



Eddystone Reefs Box 4 2019



Survey field report for the 2019 Eddystone Reefs Drop Down Video Survey Box 4

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CIFCA_SAC_Edd_2019_DDV_Box4

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Summary

This report summarises the operations and data acquired during the 2019 drop down video (DDV) survey of Box 4, located inside the Eddystone Reefs part of the Plymouth Sound to Start Point and Eddystone Special Area of Conservation (SAC). The survey was carried out on the 12th July 2019.

The aim of the survey was to collect high quality video and still imagery from Box 4. Camera work has not been conducted in this survey box since 2015. Video and stills data were successfully collected over six camera tows, with one camera tow split into two sections due to the camera becoming hitched on fishing gear. In total 2 hours 33 minutes and 58 seconds of video and 142 still images were successfully collected. Sea conditions were good throughout the survey.

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1 Background and Introduction

Following the introduction of a byelaw that either wholly or partially prohibited the use of bottom towed gears in European Marine Sites (EMS), Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA), the Marine Conservation Society (MCS) and the University of Exeter Environment Sustainability Institute (ESI) have collaborated on a study in the Eddystone reefs part of the Start Point to Plymouth Sound and Eddystone Special Area of Conservation (SAC). The project was initially funded by the Pigshed Trust between 2014 and 2016 and Princess Yachts International of Plymouth from 2017 to 2019.

The aim of the partnership study has been to collect seabed image data over time to enable a comparison of the epifaunal assemblages (by statistical analysis) within areas that are open and closed to bottom towed gear. Data has been collected from one treatment and two control survey boxes. The three sites were selected due to their similarity; they all have similar bathymetry, reef to the western side and have all been/are subject to towed gears.

In 2019, a fourth survey box, Box 4 was surveyed. Box 4 is located in a zone that was closed to bottom towed gear (Figure 1). Cornwall IFCA collected data in this survey box in 2014 and 2015 (Figure 2). Due to its differences to the main study survey boxes, data collected from the fourth survey area has not been included in the main project and has been treated as a standalone study. Whereas the other boxes have reef to the west and are open to the east, Box 4 has reef to both its eastern and western sides. Drop down video (DDV) tows have not been conducted in this survey box since 2015. The aim of this study was to return to Box 4 and collect high quality video and still image data, repeating previous video transects wherever possible. Analysis of the collected data will enable analysis epifaunal assemblages to be carried out and comparisons drawn with the baseline data collected in 2015.

1.1 Aims & Objectives

1.1.1 Aims

- Collect high quality video and still imagery from Box 4.

1.1.2 Objectives

- Complete DDV and stills imagery survey using the mapping European seabed habitats recommended operating guidelines for underwater video surveys (Coggan, 2007).
- Repeat camera tows carried out in 2014 and 2015 where possible.

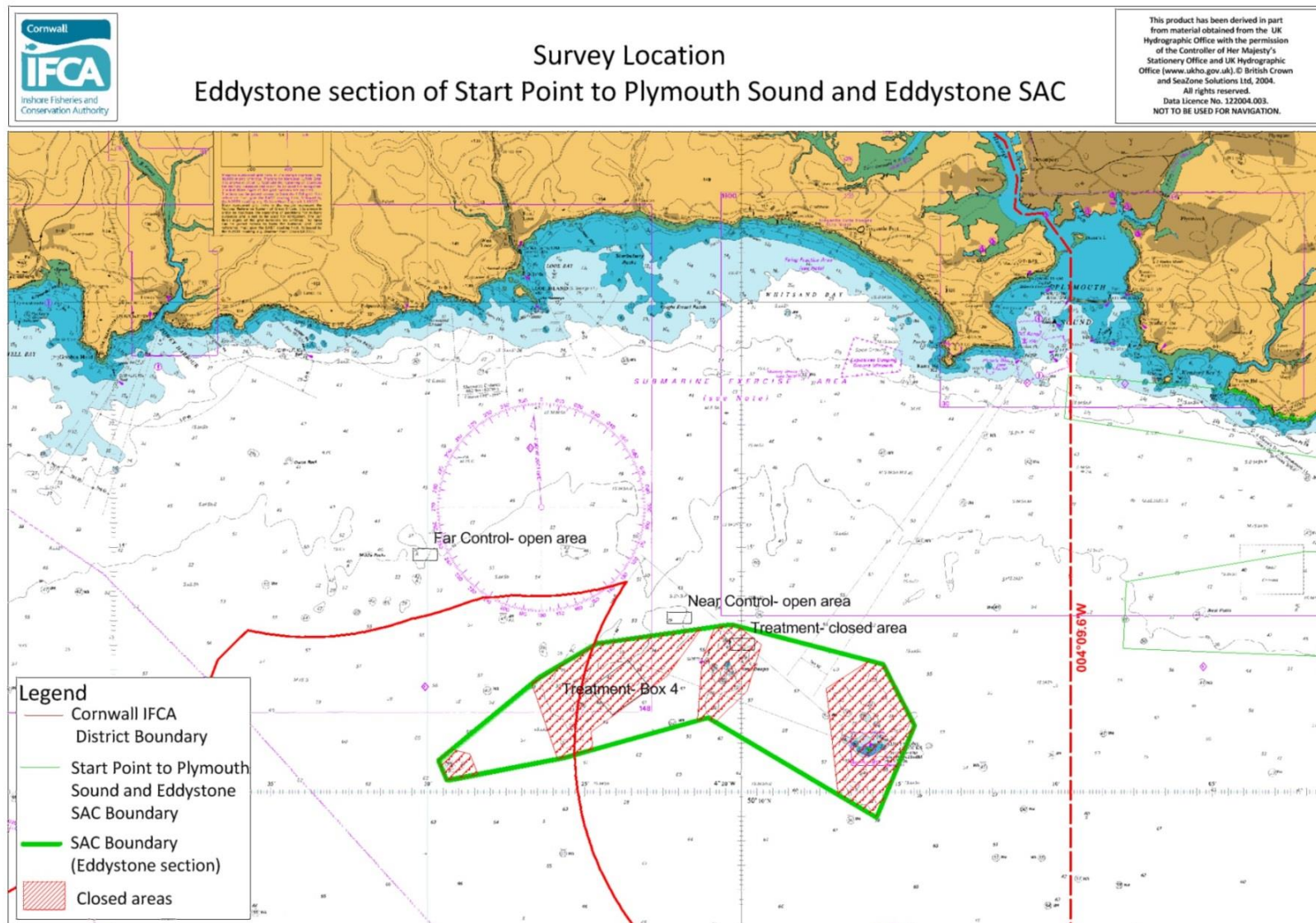


Figure 1: Location of four survey boxes within the Start Point to Plymouth Sound SAC. Box 1 = Treatment - closed area, Box 2 = Near control - open area, Box 3 = Far control - open area, Box 4 = Treatment.

