed at a maximum speed over ground of 1.5 knots and hovered at a maximum height of 50 cm above the seabed. The drop frame depth was controlled via a winch operator receiving instructions from the survey cabin. For further procedure details please see the 'Pink Sea-Fan (*Eunicella verrucosa*) and Fragile Sponge and Anthrozoan Communities DDV Survey Guidance' in Annex 7.3.

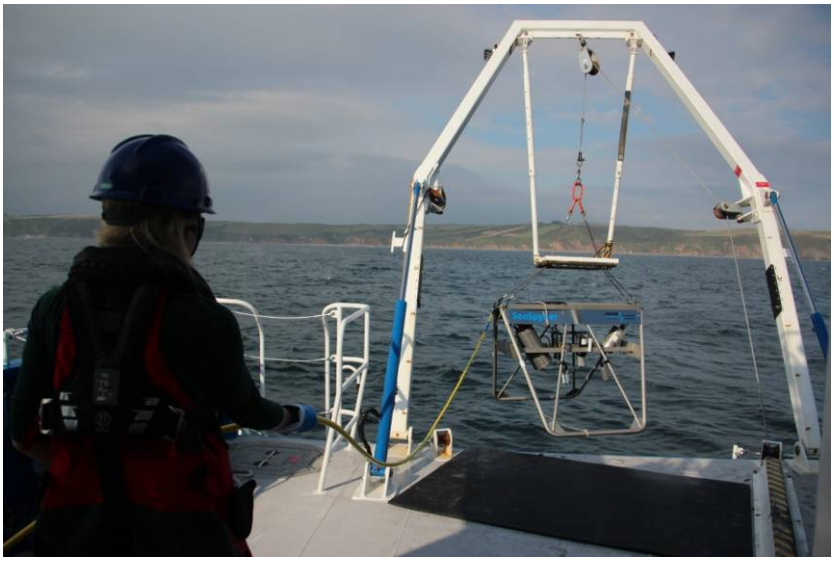

Figure 4. STR SeaSpyder Drop Camera system being deployed from the stern of the coastal survey vessel.

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. Please see Annex 7.5 for a worked example of the video log sheet.

3. Survey Narrative

Between the 16th and 21st July 2018, the Chesil Beach and Stennis Ledges MCZ survey took three 'on-task' days to complete (Table 2). Daily progress reports for each survey day are available from the Environment Agency on request.

Table 2. Summary of equipment deployments during the 2018 Chesil Beach and Stennis Ledges Marine Conservation Zone survey.

Equipment	Dates	Duration
Drop Camera deployments	16th 17th 18th 19th and 21st of July 2018	5 days

The SeaSpyder camera system was already on board and assembled from the previous survey. On the 16th July, *Solent Guardian* departed Portland Marina at 06:00 UTC to start the Drop Camera (DC) survey. The weather was calm and settled with an area of high pressure sitting over the United Kingdom producing unusually warm weather. A safety brief was conducted on board whilst transiting to the MCZ. Video footage and still images of the seabed were collected at 20 of the 75 target tows (survey boxes 1, 2, 3 and 9). *Solent Guardian* returned to Portland Marina and was alongside at 16:30 UTC.

Solent Guardian suffered a generator fault on the 17th July which briefly delayed the start of survey operations. At 07:00 UTC on the same day, *Solent Guardian* departed Portland Marina and transited to the site. The sea state was slight with a 2 ft swell and force 3 southwesterly wind. At 08:31 UTC camera operations commenced, however conditions were not as favourable as the day before due to a stronger tide and increased swell. At 14:05 UTC operations ceased with 20 tows completed (survey boxes 4, 6, 7 and 8). *Solent Guardian* returned to Portland Marina and was alongside at 15:05 UTC.

On the 18th July, *Solent Guardian* departed Portland Marina at 06:00 UTC. The weather continued to be favourable, with a light southwesterly breeze, 1-2 ft of swell and good visibility. Operations began at 07:04 UTC with video footage and still images successfully captured at 25 tows (survey boxes 5, 10, 11, 12 and 14). At 13:55 UTC operations ceased and *Solent Guardian* returned to Portland Marina.

