



Impact of Ring Netting on Seagrass Survey within Mounts Bay 2023



Field Report for the 2023 Mounts Bay Impact of Ring Netting on Seagrass Survey

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CIFCA_MountsBay_2023_DDV_Seagrass_RingNet_FieldReport

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Summary

This report summarises the operations and data acquired during the 2023 drop down video (DDV) survey to assess the impact of ring netting on seagrass within Mounts Bay. The survey was carried out over two days, 15th August 2023 and 16th August 2023. The first day consisted of carrying out video and stills over a grid with 10 m spacing, then observing the fishing activity of ring netting late afternoon the same day then repeating the video and stills on the second day. A total of 19 tows were completed on the first day (one of which was a continuation) and 17 tows on the second day with a total of 578 stills collected (544 post Quality Control) and 09:59:52 hours of video collected.

The aim of the survey was to collect high-quality video and still imagery across a grid to assess the impact of ring netting on seagrass.

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1 Background and Introduction

Cornwall Inshore Fisheries and Conservation Authority (Cornwall IFCA) carried out a survey over two days in August 2023 to investigate the potential interaction of ring netting on seagrass in Mounts Bay. The aim of the survey was to get a better understanding of the impact that ring netting activity might have on seagrass, if any. The Cornish Sardine Management Association (CSMA) were approached by Cornwall IFCA, to inform them, that as a part of our obligations to manage fishing activity in Marine Protected Areas (MPAs), we needed to assess the interaction of ring nets on seagrass. To do this effectively, we felt it was imperative that the CSMA were part of the planning and that a member could be willing to participate in the trial. The proposal was presented to the CSMA 2023 AGM. Two members agreed to carry out the proposed fishery part of the survey. The member in question was also involved in the final survey planning.

Sampling points were set up in a grid pattern and a drop down video survey was carried out before and after the activity occurred. The footage was analysed to investigate if there was an impact. The survey was carried out on a seagrass bed which is not located within a protected area.

The survey was carried out to provide additional information in respect of the potential impact of ring netting on seagrass. The results will aid in the finalisation of Habitats Regulations Assessments (HRA) and MCZ (Marine Conservation Zone) Assessments which are investigating the impact of ring netting on seagrass, a designated feature of the, Fal and Helford Special Area of Conservation (SAC), Plymouth Sound and Estuaries SAC, Mounts Bay MCZ and the Whitsand and Looe Bay MCZ within the Cornwall IFCA District.

The purpose of the HRA is to ascertain whether the fishing activity, in this instance pelagic gear (ring netting), has an effect equivalent to a Likely Significant Effect (LSE), or an Adverse Effect on Integrity (AEOI) of, the feature/sub-features of the SAC. The outcome of the HRA will determine whether management measures are required in order to ensure that the assessed fishing activity, or activities, will have no adverse effect on the integrity of the SAC. Cornwall IFCA currently considers the likelihood of the activity (ring netting) occurring within the seagrass habitat is possible and the risk to the sensitive seagrass habitat is medium and required more evidence to define determine the potential impact, if any.

The HRAs are part of the revised approach to the management of commercial fisheries in European Marine Sites (EMS), that the Department for Environment, Food and Rural Affairs (Defra) announced in 2012. The objective of the revised approach was to ensure that all existing and potential commercial fishing activities were managed in accordance with Article 6 of Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora, the 'Habitats Directive'. The marine aspects of the Habitats Directive (Council Directive 92/43/EEC) were transposed to domestic law in the Conservation of Habitats and Species Regulations 2017. The change in approach was bought in to promote sustainable fisheries while conserving the marine environment and resources, securing a sustainable future for both.

The revised approach was implemented on an evidence based, risk-prioritised, and phased basis. Risk prioritisation is informed by using a matrix of the generic sensitivity of the sub-features of EMS, to a suite of

fishing activities, as a decision-making tool. These sub-feature/activity combinations have been categorised according to specific definitions, as red, amber, green or blue (high, medium, low or no risk respectively). The interaction of ring netting on the seagrass feature was initially categorised as Blue and the matrix was revised by Cornwall IFCA for Purse seine/ring nets and the interaction updated from Blue to Amber. Ring nets are generally pelagic gear and do not interact with the seabed. However, when operating in shallow water there is a chance that the net will touch and interact with the seabed. Due to the size of the nets, the activity would not occur in the intertidal. An amber interaction is defined as “Where there is doubt as to whether conservation objectives for a feature (or sub-feature) will be achieved because of its sensitivity to a type of fishing, in all EMSs where that feature occurs, the effect of that activity or activities on such features will need to be assessed in detail at a site specific level. Appropriate management action should then be taken based on that assessment”. Activity/feature interactions identified within the matrix as amber risk require assessment to determine whether management of an activity is required to conserve site features.

The MCZ assessments are being undertaken by Cornwall IFCA in order to document and determine whether management measures are required to achieve the conservation objectives (CO) of the MCZs.

The IFCA’s responsibilities in relation to management of MCZs are laid out in Sections 125 to 128 of the Marine and Coastal Access Act (MACAA) 2009. Cornwall IFCA has duties under section 154 of the Marine and Coastal Access Act 2009 which states;

154 Protection of marine conservation zones

(1) The authority for an IFC district must seek to ensure that the conservation objectives of any MCZ in the district are furthered.

(2) Nothing in section 153(2) is to affect the performance of the duty imposed by this section.