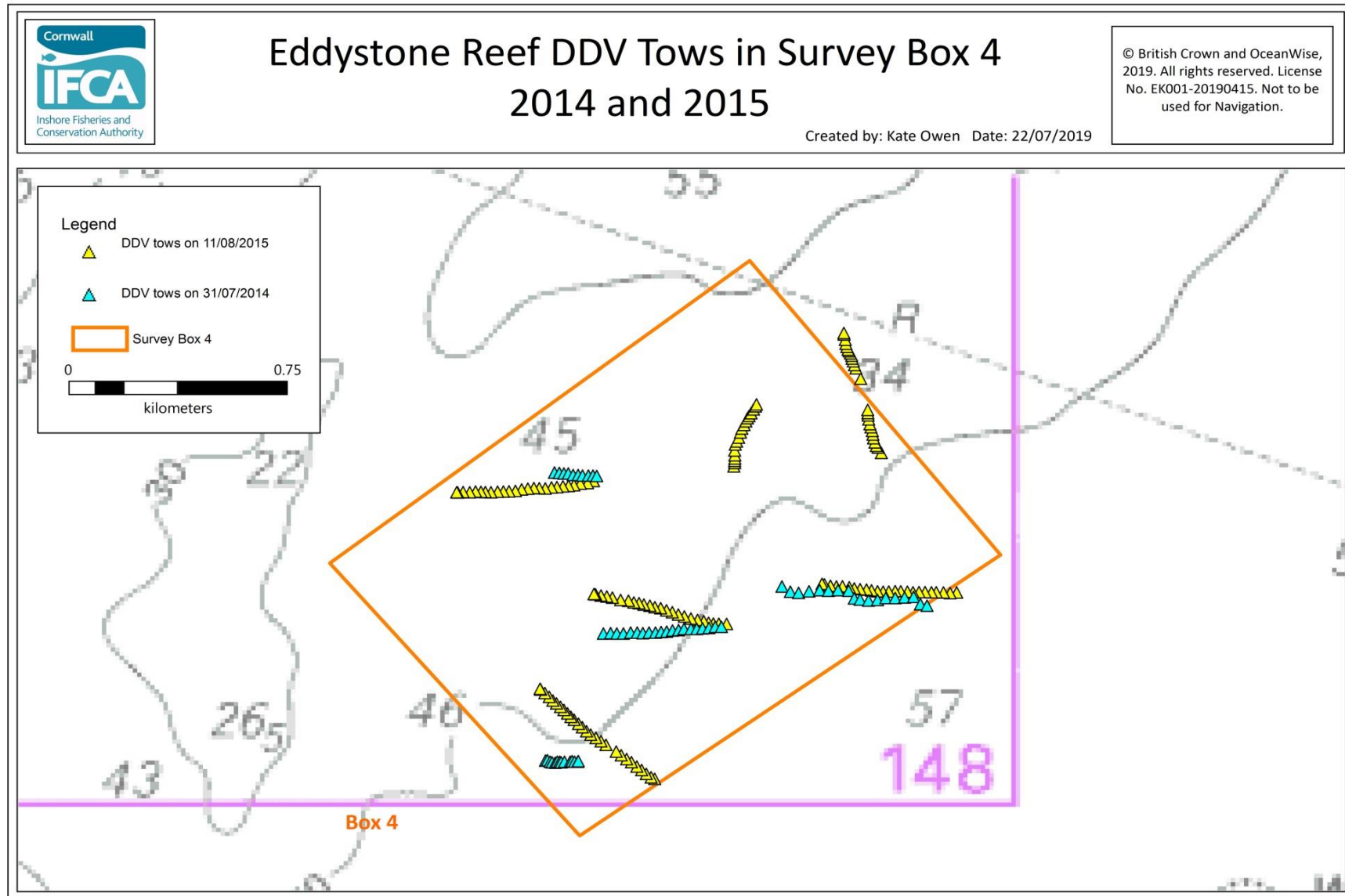


Figure 2: Drop down video tows conducted by Cornwall IFCA in Box 4 on the 31st July 2014 and on the 11th August 2015.

2 Survey Operations

The survey was undertaken aboard the Research Vessel (R/V) Tiger Lily VI. Details of the vessel and the equipment used are provided in Appendix 1. Survey operations and protocols are described below.

2.1 Personnel

The survey on the 12th July 2019 consisted of three Scientific Officers and an independent skipper.

2.2 Personal Protective Equipment (PPE)

While working on deck all crew were required to wear lifejackets, personal location beacons (PLBs) and steel toe cap boots. Hard hats were worn during deployment and recovery of the DDV. There were no reported accidents or near misses on the day.

3 Methodology

The DDV survey was carried out in line with Mapping European Seabed Habitats (MESH) recommended operating guidelines for underwater video and photographic imaging techniques (MESH, 2008). Video and digital still imagery was acquired using a STR SeaSpyder drop camera system (Appendix 1). Since the 2019 Eddystone Box 4 DDV data was collected, Cornwall IFCA carried out a side-scan sonar (SSS) survey in Box 4 on the 16th July 2019. The camera tows from Box 4 have been plotted over this SSS data.

High definition footage of the seabed (with scaling lasers and dedicated lighting) was acquired, using the downward facing camera, in one survey box. Previous survey positions from 2014 and 2015 were already programmed into the vessel's Olex navigation plotter for navigation purposes. Video tows were successfully completed at six survey stations.

Prior to the deployment of the SeaSpyder for each tow, the video text overlay was checked and adjusted to display the survey name and tow number (e.g. "Cornwall IFCA_12/07/2019. Edd DDV Box4_T1") and the GPS, heading and depth info was checked to ensure that it was updating correctly. The .jpeg file name prefix was checked and adjusted to display the survey name, tow number, date, time (UTC) and automatic image number (e.g. "CIFCA_Edd_4_T120190712_XXXXX_XXXX.JPG"). The SeaSpyder camera was deployed through the A-Frame at the stern of Tiger Lily and attached securely to the starboard side of the vessel between tows.

The video was set to record once the camera was just above the seabed. Com Port A was set to log to record all positional information from the Furuno Navigation system (Lat/ Long WGS84) for the entire tow. A target was created in Hypack Max Version 2018 to indicate the start of line (SOL); this was repeated at the end of line (EOL). The SeaSpyder was 'flown' with the frame legs just above the seabed for the tow. The camera frame was landed on the seabed every minute for a still image to be captured. Image separation varied slightly to ensure that the stills taken were of good quality (e.g. taken when the camera was focused on the seabed and the lens unobstructed) this

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sometimes led to a delay. Immediately upon having captured a still image a target was created in Hypack. Field notes were recorded for each target in Hypack such as tow number, speed over ground and real-time observations of substrate and taxa (comma delimited). The camera was recovered and securely lashed to the starboard side of Tiger Lily in between each tow.

For a full methodology see Appendix 1.

4 Data handling and analysis

Hypack targets were used in data processing to obtain exact still image locations. All position information was recorded in the Long/Lat WGS84 projection and taken from a single GPS (Furuno GP-32). GPS fixes were recorded using the Furuno Navigation system on Tiger Lily. Hypack targets were extracted as a .txt file format and opened in Microsoft Excel (comma delimited). Com Port A data was logged for the duration of each tow and saved in a .txt file format to the Topside PC. Once opened in Microsoft Excel these files had the GGA strings extracted to create a track file for each tow. Times and GPS locations were then extracted from the GGA string and position data converted from degrees and decimal minutes to a decimal degree format. Appropriate headers were then added. The Hypack target data for each tow was transferred to MapInfo Professional Version 17.0.2 and points were created to show the position of each still image and SOL/ EOL.

Stills images from the SeaSpyder camera were initially stored on the internal computer (sub-surface), then on completion of each tow the still images were transferred to the SeaSpyder topside control unit using FileZilla and filed by tow number. Video files were captured to the SeaSpyder topside unit data drive (D:/). The stills, video files and log sheets were transferred from the topside unit to a WD Passport for transport and storage at the end of each survey day.

5 Cruise Narrative

All times are in Universal Time Coordinated (UTC).

12th July 2019

R/V Tiger Lily departed Mylor at 06:45 on the 12/07/2019, with three Scientific Officers and an independent skipper on board. The vessel transited to the survey site, arriving at 08:15. A Toolbox talk was conducted at 08:36 and the camera deployed into the water at 08:35. Tow 1 started at 08:40 and at approximately 08:44 comms were lost. Comms were re-established less than a minute later and the tow continued, concluding at 09:06:48 with 25 still images taken. Tow 2 started at 09:24:54 and ended at 09:48:20 with 24 still images taken. Tow 3 started at 10:11:19 and concluded at 10:34:38 with 23 still images taken. Tow 4 began at 10:48:28 and ended at 11:11:49 with 23 still images taken. The camera was then recovered alongside and at 11:17 the crew broke for lunch.