The following day, camera deployments commenced at 08:42 UTC. At 09:43 UTC the SeaSpyder DC developed an internal software error. These errors continued intermittently until 10:00 UTC, at this time the survey was halted. Three tows had been

completed (in survey box 13). STR was contacted and an investigation of the issue began. At 14:00 UTC the team decided to return the DC equipment to the supplier. *Solent Guardian* returned to Portland Marina and was alongside at 15:00 UTC. The faulty DC equipment was dismantled and packed up ready for shipping. Due to this technical fault the data from this day was omitted for quality reasons.

New DC equipment arrived on the 20th July and was unpacked, installed and tested. On the 21st July, *Solent Guardian* departed Portland Marina at 06:30 UTC and operations began at 08:30 UTC. Video footage and digital still images of the seabed were successfully collected at ten tows (survey boxes 13 and 15). Three tows from the 19th July were also revisited as the earlier software error had potentially affected the data collected. *Solent Guardian* then continued to Torquay collecting statutory water quality samples along the way.

4. Data Acquisition

4.1 Sample collection summary

Samples collected during the Chesil Beach and Stennis Ledges MCZ 2018 survey are summarised in Table 3.

Table 3. Summary of samples collected during the 2018 Chesil Beach and Stennis Ledges Marine Conservation Zone survey.

Equipment	Data Type	No. of samples
Drop Camera	Video and still images	75 videos, 5802 images

Video footage and digital photographs of the seabed were captured to assess the presence, population structure, condition and spatial distribution of Pink Sea-Fans along 75 tow lengths within the Chesil Beach and Stennis Ledges MCZ boundary (Figures 5 to 7).