(3) In this section—

(a) “MCZ” means a marine conservation zone designated by an order under section 116

(b) The reference to the conservation objectives of an MCZ is a reference to the conservation objectives stated for the MCZ under section 117(2)(b).

Section 125 of the 2009 Act also requires that public bodies (which includes the IFCA) exercise its functions in a manner to best further (or, if not possible, least hinder) the conservation objectives for MCZs.

This MCZ assessment will complement Cornwall IFCA’s assessment of commercial fishing activities in EMSs.

The Cornwall IFCA is implementing the assessment process in three stages:

- Simple screening: Is the activity capable of affecting the feature?
Does the activity take place within the MCZ?
- Stage 1 assessment - MCZ screening: Is the activity capable of affecting (other than insignificantly) the protected features of the MCZ (includes affecting any ecological or geomorphological process on which the conservation of any protected feature of the MCZ is (wholly or in part) dependent)?
- Stage 2 assessment - Significant risk assessment: Is there a significant risk of the activity hindering the achievement of the conservation objectives of the MCZ?

The outcomes of this survey will help inform the conclusions of all four assessments.

1.1 Aims & Objectives

1.1.1 Aims

- To assess the impact of ring netting on seagrass.

1.1.2 Objectives

- Collect high quality video and still imagery from a 10 m spaced grid of 20 by 20 sites, within Mounts Bay using the mapping European seabed habitats recommended operating guidelines for underwater video surveys (Coggan, 2007).
- Compare still images from before and after the ring netting activity for signs of impact, if any.

2 Methodology

2.1 Survey Area

The survey was carried out in Mounts Bay on the south coast of Cornwall (Figure 1). The bay contains a large area of seagrass estimated at 290 ha (Ecospan, 2021), and the Mounts Bay MCZ (shown by the red boundary in the east of the bay). The survey was carried out in an area of dense seagrass.

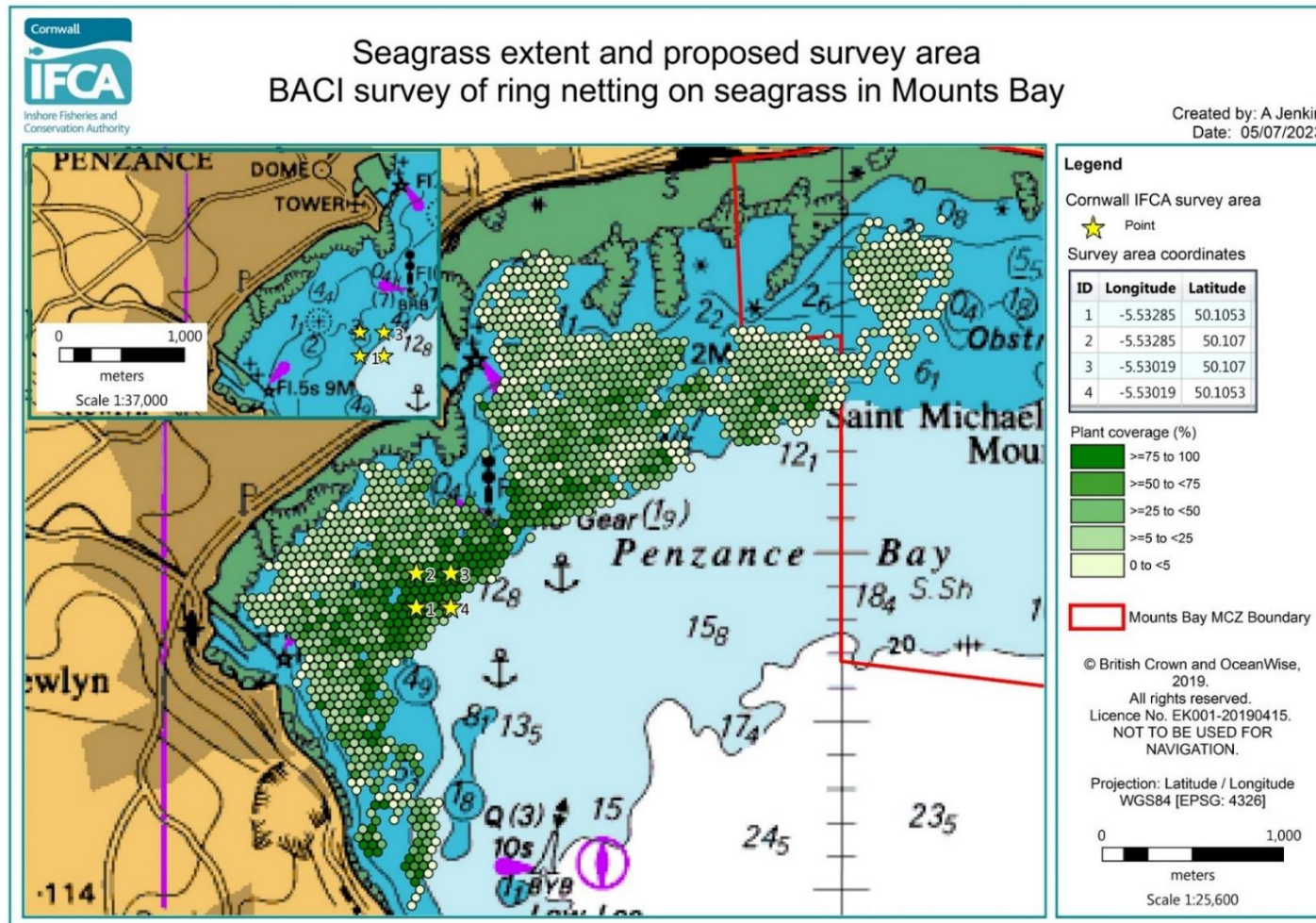


Figure 1: Seagrass extent in Mounts Bay (Ecospan, 2021), Cornwall and the Before-After-Control Impact (BACI) survey area in relation to the Mounts Bay MCZ boundary