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Tow 5 began at 11:53:50 and at 11:58 the camera became stuck on fishing gear. At 12:01 the camera was recovered to the surface and disentangled, before re-deployment to the sea bed at 12:04. At 12:06 the camera was back on the seabed, but comms were lost at 12:07. Tow 5 was then concluded at 12:10:44 with four still images collected. At 12:11 the camera was re-booted. Once the restart was complete the camera was recovered to the vessel at 12:18 for the vessel to reposition. At 12:25:20 Tow 5B began, concluding at 12:42:48 with 19 still images collected. Tow 6 began at 13:02:00 and concluded at 13:26:23 with 24 still images taken. The camera was then recovered to the deck at 13:27. The vessel then departed for Mylor, arriving alongside at 15:20.

During processing it was observed that the UTC time in the still image file name was consistently approximately four seconds ahead of the UTC time of the target file in Hypack. It is unclear why this difference occurred as all clocks were synchronised to UTC time at the start of the survey. After the camera system was re-booted, before the start of Tow 5B, this issue resolved itself.

6 Data acquisition

Seabed imagery was acquired for later assessment of the benthic epifaunal community within Box 4 in the Start Point to Plymouth Sound and Eddystone SAC.

A drop down camera system was deployed at six stations inside survey box 4 (Figure 3 and Figure 4). Where possible camera tows were repeats of the DDV tows conducted in 2014 and 2015 (Figure 5). High definition video footage and digital still images were captured during a single drop camera deployment at five of the stations. Two camera drops were required at one of the stations, after the camera became hitched. For each station video was recorded for a minimum length of 22 minutes. The camera frame was landed on the seabed every minute and a still image taken, resulting in 142 still images. For equipment specifications see Appendix 3. Video footage and still images collected are summarised in Appendix 2 and Appendix 3. The daily logs are shown in Appendix 4.

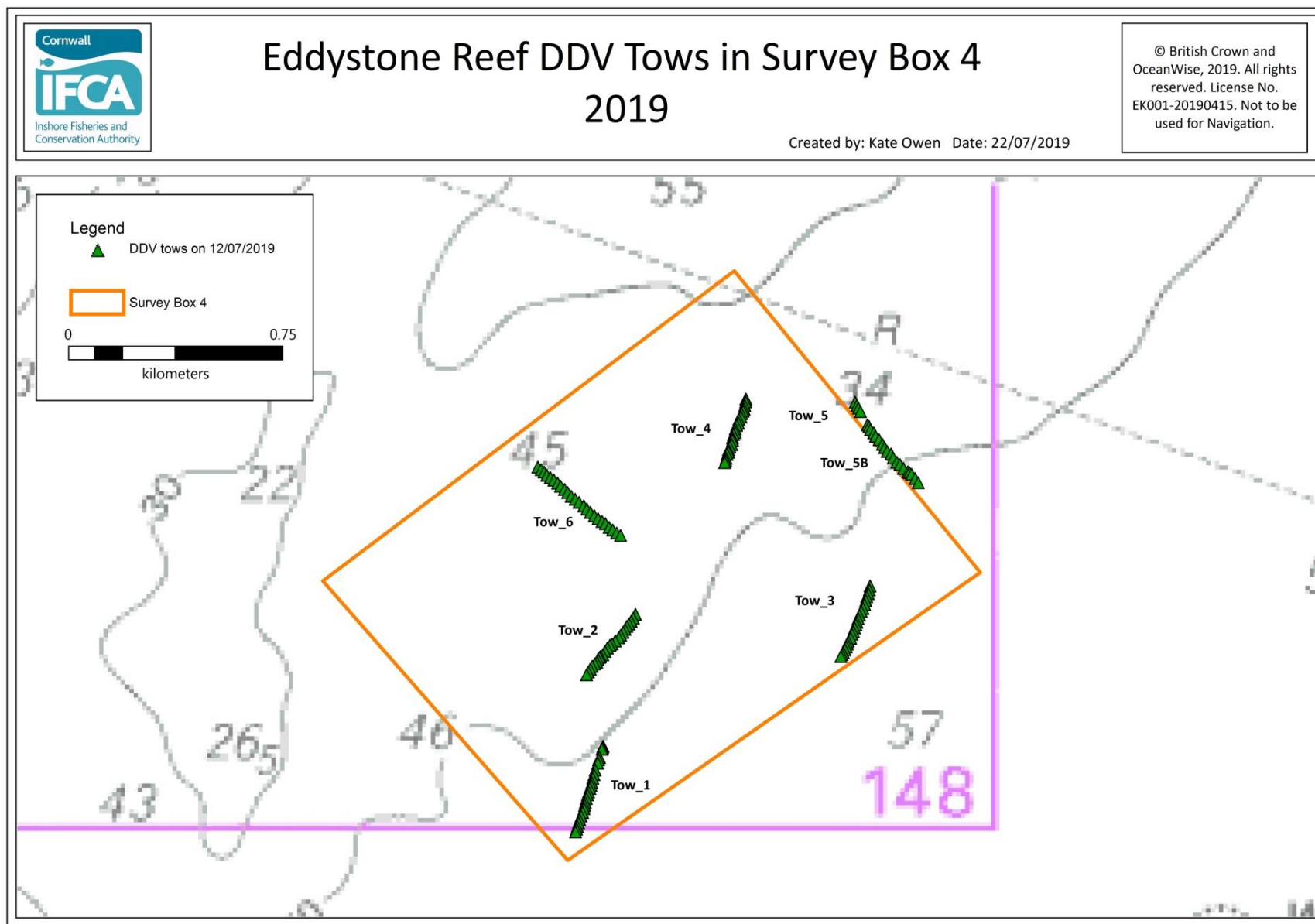


Figure 3: Drop Down Video tows completed by Cornwall IFCA in Box 4 on the 12th July 2019.