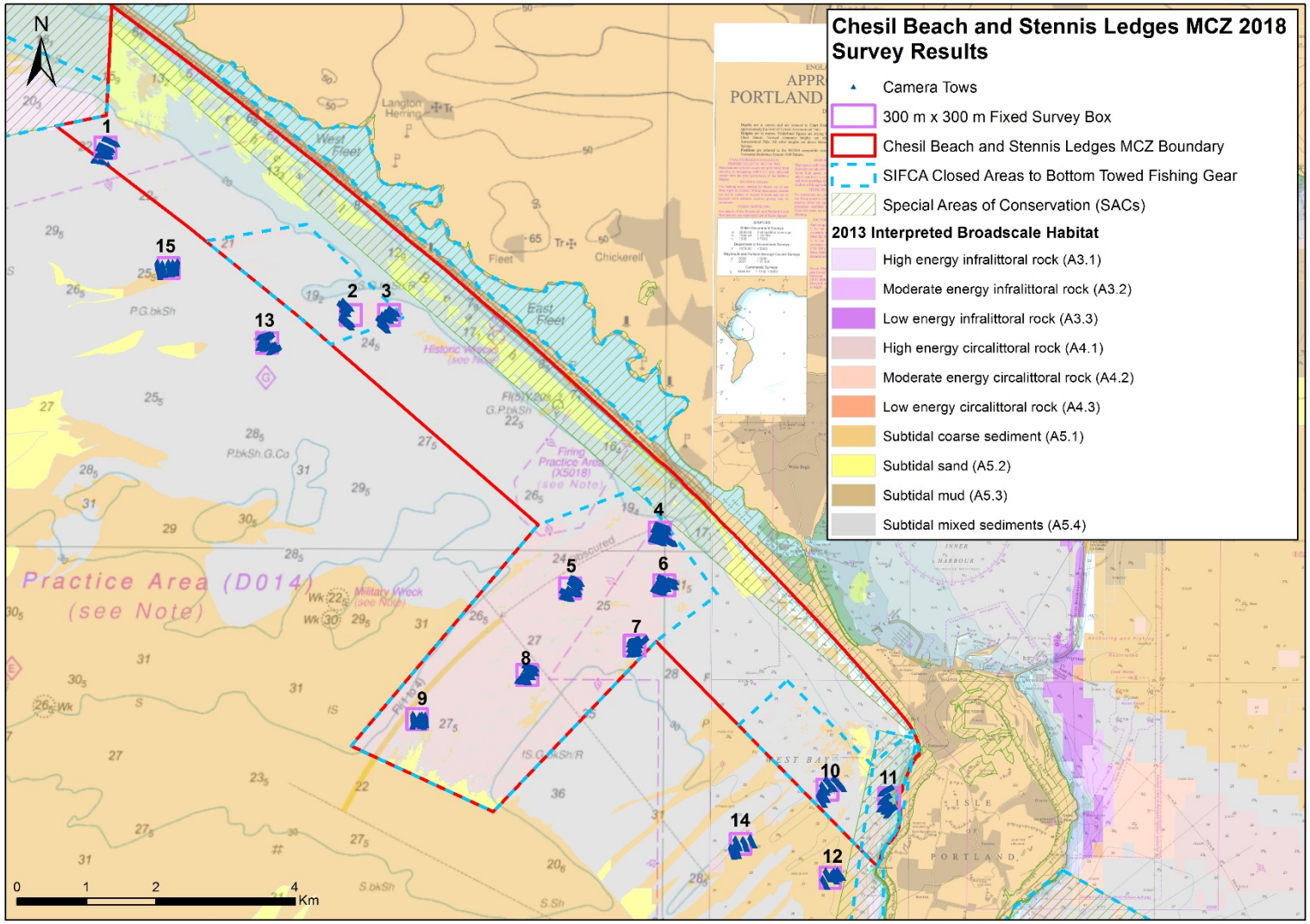

Figure 5. Drop Camera data acquired during the Chesil Beach and Stennis Ledges Marine Conservation Zone Summer 2018 survey mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