2.2 Survey Sites

A proposed survey area with four coordinates was sent to Cornwall IFCA by the owner of the vessel. These positions were plotted and a grid was set up within the proposed area (Figure 2)

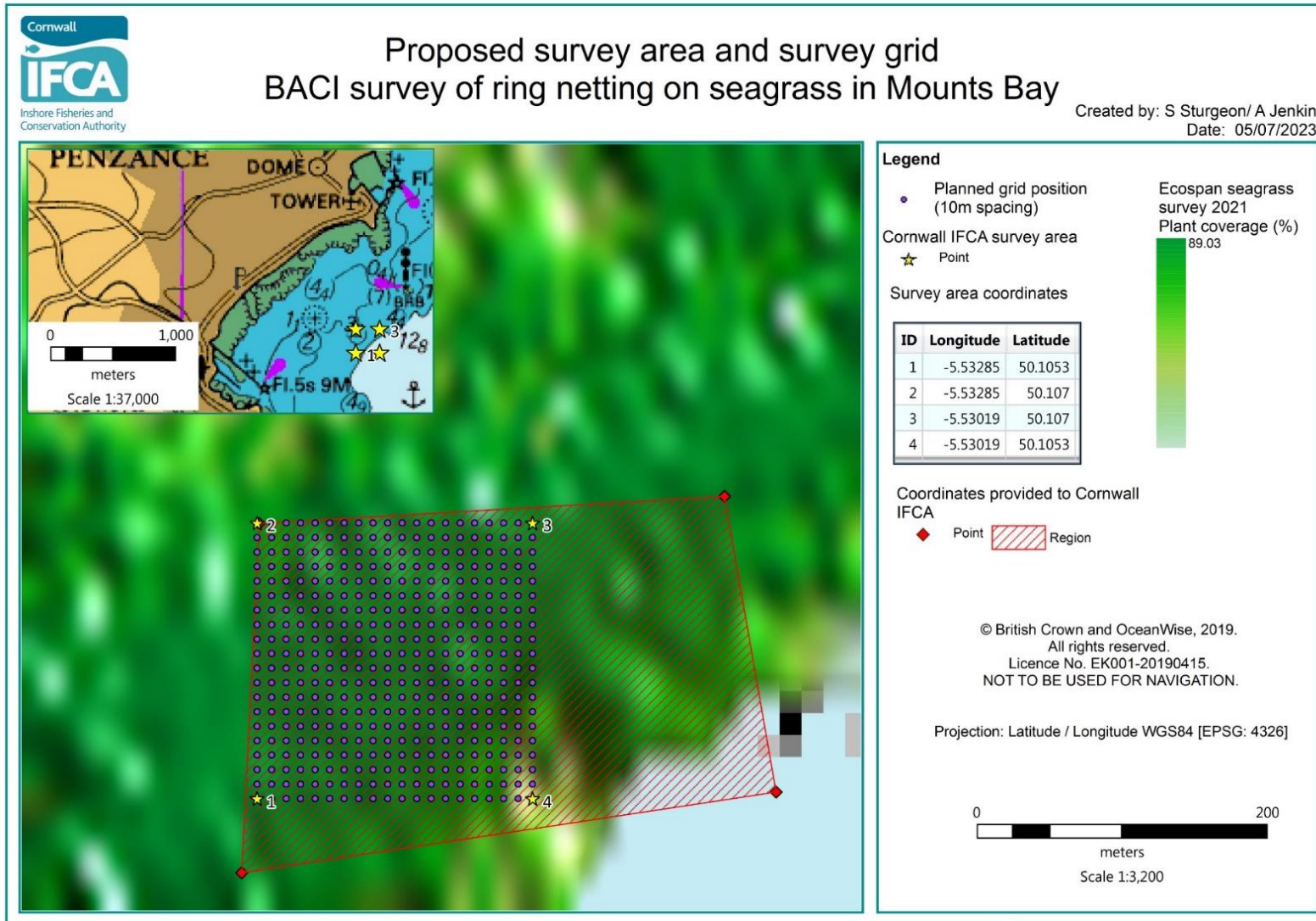


Figure 2: Planned survey sites for the Cornwall IFCA drop down video Before-After-Control Impact (BACI) survey of ring netting within Mounts Bay

2.3 Planned grid positions

A grid was set up consisting of 20 sites east to west (labelled 1 to 20) and 20 sites running north to south (labelled A to T). These were labelled T1 to T20 and from letters A to T. A total of 400 survey grid positions were planned as shown in Figure 3.