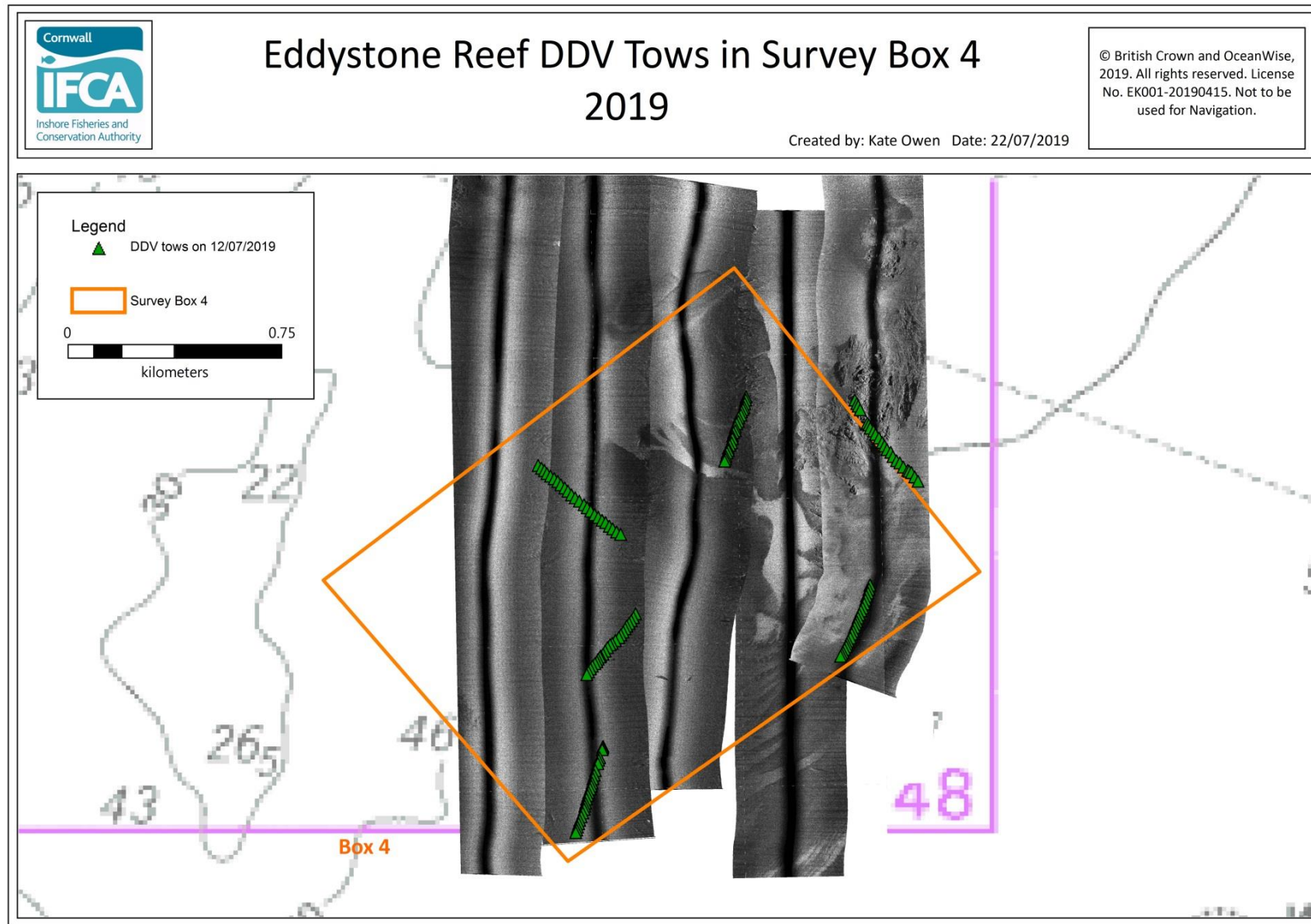


Figure 4: Drop Down Video tows completed by Cornwall IFCA in Box 4 on the 12th July 2019 overlaid onto the side-scan sonar data.

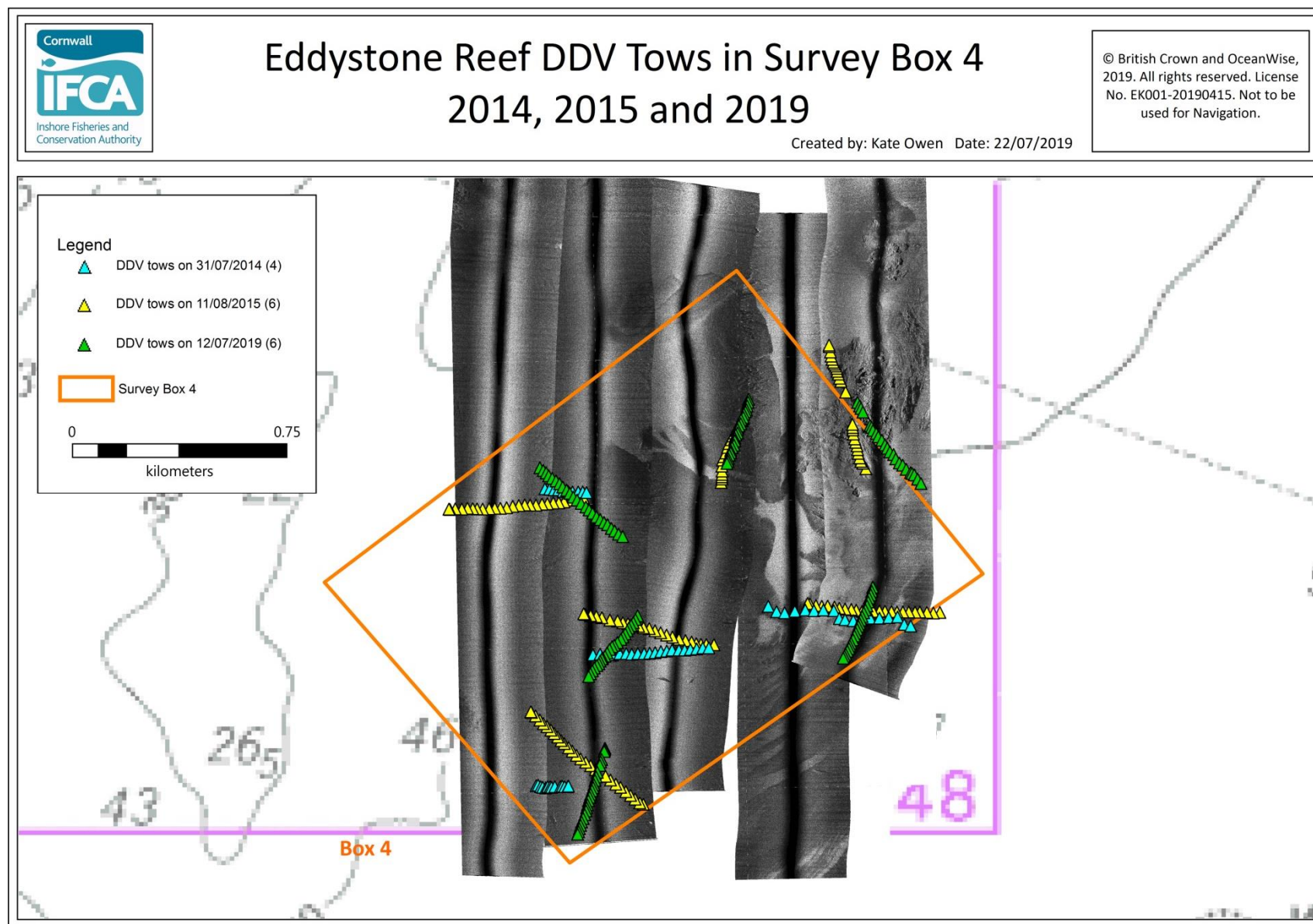


Figure 5: Drop Down Video tows completed by Cornwall IFCA in Box 4 on the 31st July 2014, 11th August 2015 and 12th July 2019 overlaid onto the side-scan sonar data

7 References

Coggan, R., Mitchell, A., White, J. and Golding, N. 2007. Recommended operating guidelines (ROG) for underwater video and photographic imaging techniques. Report number: Video ROG v11, Affiliation: MESH, DOI: 10.13140/RG.2.1.1919.9206

8 Appendices

Appendix 1. Vessel and equipment used

R/V Tiger Lily VI

The survey was undertaken from Cornwall IFCA's Research Vessel (R/V) Tiger Lily VI (Annex Figure A). The vessel has been refitted for survey work and includes a purpose built survey station within the wheelhouse. R/V Tiger Lily VI has been fitted with an inverter and uninterruptable power supply (UPS) to provide stable, continuous 240 v power, NMEA outputs and a dedicated GPS with WAAS enabled. All times are recorded as UTC and taken from the same source as the position data. The clocks on all of the data capture PCs were synched prior to departing the vessel's mooring.



Annex Figure A: Cornwall IFCA's dedicated survey vessel, R/V Tiger Lily VI.

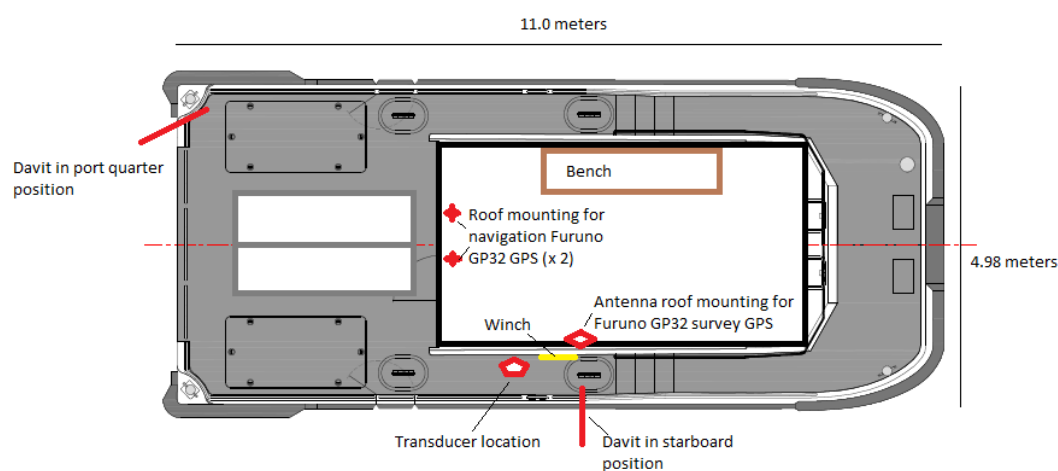
Builder	South Boats Ltd
Model	Island MkII
Built	2007
LOA	11.0m
Beam	4.98m
Draught	1.1m (aft)
Tonnage	c.10 tonnes
Area of operation	MCA Category 2
Call sign	MRWR7
MMSI Number	235054954
MECAL Certification number	M07WB0111059
Complement	14 (including min 2 crew)
Propulsion	2 x 450hp Iveco NEF series
Speed	Cruising: 16 – 18 knots Top: 24 – 26 knots
Range	c. 400 nautical miles
240v AC supply	Victron 3Kw power inverter 5KvA Volvo-Perkins generator (All 240 AC power is accessed via APC Smart UPS C1500)