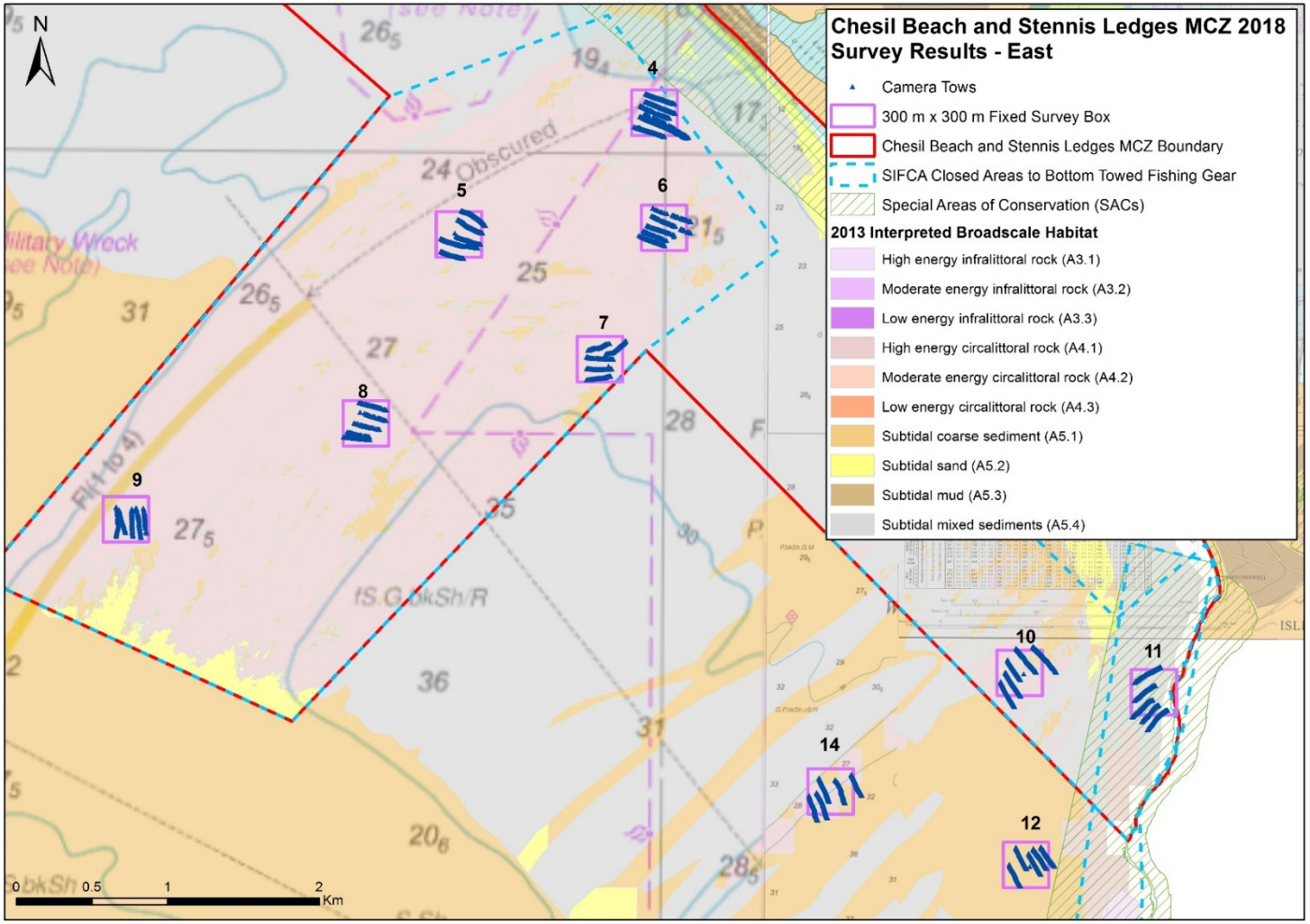

Figure 6. Drop Camera data acquired during the Chesil Beach and Stennis Ledges Marine Conservation Zone Summer 2018 survey (East) mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