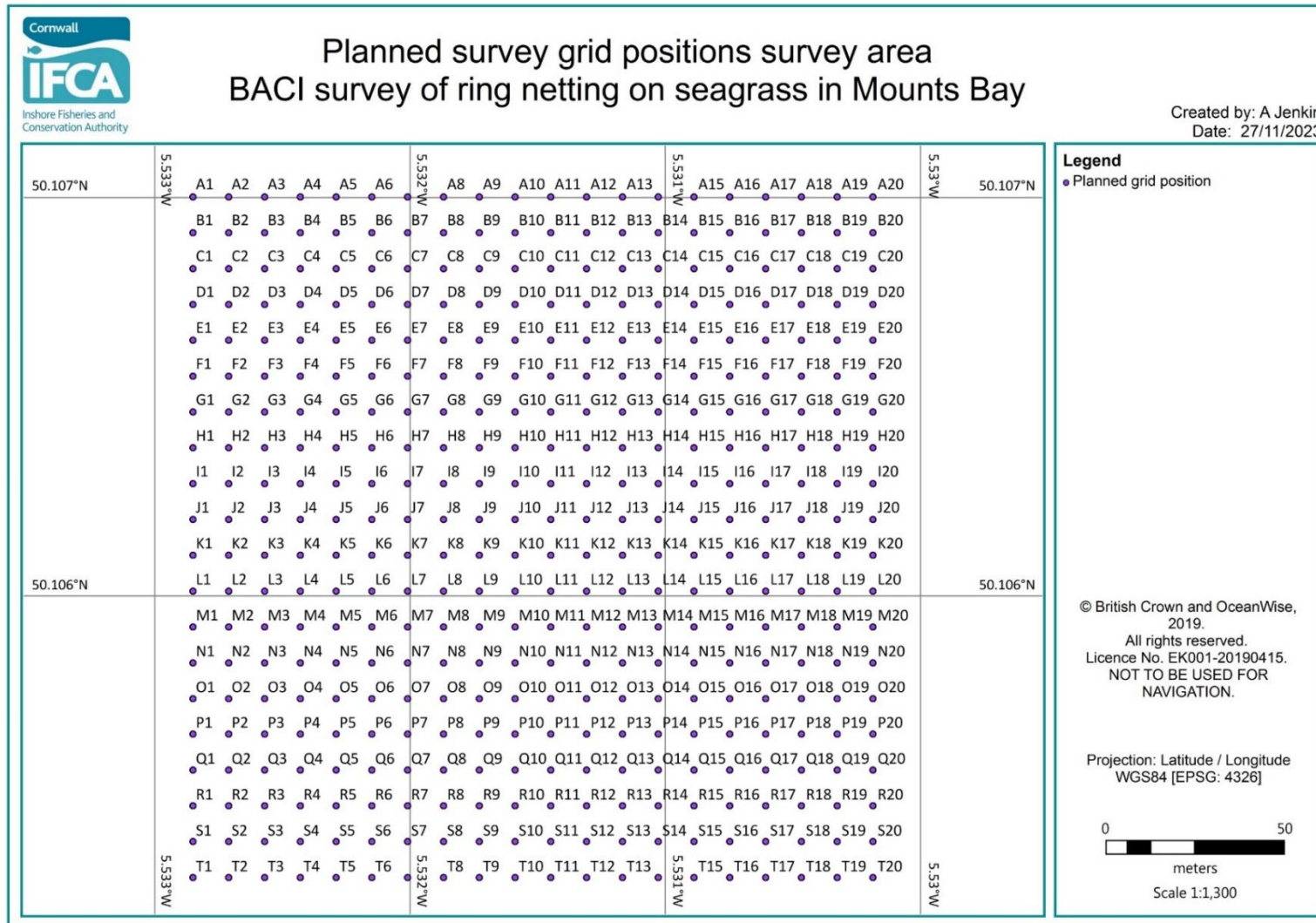


Figure 3: Planned grid survey positions for the Cornwall IFCA drop down video Before-After-Control Impact (BACI) survey of ring netting within Mounts Bay

2.4 Vessel Specifications

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 and Appendix 2. Survey operations and protocols are described below.

2.5 Personnel

The crew during the survey days consisted of the Principal Scientific Officer, an independent skipper onboard and two Scientific Officers working remotely. The crew roles consisted of operating the stills camera and video, running software Hypack, survey logs and operating the winch.

2.6 Personal Protective Equipment (PPE)

Life jackets with personal location beacons (PLBs) and steel toe capped waterproof boots were worn while working on deck. Hard hats were worn during deployment and recovery of the camera frame. There were no reported accidents or near misses during the survey.

2.7 Survey methodology

Video and digital still imagery was acquired using a STR SeaSpyder drop camera system (Appendix 2). The survey was carried out in line with Mapping European Seabed Habitats (MESH) recommended operating guidelines for underwater video and photographic imaging techniques (MESH, 2008).

The tows were planned with a still image every 10 m on a planned grid position at a speed of a maximum 0.5 knots. Planned survey sites were loaded into Hypack Max Version 2019 for navigation purposes.

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. "CIFCA_MountsBay_T3_20230815_VID_09_10_06") 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_MountsBay_T2_20230815__08_52_53__0001"). The SeaSpyder camera was deployed through the A-Frame at the stern of Tiger Lily and lashed 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 USBL GPS antenna (Lat/ Long WGS84) for the entire tow. A target was created in Hypack 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. Still images were taken 'on the fly' and the camera was not landed to avoid sediment being lifted prior to an impact occurring from the camera frame legs. Immediately upon having captured a still image a target was created in Hypack. Field notes were recorded for each target in Hypack such as image number, speed over ground and any comments (comma delimited) when possible.

The fishing vessel carried out the ring netting activity over the seagrass bed as updated coordinates were supplied to the fishermen prior to the operation to ensure the net was used in the same area. The drop of the ring net used from the fishing vessel was 34 m. An example of a ring net is shown in Figure 4. Tiger Lily VI followed the

fishing vessel at a distance of approximately 30 m to avoid collision and Hypack targets were created frequently to track the position of the fishing vessel.