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Stern Gantry	500kg SWL
Winch (on stern gantry)	Spencer Carter 0.5t with scrolling level wind
Slave hauler	Sea Winch 200m dia.
Electric line hauler	12v Spencer Carter Bandit
Positioning	Hemisphere V100 GNSS 3 x Furuno GP32
NMEA data outputs	4 x USB 4 x Serial 4 x banjo
Navigation	Olex with data export Knockle Hypack Max

Positioning Software and Offsets

Tiger Lily VI General Layout - Plan view



Equipment			Offset (m)		
NMEA Device	Make/Model	Offset Name	X (f'wd)	Y (port)	Z (+/-)
Sounder	Furuno Navnet	Transducer	7.0	4.2	-0.5
GPS	Furuno GP32	GPS 1	5.5	2.5	+3
GNSS	Hemisphere V100	GNSS 1	5.0	2.5	+2.35

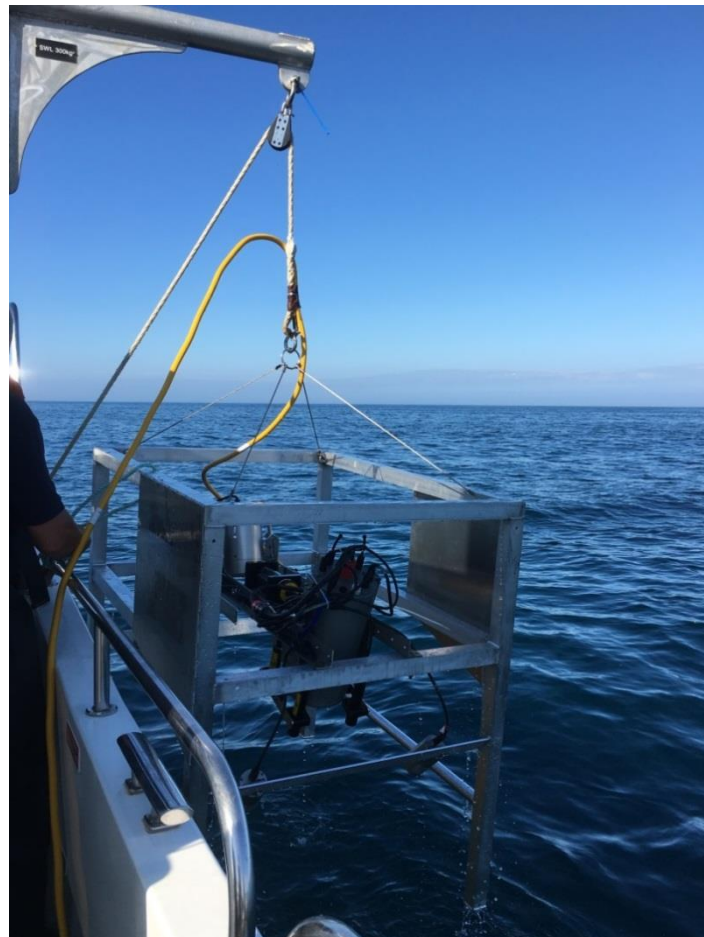
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STR SeaSpyder drop camera system

Details of the system are available online: <http://www.str-subsea.com/sales/str-SeaSpyder-drop-camera-system>.

Annex Figure B shows the camera system on the starboard side of R/V Tiger Lily.

Equipment	Camera System
Manufacturer	Subsea Technology & Rentals Ltd
Video	HD video 600 lines PAL
Stills	18 mega pixels
Height control	Video footage
Lighting	Four high density LED 20w lamps
Image scaling	4 Dual lasers for precise imagery scaling
Shutter control	Remote from deck
Additional info	<ul style="list-style-type: none"> • Full remote control of camera functions including automatic and manual focus control • 'On-the-fly' image download • High speed digital telemetry link to camera and sensors • High power underwater flash • Inbuilt compass and depth sensors



Annex Figure B: Drop Down Video mounted camera system and frame used onboard R/V Tiger Lily for the Eddystone Reefs Survey 2019

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Appendix 2. Video position data

Cornwall IFCA		Video Positioning Summary									
Area	Eddystone Reef	Project name		2019 Eddystone Reefs Box 4							
Vessel	Tiger Lily	Sampling position		Starboard davit							
Tow	Video ID	Date	Time SOL (UTC)	Time EOL (UTC)	SOL Latitude (decimal degrees)	SOL Longitude (decimal degrees)	EOL Latitude (decimal degrees)	EOL Longitude (decimal degrees)	Video length (hh:mm:ss)	Number of stills pre QC	Number of still post initial QC
1	2019_193_08_40_27.avi	12/07/2019	08:40:28	09:06:48	50.196010	-4.400155	50.193180	-4.401597	00:26:19	25	24
2	2019_193_09_24_53.avi	12/07/2019	09:24:54	09:48:20	50.200176	-4.398510	50.198117	-4.401067	00:23:25	24	24
3	2019_193_10_11_19.avi	12/07/2019	10:11:19	10:34:38	50.201042	-4.387040	50.198680	-4.388585	00:23:19	23	23
4	2019_193_10_48_12.avi	12/07/2019	10:48:28	11:11:49	50.206902	-4.393152	50.204805	-4.394275	00:23:35	23	23
5	2019_193_11_53_29.avi	12/07/2019	11:53:50	12:10:44	50.206785	-4.387902	50.205548	-4.386242	00:16:59	4	4
5B	2019_193_12_25_19.avi	12/07/2019	12:25:20	12:42:48	50.206093	-4.387333	50.204145	-4.384692	00:17:28	19	19
6	2019_193_13_01_59.avi	12/07/2019	13:02:00	13:26:23	50.204793	-4.403652	50.202495	-4.399312	00:22:53	24	24

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Appendix 3. Still image positions**Survey Box 1**