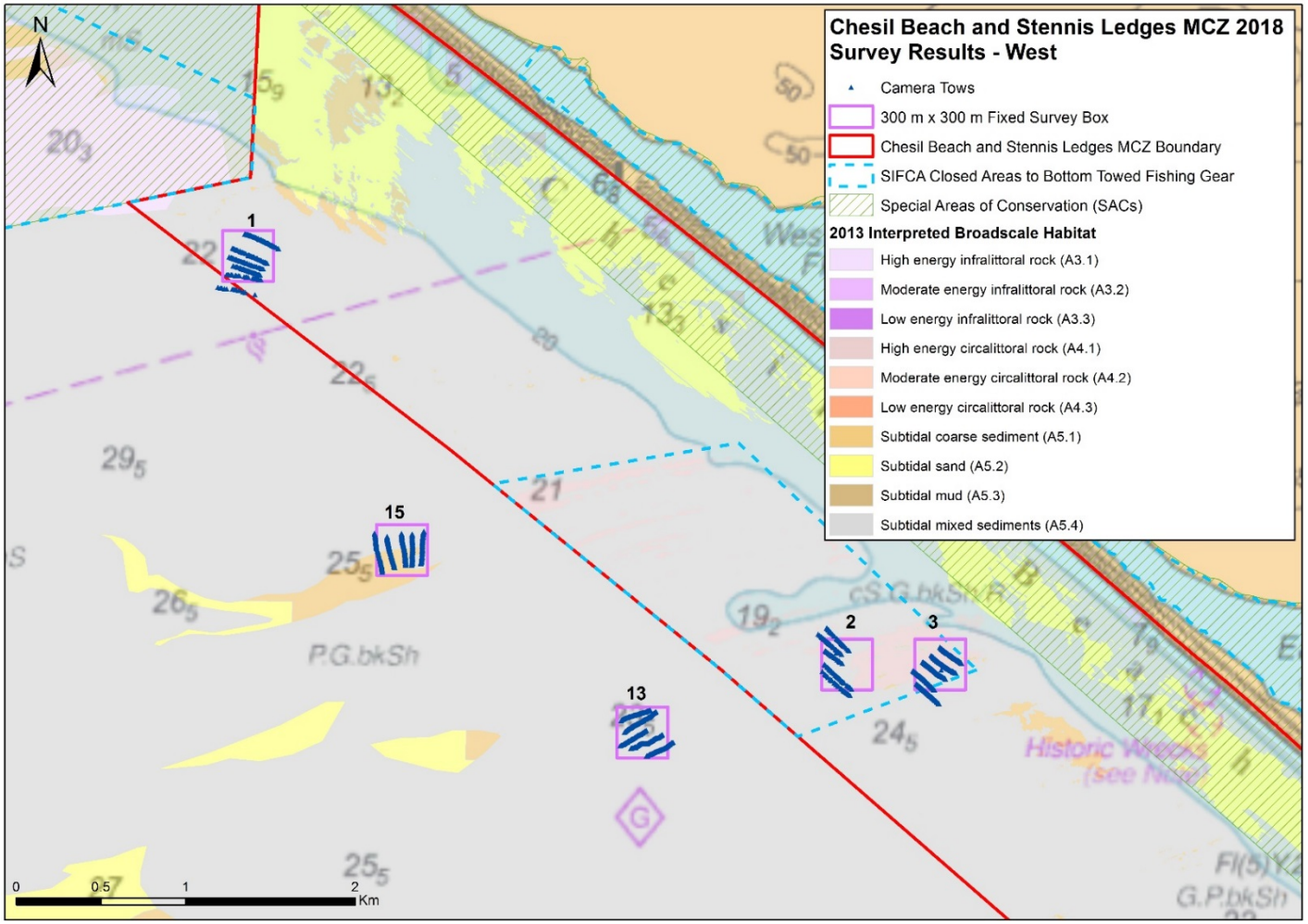

Figure 7. Drop Camera data acquired during the Chesil Beach and Stennis Ledges Marine Conservation Zone Summer 2018 survey (West) mapped over interpreted Broadscale Habitat data from the 2013 verification survey (Natural England, 2018).

4.2 Evidence of anthropogenic impacts

Static fishing gear (line of pots) was observed on the live video feed in the survey box CBSL02 during the second tow, so the line was ended at 134 m. Fishing gear was also seen in survey boxes CBSL06, CBSL011 and CBSL05.

5. References

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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 & Assessment Service
ENG	Ecological Network Guidance
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

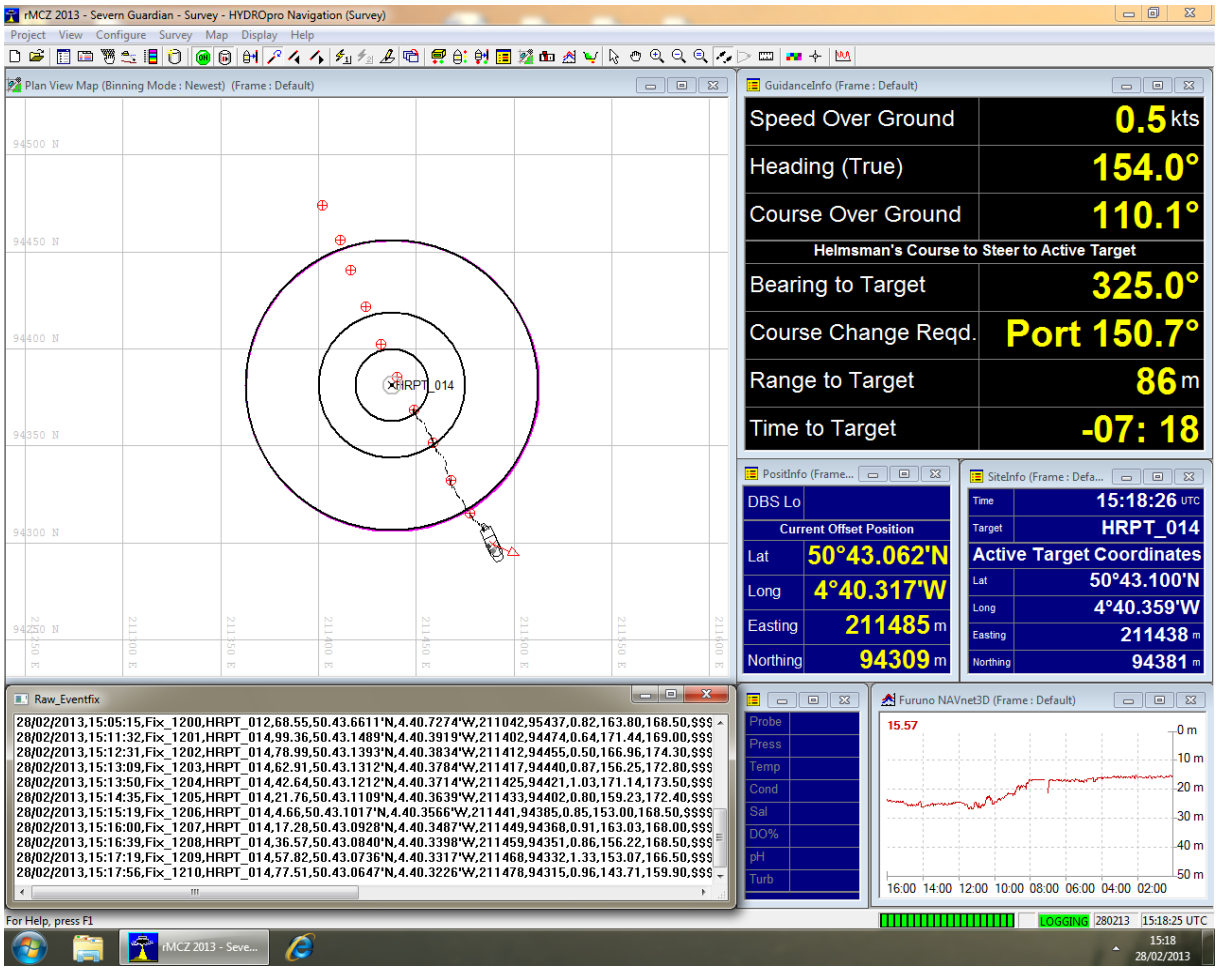
General Information
Length: 18.3 m
Beam: 6.3 m
Draft (baseline): 1.15 m
Draught (skegs): 2.2 m
Displacement (light ship): 22 T
Displacement (full load): 30 T
Service Speed: 16 knots
Maximum Speed: 18 knots