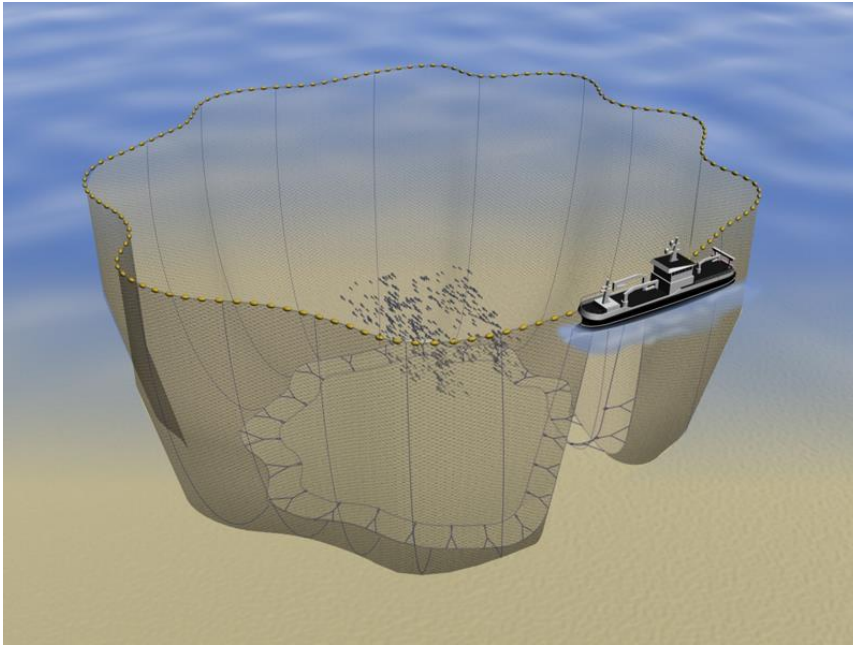


Figure 4: Ring netting activity (Source: Seafish, 2023).

2.8 Data handling

Hypack targets were used in data processing to obtain the exact time of each still image and the Com Port A GPS log using the Hemisphere GPS was used to obtain the exact location of each still image. All position information was recorded in the Lat/Long WGS84 projection and taken from a single GPS (Hemisphere V500 GNSS). Hypack was set up to log a vessel position recorded every second and the Com Port A file was recording the Hemisphere V500 GNSS position from the vessel for the duration of each tow. Hypack targets were extracted as a .txt file format and opened in Microsoft Excel (comma delimited). The Hypack 'logging' function was left running both survey days which outputs as a .RAW file. This data was opened with Microsoft Excel and cut to only include relevant strings of data such as date, time, position and depth. The data has not been extracted per tow but is available if required. Com Port A data was logged for the duration of each tow and saved in a .txt file format to the Topside PC.

Still 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 site number. Video files were captured to the SeaSpyder topside unit data drive (D:). The stills and video files were transferred from the topside unit to a WD Passport for transport and storage at the end of each survey day. The log sheets were worked on from the network and saved regularly throughout the day.

2.9 Data analysis

Image analysis was carried out post-survey with each still image being assessed in terms of quality with categories good, acceptable or poor as follows;

- Good: Clear, camera on seabed and sediment type and fauna distinguishable
- Acceptable: Can make out the sediment type and what fauna are present but not the best quality
- Poor: Can't make out the sediment type or what fauna is present

Any poor-quality images or duplicates were not carried forward for further analysis.

The position data for each tow were transferred to MapInfo Professional Version 17.0.2 and points were created to show the position of each still image (good and acceptable quality images only) and SOL/ EOL positions.

3 Results

3.1 Cruise Narrative

All times are Universal Time Coordinated (UTC).

15th August 2023

R/V Tiger Lily departed Mylor at 05:00 on the 15/08/2023 with the Principal Scientific Officer and an independent skipper onboard. Two Scientific Officers worked remotely. The vessel transited to Mounts Bay and the camera was deployed at 08:24 for a test tow. A total of 19 tows were completed, obtaining 04:57:49 of video and 307 still images pre-QC (Table 1). The camera was recovered at 15:00, secured on deck and the fishing vessel was on site at 15:15. The ring net was shot by the fishing vessel at 15:25. R/V Tiger Lily tracked the vessel at 30 m to avoid entanglement. The crew began the process of recovering the net at 15:29. The ring net was fully recovered by 15:45.

The vessel returned to Newlyn at 16:05.

16th August 2023

R/V Tiger Lily departed Newlyn at 07:00 on the 16/08/2023 with the Principal Scientific Officer and an independent skipper onboard. Two Scientific Officers worked remotely. The vessel transited to the first tow and the camera was deployed at 07:45. A total of 17 tows were completed, obtaining 05:02:03 of video and 271 still images pre-QC (Table 2). The camera was recovered to deck by 14:25 and Tiger Lily departed for Mylor, arriving alongside at 17:00.

High definition video footage and digital still images of the seabed (with scaling lasers and dedicated lighting) was acquired, using the downward facing camera, at 275 planned grid positions on 15/08/2023 and 266 planned grid positions on 16/08/2023.

The daily logs are shown in Appendix 3. Tow information including still image and video positions are available upon request.

CIFCA_MountsBay_2023_DDV_Seagrass_RingNet_FieldReport

Table 1: Summary of video and still metadata and brief description of each tow from 15th August 2023.