Survey Box	Tow	File Name	Time (UTC)	Date	Latitude (decimal degrees)	Longitude (decimal degrees)	Depth (m)	Speed (knots)
4	1	CIFCA_Edd_4_T120190712__08_42_05__0002.JPG	08:42:01	12/07/2019	50.195853	-4.400253	52.1	0.5
4	1	CIFCA_Edd_4_T120190712__08_42_34__0003.JPG	08:42:31	12/07/2019	50.195808	-4.400282	52	0.5
4	1	CIFCA_Edd_4_T120190712__08_44_46__0004.JPG	08:44:43	12/07/2019	50.195553	-4.400408	52.7	0.4
4	1	CIFCA_Edd_4_T120190712__08_45_32__0005.JPG	08:45:29	12/07/2019	50.195480	-4.400453	52.6	0.4
4	1	CIFCA_Edd_4_T120190712__08_46_32__0006.JPG	08:46:28	12/07/2019	50.195370	-4.400493	52.5	0.4
4	1	CIFCA_Edd_4_T120190712__08_48_33__0007.JPG	08:48:29	12/07/2019	50.195153	-4.400620	52.8	0.4
4	1	CIFCA_Edd_4_T120190712__08_49_31__0008.JPG	08:49:28	12/07/2019	50.195013	-4.400675	52.8	0.5
4	1	CIFCA_Edd_4_T120190712__08_50_32__0009.JPG	08:50:28	12/07/2019	50.194897	-4.400737	52.9	0.5
4	1	CIFCA_Edd_4_T120190712__08_51_32__0010.JPG	08:51:28	12/07/2019	50.194760	-4.400780	53	0.4
4	1	CIFCA_Edd_4_T120190712__08_52_36__0011.JPG	08:52:32	12/07/2019	50.194673	-4.400823	53.1	0.4
4	1	CIFCA_Edd_4_T120190712__08_53_32__0012.JPG	08:53:29	12/07/2019	50.194580	-4.400882	53.4	0.4
4	1	CIFCA_Edd_4_T120190712__08_54_31__0013.JPG	08:54:28	12/07/2019	50.194467	-4.400950	53.4	0.4
4	1	CIFCA_Edd_4_T120190712__08_55_31__0014.JPG	08:55:28	12/07/2019	50.194372	-4.400998	53.5	0.4
4	1	CIFCA_Edd_4_T120190712__08_56_32__0015.JPG	08:56:28	12/07/2019	50.194260	-4.401055	53.6	0.5
4	1	CIFCA_Edd_4_T120190712__08_57_32__0016.JPG	08:57:31	12/07/2019	50.194133	-4.401098	53.7	0.4
4	1	CIFCA_Edd_4_T120190712__08_58_31__0017.JPG	08:58:33	12/07/2019	50.194042	-4.401138	53.6	0.3
4	1	CIFCA_Edd_4_T120190712__08_59_34__0018.JPG	08:59:31	12/07/2019	50.193940	-4.401170	54	0.4
4	1	CIFCA_Edd_4_T120190712__09_00_32__0019.JPG	09:00:28	12/07/2019	50.193822	-4.401235	53.8	0.4
4	1	CIFCA_Edd_4_T120190712__09_01_31__0020.JPG	09:01:27	12/07/2019	50.193708	-4.401315	53.8	0.5
4	1	CIFCA_Edd_4_T120190712__09_02_32__0021.JPG	09:02:32	12/07/2019	50.193595	-4.401385	53.9	0.4
4	1	CIFCA_Edd_4_T120190712__09_03_32__0022.JPG	09:03:28	12/07/2019	50.193492	-4.401442	53.9	0.5
4	1	CIFCA_Edd_4_T120190712__09_04_33__0023.JPG	09:04:29	12/07/2019	50.193385	-4.401497	53.9	0.3
4	1	CIFCA_Edd_4_T120190712__09_05_33__0024.JPG	09:05:29	12/07/2019	50.193295	-4.401532	54	0.5
4	1	CIFCA_Edd_4_T120190712__09_06_33__0025.JPG	09:06:29	12/07/2019	50.193210	-4.401580	54.1	0.3
4	2	CIFCA_Edd_4_T220190712__09_26_06__0026.JPG	09:26:01	12/07/2019	50.200053	-4.398643	49.4	0.5
4	2	CIFCA_Edd_4_T220190712__09_27_06__0027.JPG	09:27:02	12/07/2019	50.199940	-4.398743	49.3	0.5

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4	2	CIFCA_Edd_4_T220190712__09_28_06__0028.JPG	09:28:02	12/07/2019	50.199838	-4.398852	49.4	0.4
4	2	CIFCA_Edd_4_T220190712__09_29_03__0029.JPG	09:29:02	12/07/2019	50.199752	-4.398957	49.3	0.4
4	2	CIFCA_Edd_4_T220190712__09_30_02__0030.JPG	09:29:58	12/07/2019	50.199675	-4.399070	49.5	0.4
4	2	CIFCA_Edd_4_T220190712__09_31_04__0031.JPG	09:31:00	12/07/2019	50.199583	-4.399150	49.3	0.4
4	2	CIFCA_Edd_4_T220190712__09_32_05__0032.JPG	09:32:03	12/07/2019	50.199490	-4.399245	49.4	0.5
4	2	CIFCA_Edd_4_T220190712__09_33_04__0033.JPG	09:33:00	12/07/2019	50.199395	-4.399363	49.4	0.5
4	2	CIFCA_Edd_4_T220190712__09_34_04__0034.JPG	09:34:00	12/07/2019	50.199317	-4.399460	49.4	0.3
4	2	CIFCA_Edd_4_T220190712__09_35_04__0035.JPG	09:35:02	12/07/2019	50.199217	-4.399632	49.6	0.6
4	2	CIFCA_Edd_4_T220190712__09_36_03__0036.JPG	09:36:02	12/07/2019	50.199128	-4.399785	49.8	0.5
4	2	CIFCA_Edd_4_T220190712__09_37_03__0037.JPG	09:36:59	12/07/2019	50.199085	-4.399893	49.5	0.6
4	2	CIFCA_Edd_4_T220190712__09_38_04__0038.JPG	09:38:00	12/07/2019	50.198998	-4.400023	49.6	0.5
4	2	CIFCA_Edd_4_T220190712__09_39_03__0039.JPG	09:38:59	12/07/2019	50.198888	-4.400138	49.8	0.5
4	2	CIFCA_Edd_4_T220190712__09_40_05__0040.JPG	09:40:01	12/07/2019	50.198787	-4.400238	49.9	0.4
4	2	CIFCA_Edd_4_T220190712__09_41_05__0041.JPG	09:41:01	12/07/2019	50.198732	-4.400358	49.7	0.5
4	2	CIFCA_Edd_4_T220190712__09_41_20__0042.JPG	09:41:20	12/07/2019	50.198702	-4.400400	49.9	0.5
4	2	CIFCA_Edd_4_T220190712__09_42_05__0043.JPG	09:42:01	12/07/2019	50.198635	-4.400480	50.2	0.4
4	2	CIFCA_Edd_4_T220190712__09_43_04__0044.JPG	09:42:59	12/07/2019	50.198552	-4.400543	50.2	0.3
4	2	CIFCA_Edd_4_T220190712__09_44_04__0045.JPG	09:44:00	12/07/2019	50.198502	-4.400640	49.7	0.4
4	2	CIFCA_Edd_4_T220190712__09_45_03__0046.JPG	09:44:59	12/07/2019	50.198418	-4.400762	50.3	0.5
4	2	CIFCA_Edd_4_T220190712__09_46_04__0047.JPG	09:46:00	12/07/2019	50.198332	-4.400857	50.6	0.4
4	2	CIFCA_Edd_4_T220190712__09_47_05__0048.JPG	09:47:01	12/07/2019	50.198240	-4.400960	50.5	0.4
4	2	CIFCA_Edd_4_T220190712__09_48_06__0049.JPG	09:48:01	12/07/2019	50.198155	-4.401040	50.4	
4	3	CIFCA_Edd_4_T320190712__10_12_23__0050.JPG	10:12:19	12/07/2019	50.200948	-4.387112	55.6	0.5
4	3	CIFCA_Edd_4_T320190712__10_13_30__0051.JPG	10:13:23	12/07/2019	50.200822	-4.387155	56	0.4
4	3	CIFCA_Edd_4_T320190712__10_14_24__0052.JPG	10:14:20	12/07/2019	50.200707	-4.387207	55.8	0.4
4	3	CIFCA_Edd_4_T320190712__10_15_25__0053.JPG	10:15:20	12/07/2019	50.200610	-4.387280	56.4	0.5
4	3	CIFCA_Edd_4_T320190712__10_16_22__0054.JPG	10:16:19	12/07/2019	50.200488	-4.387332	56.2	0.5
4	3	CIFCA_Edd_4_T320190712__10_17_23__0055.JPG	10:17:18	12/07/2019	50.200365	-4.387387	56.4	0.4
4	3	CIFCA_Edd_4_T320190712__10_18_29__0056.JPG	10:18:23	12/07/2019	50.200243	-4.387468	56.4	0.5
4	3	CIFCA_Edd_4_T320190712__10_19_26__0057.JPG	10:19:21	12/07/2019	50.200145	-4.387555	56.6	0.6