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

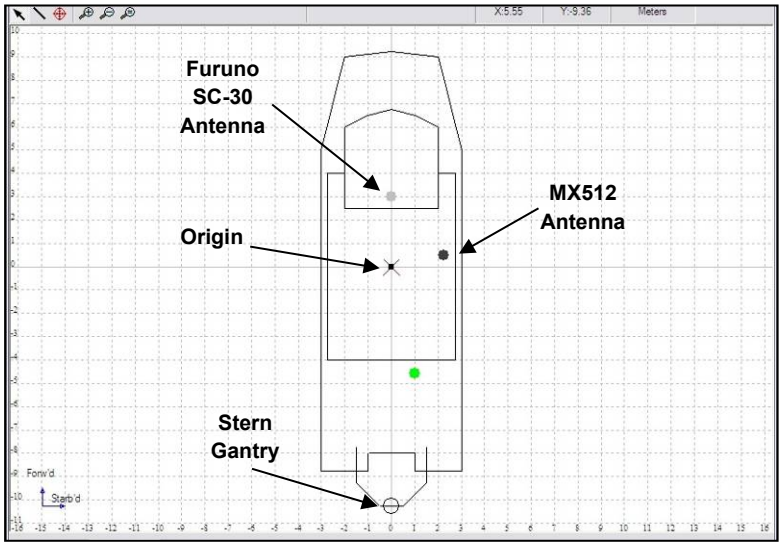
Trimble® HYDRO*pro*™ software is utilised for real-time navigation and survey data acquisition.



Trimble® HYDRO*pro*™ 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 & 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 & Assessment Service).

7.2.2 SeaSpyder Drop Camera System

STR
SUBSEA TECHNOLOGY & RENTALS

SEASPYDER DROP CAMERA SYSTEM

Surface Control Unit & Processor

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)

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: ≈1m²@ 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

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

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

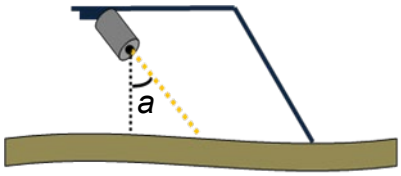
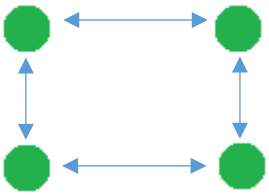
SEASPYDER DROP CAMERA FRAME

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	**Ed Stevens**
Date	**16th July 2018**
Manufacturer and Model	**STR Sea Spyder**
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 (dimmable?)	**4 - No**
Distance between horizontal and vertical vertices of FOV scaling laser points 	
Comments	**Lasers wonky.**

Camera settings	
Date and Time	16 July 2018
Image quality	Large Normal
Flash setup	Auto
Shutter speed	1/80
Aperture size	F8.1
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 Hydro-pro
- 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).