Date	Tow	Video Start Time	Video End Time	Video Length	No. of Stills per QA	No. of Stills post QA	Comments
15/08/2023	T2	08:51:57	09:08:15	00:16:18	16	14	Seagrass
15/08/2023	T3	09:10:08	09:25:35	00:15:27	16	11	Seagrass
15/08/2023	T4	09:28:00	09:43:32	00:15:32	16	16	Seagrass
15/08/2023	T5	09:54:52	10:13:38	00:18:46	15	15	Seagrass
15/08/2023	T6	10:14:32	10:39:10	00:24:38	12	11	Seagrass
15/08/2023	T6b	11:05:44	11:12:23	00:06:39	10	05	Seagrass
15/08/2023	T7	10:43:32	11:01:07	00:17:35	17	17	Seagrass
15/08/2023	T8	11:21:30	11:41:03	00:19:33	23	16	Seagrass
15/08/2023	T9	11:43:17	12:01:39	00:18:22	23	16	Seagrass
15/08/2023	T10	12:05:30	12:22:22	00:16:52	15	14	Seagrass
15/08/2023	T11	12:40:21	12:57:17	00:16:56	18	16	Seagrass
15/08/2023	T12	12:58:05	13:16:38	00:18:33	15	15	Seagrass
15/08/2023	T13	13:18:12	13:32:53	00:14:41	16	16	Seagrass
15/08/2023	T14	13:36:33	13:49:55	00:13:22	16	16	Seagrass
15/08/2023	T15	13:54:01	14:08:16	00:14:15	16	16	Seagrass
15/08/2023	T16	14:14:46	14:27:33	00:12:47	16	16	Seagrass
15/08/2023	T17	14:31:21	14:44:41	00:13:20	15	15	Seagrass
15/08/2023	T18	14:49:20	15:01:52	00:12:32	16	16	Seagrass
15/08/2023	T19	15:06:01	15:17:42	00:11:41	16	16	Seagrass
Total				04:57:49	307	277	

CIFCA_MountsBay_2023_DDV_Seagrass_RingNet_FieldReport

Table 2: Summary of video and still metadata and brief description of each tow from 16th August 2023.

Date	Tow	Video Start Time	Video End Time	Video Length	No. of Stills per QA	No. of Stills post QA	Comments
16/08/2023	T2	07:58:48	08:13:41	00:14:53	15	15	Seagrass
16/08/2023	T3	08:15:40	08:33:22	00:17:42	16	16	Seagrass
16/08/2023	T4	08:36:25	08:47:01	00:10:36	16	16	Seagrass
16/08/2023	T5	08:49:13	09:06:28	00:17:15	16	16	Seagrass
16/08/2023	T6	09:08:20	09:23:07	00:14:47	16	16	Seagrass
16/08/2023	T7	09:24:34	09:41:48	00:17:14	16	16	Seagrass
16/08/2023	T8	09:43:56	09:56:46	00:12:50	16	16	Seagrass
16/08/2023	T9	10:08:37	10:28:19	00:19:42	18	16	Seagrass
16/08/2023	T10	10:29:38	10:44:34	00:14:56	15	15	Seagrass
16/08/2023	T11	10:46:26	11:00:44	00:14:18	16	16	Seagrass
16/08/2023	T12	11:02:06	11:15:32	00:13:26	16	16	Seagrass
16/08/2023	T13	11:48:30	12:07:44	00:19:14	16	16	Seagrass
16/08/2023	T14	12:09:48	12:29:10	00:19:22	16	15	Seagrass
16/08/2023	T15	12:30:46	12:47:03	00:16:17	15	14	Seagrass
16/08/2023	T16	12:51:15	13:20:34	00:29:19	16	16	Seagrass
16/08/2023	T17	13:22:58	13:40:36	00:17:38	16	16	Seagrass
16/08/2023	T18	13:42:42	14:15:16	00:32:34	16	16	Seagrass
Total				05:02:03	271	267	

3.2 15th August 2023

The still image positions from the 15th August 2023 (before activity) and the planned grid positions are shown in Figure 5.