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4	3	CIFCA_Edd_4_T320190712__10_20_24__0058.JPG	10:20:20	12/07/2019	50.200030	-4.387635	56.9	0.4
4	3	CIFCA_Edd_4_T320190712__10_21_25__0059.JPG	10:21:20	12/07/2019	50.199925	-4.387703	56.9	0.5
4	3	CIFCA_Edd_4_T320190712__10_22_26__0060.JPG	10:22:22	12/07/2019	50.199808	-4.387760	57.2	0.5
4	3	CIFCA_Edd_4_T320190712__10_23_25__0061.JPG	10:23:20	12/07/2019	50.199725	-4.387813	57.1	0.3
4	3	CIFCA_Edd_4_T320190712__10_24_23__0062.JPG	10:24:19	12/07/2019	50.199627	-4.387875	57.2	0.4
4	3	CIFCA_Edd_4_T320190712__10_25_26__0063.JPG	10:25:21	12/07/2019	50.199512	-4.387942	57.6	0.4
4	3	CIFCA_Edd_4_T320190712__10_26_24__0064.JPG	10:26:20	12/07/2019	50.199427	-4.388008	57.5	0.5
4	3	CIFCA_Edd_4_T320190712__10_27_24__0065.JPG	10:27:19	12/07/2019	50.199303	-4.388072	57.7	0.3
4	3	CIFCA_Edd_4_T320190712__10_28_25__0066.JPG	10:28:21	12/07/2019	50.199200	-4.388185	57.9	0.4
4	3	CIFCA_Edd_4_T320190712__10_29_25__0067.JPG	10:29:21	12/07/2019	50.199117	-4.388237	58.2	0.3
4	3	CIFCA_Edd_4_T320190712__10_30_24__0068.JPG	10:30:20	12/07/2019	50.199032	-4.388283	58.2	0.4
4	3	CIFCA_Edd_4_T320190712__10_31_23__0069.JPG	10:31:19	12/07/2019	50.198942	-4.388352	58.1	0.4
4	3	CIFCA_Edd_4_T320190712__10_32_22__0070.JPG	10:32:18	12/07/2019	50.198842	-4.388433	58.2	0.3
4	3	CIFCA_Edd_4_T320190712__10_33_22__0071.JPG	10:33:17	12/07/2019	50.198792	-4.388497	58.3	0.4
4	3	CIFCA_Edd_4_T320190712__10_34_25__0072.JPG	10:34:20	12/07/2019	50.198728	-4.388555	58.4	0.5
4	4	CIFCA_Edd_4_T420190712__10_49_12__0073.JPG	10:49:08	12/07/2019	50.206835	-4.393212	51.5	0.6
4	4	CIFCA_Edd_4_T420190712__10_50_08__0074.JPG	10:50:04	12/07/2019	50.206742	-4.393230	51.3	0.3
4	4	CIFCA_Edd_4_T420190712__10_51_12__0075.JPG	10:51:08	12/07/2019	50.206627	-4.393270	51.6	0.5
4	4	CIFCA_Edd_4_T420190712__10_52_13__0076.JPG	10:52:09	12/07/2019	50.206510	-4.393302	51.5	0.3
4	4	CIFCA_Edd_4_T420190712__10_53_07__0077.JPG	10:53:03	12/07/2019	50.206448	-4.393355	51.2	0.4
4	4	CIFCA_Edd_4_T420190712__10_54_09__0078.JPG	10:54:03	12/07/2019	50.206373	-4.393428	51.2	0.3
4	4	CIFCA_Edd_4_T420190712__10_55_09__0079.JPG	10:55:05	12/07/2019	50.206268	-4.393462	51.1	0.4
4	4	CIFCA_Edd_4_T420190712__10_56_08__0080.JPG	10:56:04	12/07/2019	50.206192	-4.393562	51.4	0.4
4	4	CIFCA_Edd_4_T420190712__10_57_08__0081.JPG	10:57:05	12/07/2019	50.206072	-4.393583	51.4	0.2
4	4	CIFCA_Edd_4_T420190712__10_58_10__0082.JPG	10:58:06	12/07/2019	50.206002	-4.393670	51.2	0.5
4	4	CIFCA_Edd_4_T420190712__10_59_10__0083.JPG	10:59:06	12/07/2019	50.205892	-4.393737	51.2	0.4
4	4	CIFCA_Edd_4_T420190712__11_00_10__0084.JPG	11:00:06	12/07/2019	50.205782	-4.393738	51.1	0.4
4	4	CIFCA_Edd_4_T420190712__11_01_08__0085.JPG	11:01:04	12/07/2019	50.205720	-4.393827	51.4	0.4
4	4	CIFCA_Edd_4_T420190712__11_02_09__0086.JPG	11:02:06	12/07/2019	50.205615	-4.393872	51.2	0.4
4	4	CIFCA_Edd_4_T420190712__11_03_09__0087.JPG	11:03:05	12/07/2019	50.205532	-4.393873	51.3	0.4

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4	4	CIFCA_Edd_4_T420190712__11_04_36__0088.JPG	11:04:31	12/07/2019	50.205397	-4.393913	51.3	0.4
4	4	CIFCA_Edd_4_T420190712__11_05_31__0089.JPG	11:05:28	12/07/2019	50.205322	-4.394007	51.2	0.3
4	4	CIFCA_Edd_4_T420190712__11_06_41__0090.JPG	11:06:33	12/07/2019	50.205237	-4.394072	51.1	0.4
4	4	CIFCA_Edd_4_T420190712__11_07_40__0091.JPG	11:07:36	12/07/2019	50.205162	-4.394077	51.5	0.3
4	4	CIFCA_Edd_4_T420190712__11_08_37__0092.JPG	11:08:32	12/07/2019	50.205090	-4.394145	49.9	0.4
4	4	CIFCA_Edd_4_T420190712__11_09_37__0093.JPG	11:09:34	12/07/2019	50.204968	-4.394193	51.7	0.4
4	4	CIFCA_Edd_4_T420190712__11_10_35__0094.JPG	11:10:33	12/07/2019	50.204890	-4.394208	51.6	0.3
4	4	CIFCA_Edd_4_T420190712__11_11_36__0095.JPG	11:11:33	12/07/2019	50.204830	-4.394263	50.3	0.3
4	5	CIFCA_Edd_4_T520190712__11_54_13__0096.JPG	11:54:08	12/07/2019	50.206735	-4.387855	41.4	0.4
4	5	CIFCA_Edd_4_T520190712__11_55_14__0097.JPG	11:55:10	12/07/2019	50.206628	-4.387762	43.4	0.4
4	5	CIFCA_Edd_4_T520190712__11_56_13__0098.JPG	11:56:08	12/07/2019	50.206550	-4.387688	44.3	0.4
4	5	CIFCA_Edd_4_T520190712__11_57_24__0099.JPG	11:57:21	12/07/2019	50.206435	-4.387590	41.8	0.4
4	5B	CIFCA_Edd_4_T5b20190712__12_25_40__0001.JPG	12:26:02	12/07/2019	50.206017	-4.387248	43.4	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_26_43__0002.JPG	12:26:43	12/07/2019	50.205962	-4.387168	44.3	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_27_23__0003.JPG	12:27:22	12/07/2019	50.205863	-4.387098	44.7	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_28_30__0004.JPG	12:28:30	12/07/2019	50.205768	-4.386938	45.7	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_29_21__0005.JPG	12:29:22	12/07/2019	50.205662	-4.386842	46.2	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_30_24__0006.JPG	12:30:23	12/07/2019	50.205550	-4.386670	46.9	0.4
4	5B	CIFCA_Edd_4_T5b20190712__12_31_38__0007.JPG	12:31:38	12/07/2019	50.205407	-4.386512	52.1	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_32_29__0008.JPG	12:32:30	12/07/2019	50.205305	-4.386398	55.1	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_33_24__0009.JPG	12:33:29	12/07/2019	50.205187	-4.386275	55.4	0.6
4	5B	CIFCA_Edd_4_T5b20190712__12_34_22__0010.JPG	12:34:23	12/07/2019	50.205105	-4.386087	55.6	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_35_23__0011.JPG	12:35:23	12/07/2019	50.204973	-4.385982	55.5	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_36_24__0012.JPG	12:36:27	12/07/2019	50.204843	-4.385807	55.6	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_37_23__0013.JPG	12:37:23	12/07/2019	50.204772	-4.385648	55.5	0.5
4	5B	CIFCA_Edd_4_T5b20190712__12_38_25__0014.JPG	12:38:24	12/07/2019	50.204645	-4.385473	55.7	0.6
4	5B	CIFCA_Edd_4_T5b20190712__12_39_24__0015.JPG	12:39:25	12/07/2019	50.204538	-4.385260	55.6	0.6
4	5B	CIFCA_Edd_4_T5b20190712__12_39_36__0016.JPG	12:39:46	12/07/2019	50.204517	-4.385188	55.9	0.4
4	5B	CIFCA_Edd_4_T5b20190712__12_40_22__0017.JPG	12:40:23	12/07/2019	50.204468	-4.385078	55.6	0.6