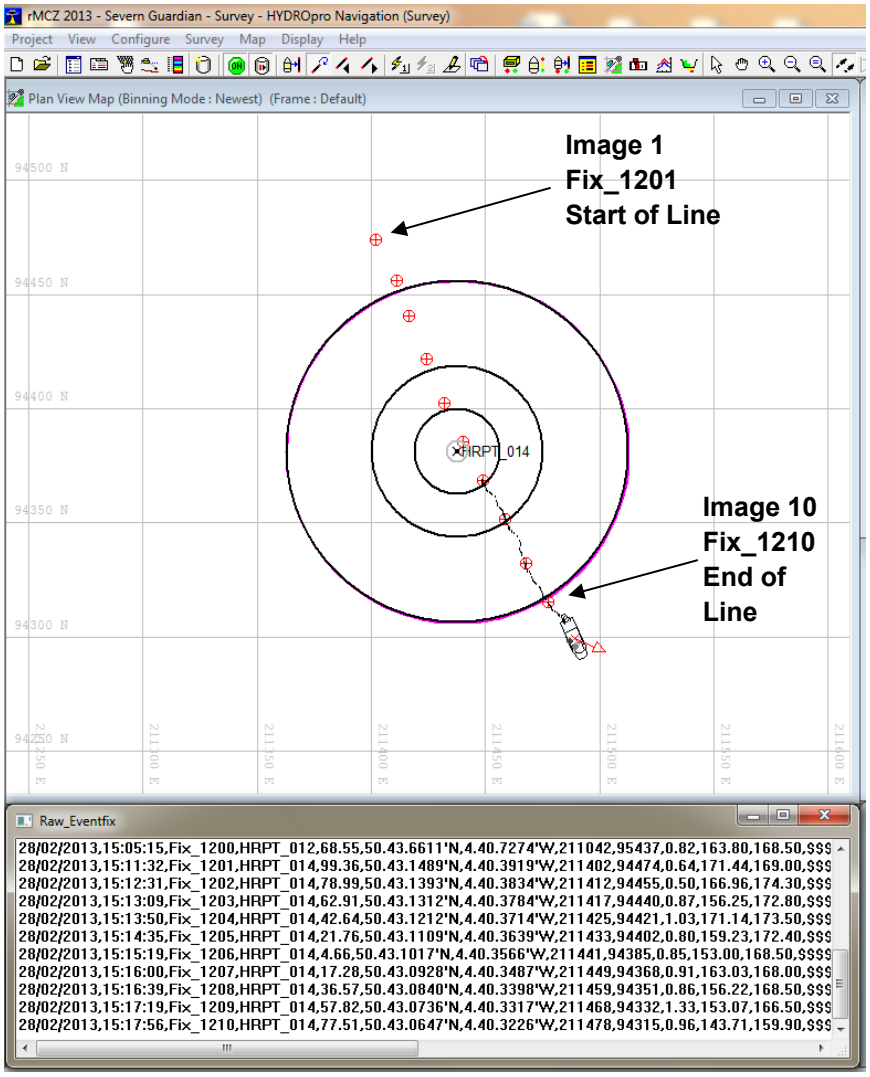
Overlay Example:
EA ECMAS_2018-0622
KNMR_GT017_STN_33_A1 (annotate if station has been attempted on a previous occasion)
UTC: 083912 (real time feed from survey GPS)
Lat: 5043.1189N (real time feed from survey GPS – **uncorrected**)
Lon: 00025.7294W (real time feed from survey GPS – **uncorrected**)

Clapperboard Example:

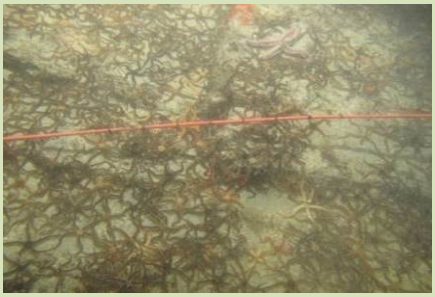
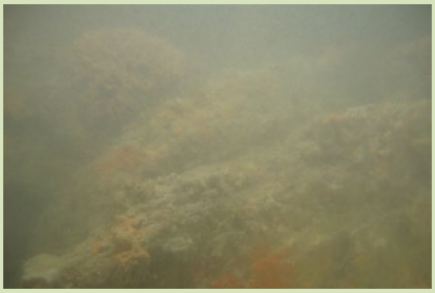
- Alter the stills prefix to the correct station code.

- 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 Megapixels, 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 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.
- Beware of sudden depth changes when surveying rocky areas.
- Abandon the station if survey conditions are hazardous.