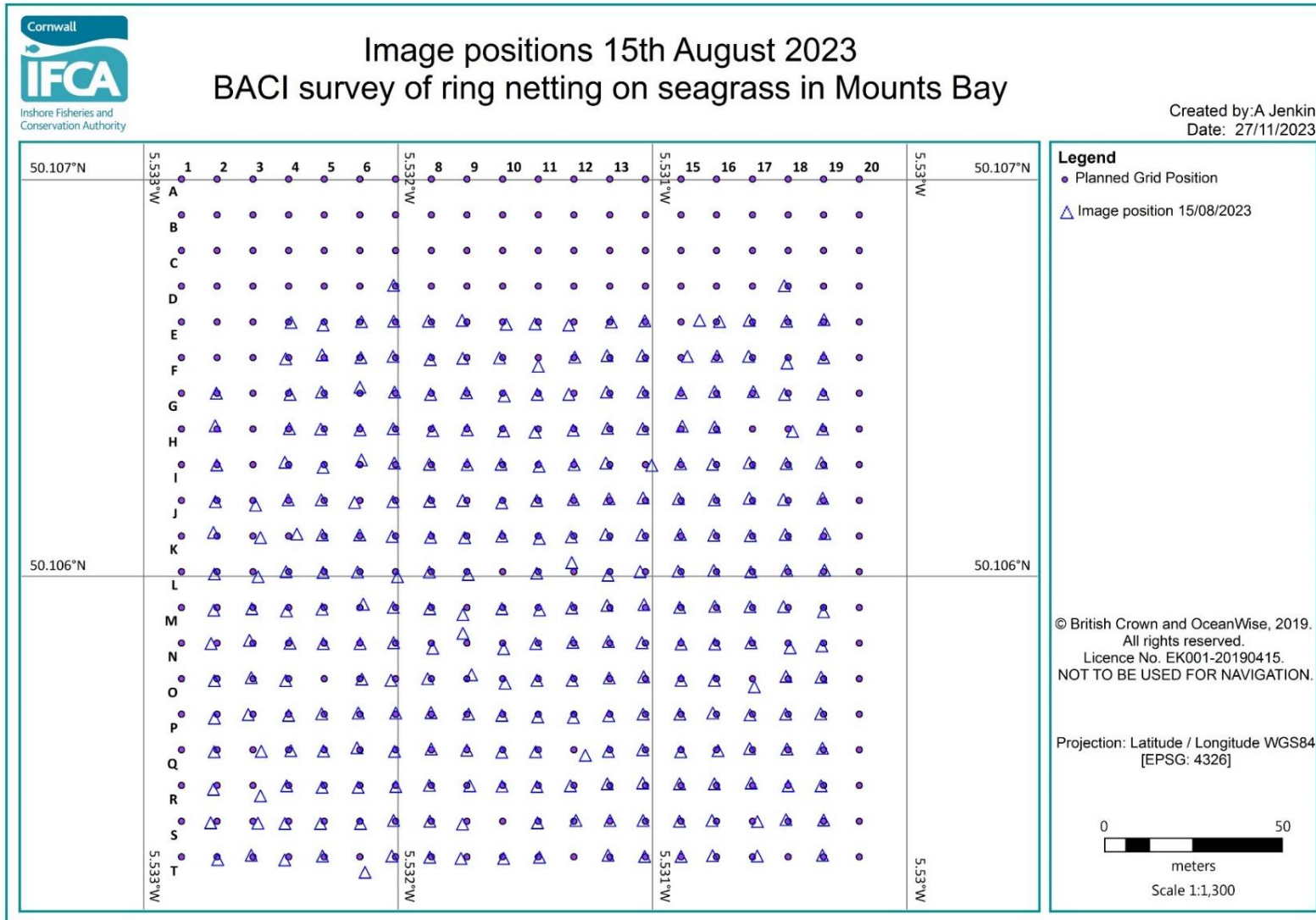


Figure 5: Still image positions and planned survey grid positions taken before the ring netting activity on 15th August 2023 from the 2023 impact of ring netting survey within Mounts Bay

3.3 16th August 2023

The still image positions from the 16th August 2023 (after activity) and the planned grid positions are shown in Figure 6.