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4	5B	CIFCA_Edd_4_T5b20190712__12_41_23__0018.JPG	12:41:24	12/07/2019	50.204332	-4.384907	55.7	0.6
4	5B	CIFCA_Edd_4_T5b20190712__12_42_25__0019.JPG	12:42:25	12/07/2019	50.204197	-4.384750	55.7	0.6
4	6	CIFCA_Edd_4_T620190712__13_03_01__0020.JPG	13:03:03	12/07/2019	50.204690	-4.403435	49.6	0.5
4	6	CIFCA_Edd_4_T620190712__13_04_03__0021.JPG	13:04:03	12/07/2019	50.204608	-4.403273	49.5	0.5
4	6	CIFCA_Edd_4_T620190712__13_05_02__0022.JPG	13:05:01	12/07/2019	50.204533	-4.403130	49.5	0.4
4	6	CIFCA_Edd_4_T620190712__13_06_06__0023.JPG	13:06:05	12/07/2019	50.204437	-4.402997	49.2	0.5
4	6	CIFCA_Edd_4_T620190712__13_07_03__0024.JPG	13:07:03	12/07/2019	50.204362	-4.402823	49.2	0.5
4	6	CIFCA_Edd_4_T620190712__13_08_03__0025.JPG	13:08:02	12/07/2019	50.204277	-4.402643	49.2	0.5
4	6	CIFCA_Edd_4_T620190712__13_09_03__0026.JPG	13:09:03	12/07/2019	50.204190	-4.402467	49.2	0.5
4	6	CIFCA_Edd_4_T620190712__13_10_01__0027.JPG	13:10:01	12/07/2019	50.204085	-4.402320	49.1	0.5
4	6	CIFCA_Edd_4_T620190712__13_11_05__0028.JPG	13:11:04	12/07/2019	50.203988	-4.402125	49	0.5
4	6	CIFCA_Edd_4_T620190712__13_12_02__0029.JPG	13:12:02	12/07/2019	50.203892	-4.401972	48.7	0.6
4	6	CIFCA_Edd_4_T620190712__13_13_01__0030.JPG	13:13:01	12/07/2019	50.203772	-4.401795	48.9	0.6
4	6	CIFCA_Edd_4_T620190712__13_14_01__0031.JPG	13:14:01	12/07/2019	50.203682	-4.401607	49	0.5
4	6	CIFCA_Edd_4_T620190712__13_15_02__0032.JPG	13:15:02	12/07/2019	50.203577	-4.401413	48.9	0.6
4	6	CIFCA_Edd_4_T620190712__13_16_08__0033.JPG	13:16:09	12/07/2019	50.203467	-4.401182	48.9	0.6
4	6	CIFCA_Edd_4_T620190712__13_17_00__0034.JPG	13:17:00	12/07/2019	50.203370	-4.401027	49.1	0.6
4	6	CIFCA_Edd_4_T620190712__13_18_04__0035.JPG	13:18:03	12/07/2019	50.203265	-4.400848	48.9	0.6
4	6	CIFCA_Edd_4_T620190712__13_19_00__0036.JPG	13:19:00	12/07/2019	50.203158	-4.400660	49.1	0.5
4	6	CIFCA_Edd_4_T620190712__13_20_02__0037.JPG	13:20:02	12/07/2019	50.203067	-4.400475	49	0.6
4	6	CIFCA_Edd_4_T620190712__13_21_06__0038.JPG	13:21:08	12/07/2019	50.202978	-4.400285	49.2	0.5
4	6	CIFCA_Edd_4_T620190712__13_22_02__0039.JPG	13:22:01	12/07/2019	50.202908	-4.400118	49.2	0.5
4	6	CIFCA_Edd_4_T620190712__13_23_02__0040.JPG	13:23:01	12/07/2019	50.202792	-4.399930	49.5	0.5
4	6	CIFCA_Edd_4_T620190712__13_23_59__0041.JPG	13:23:58	12/07/2019	50.202712	-4.399765	49.5	0.5
4	6	CIFCA_Edd_4_T620190712__13_25_01__0042.JPG	13:25:02	12/07/2019	50.202612	-4.399572	49.6	0.6
4	6	CIFCA_Edd_4_T620190712__13_26_00__0043.JPG	13:25:59	12/07/2019	50.202540	-4.399377	49.7	0.5

CIFCA_SAC_Edd_2019_DDV_Box4

Appendix 4. Daily Log

Project information		
Project	Eddystone SAC (Year 6) DDV	
Survey code	2019_CIFCA_SAC_Edd_DDV	
Location	Eddystone	
Date	12/07/2019	
Vessel	Tiger Lily	
SeaSpyder laser calibration:	208 mm, 206 mm, 200 mm, 200 mm	
Olex mark	Single fish	
Staff		
Survey role	Company	Name
Principal Scientific Officer	Cornwall IFCA	Colin Trundle
Scientific Officer	Cornwall IFCA	Annie Jenkin
Scientific Officer	Cornwall IFCA	Hilary Stidwell
Skipper	Independent	Chris Lowe
Weather and tides		
High water time (Plymouth):	15:04 (UTC)	
High water (m)	4.65 m	
Time weather recorded (Falmouth)	08:12	
Wind direction	NW	
Wind speed	16mph	
Beaufort scale	4	
Cloud coverage	1/8	
Time weather recorded (Falmouth)	12:30 (UTC)	
Wind direction	NW	
Wind speed	10mph	
Beaufort scale	2	
Cloud coverage	1/8	
Safety		
Toolbox talk time	08:26	
Induction	None required	
Summary of operations		
Time (UTC)	Type	Activity
06:30		Onboard setting up
06:45		Depart Mylor
08:15		Arrive on survey site
08:26		Toolbox talk
08:35		Camera deployed
08:40:28	DDV	Box4_T1_SOL

CIFCA_SAC_Edd_2019_DDV_Box4

08:44		Lost comms
08:44		Comms back
09:06:48	DDV	Box4_T1_EOL
09:24:54	DDV	Box4_T2_SOL
09:48:20	DDV	Box4_T2_EOL
10:11:19	DDV	Box4_T3_SOL
10:34:38	DDV	Box4_T3_EOL
10:48:28	DDV	Box4_T4_SOL
11:11:49	DDV	Box4_T4_EOL
11:17		Lunch
11:53:30	DDV	Box4_T5_SOL
11:58		Stuck on gear
12:00		Recovering camera to surface
12:01		Camera at surface, release fishing gear
12:04		Redeployed camera to seabed
12:06		Camera on seabed
12:07		Lost comms
12:10:44	DDV	Box4_T5_EOL
12:11		Rebooting camera and re-starting system
12:18		Recovering camera to surface to reposition vessel
12:25:20	DDV	Box4_T5b_SOL (no comm port A file)
12:42:48	DDV	Box4_T5b_EOL
13:02:00	DDV	Box4_T6_SOL
13:26:23	DDV	Box4_T6_EOL
13:27		Camera recovered to deck
13:45		Depart for Mylor
15:20		Arrive Mylor