Video Camera Type	Survey Conditions	Deployment
Drop Camera	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:
(including any times & adjustments to Cable Out)

Position Reference Point: Stern gantry

Sample data

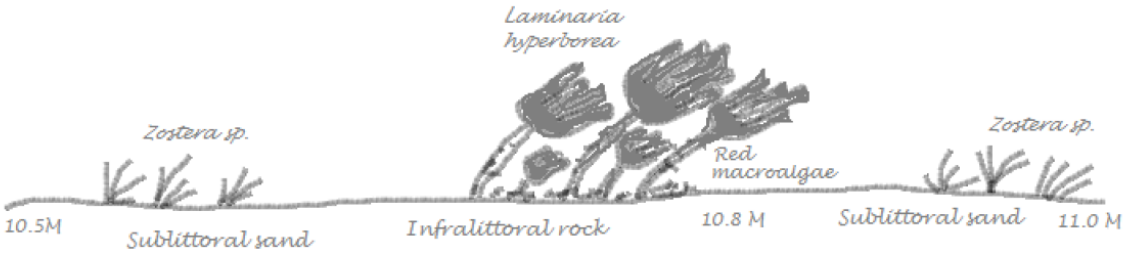
Digital Video Tape label: n/a

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
Start of Video (SOV)	15	40	3862	50⁰ 06·3266′ N; 5⁰ 32·2924′ W	n/a	n/a
End of Video (EOV)	15	45	3875	50⁰ 06·3893′ N; 5⁰ 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 dominated sed's	✓
mod.energy		mod.energy		subtidal coarse			
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 DDV 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 m 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 for 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

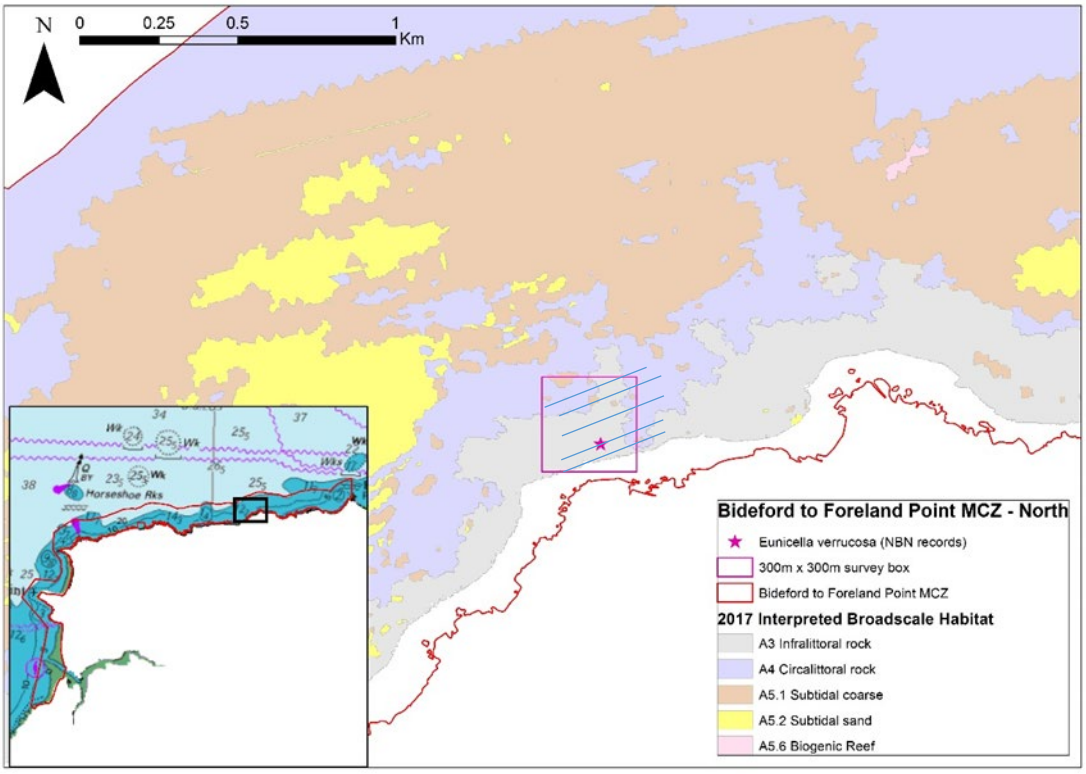
station should have 5 camera tow replicates. Follow Cefas guidance 'MPA work – File naming convention – all sample types. Version 2.1 (11 Jan 2013)'.

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 (Hpro '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 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, O_2, temperature and salinity measurements 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 attached spreadsheet by clicking on the paper clip icon.

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