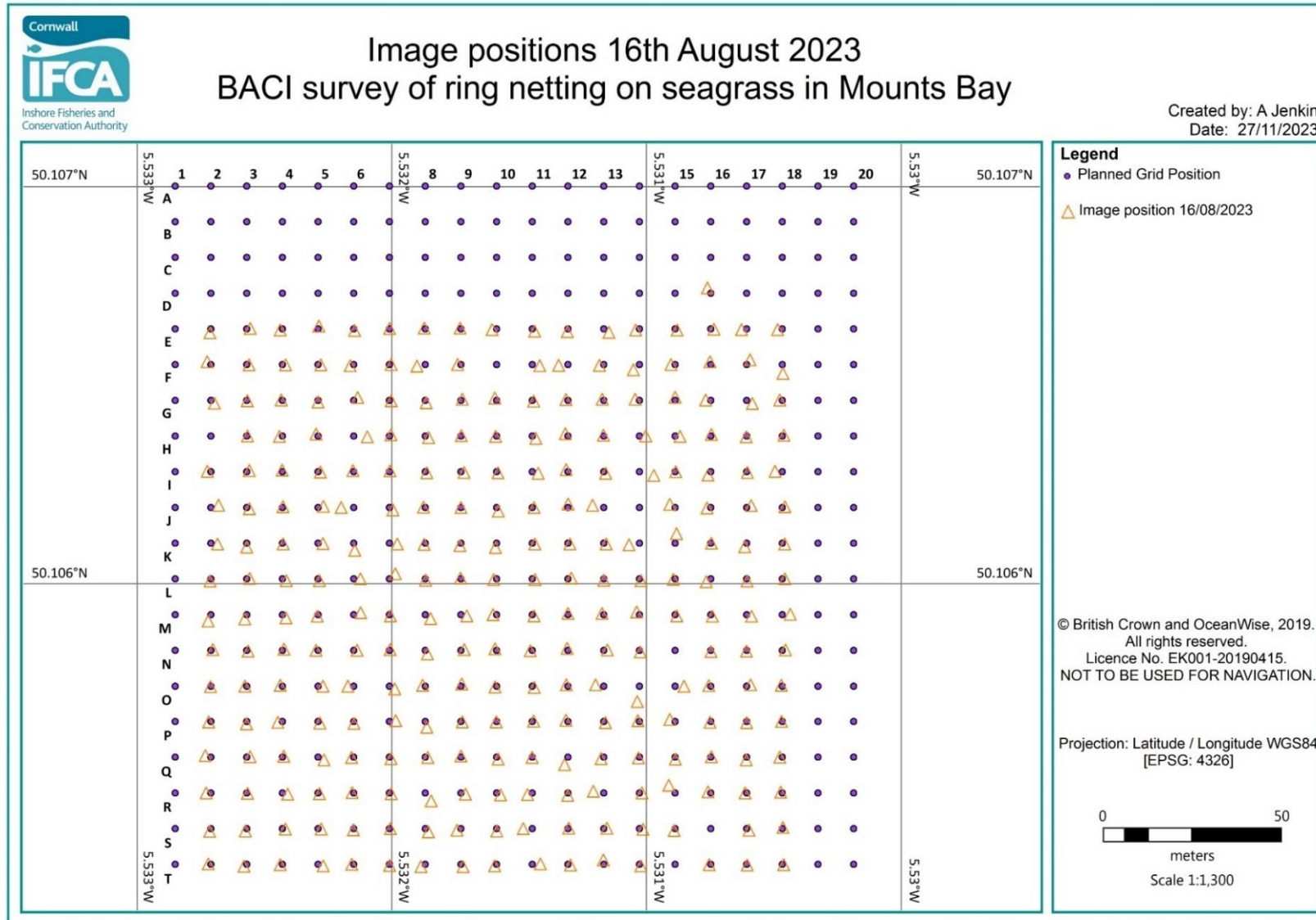


Figure 6: Still image positions and planned survey grid positions taken before the ring netting activity on 16th August 2023 from the 2023 impact of ring netting survey within Mounts Bay

3.4 Before and after image positions

The still image positions from before and after the activity and the planned grid positions are shown in Figure 7. The difference in latitude and longitude between paired images is shown in more detail in Appendix 4

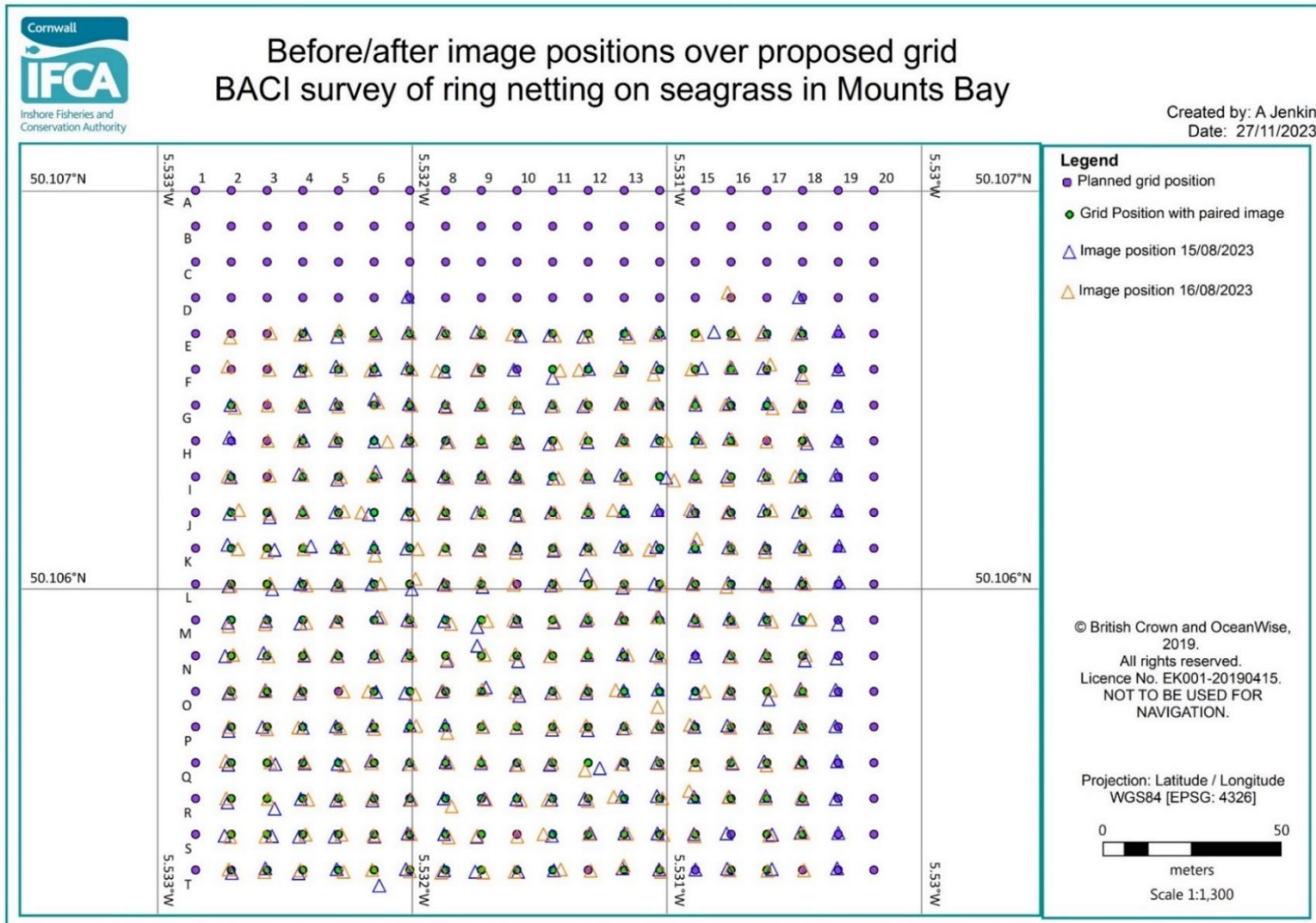


Figure 7: Still image positions and planned survey grid positions taken before the ring netting activity on 15th August and after the ring netting activity on 16th August from the 2023 impact of ring netting survey within Mounts Bay

3.5 Paired grid positions

Grid positions with paired images are shown in Figure 8. The grid positions with paired positions are shown in more detail in Appendix 5.

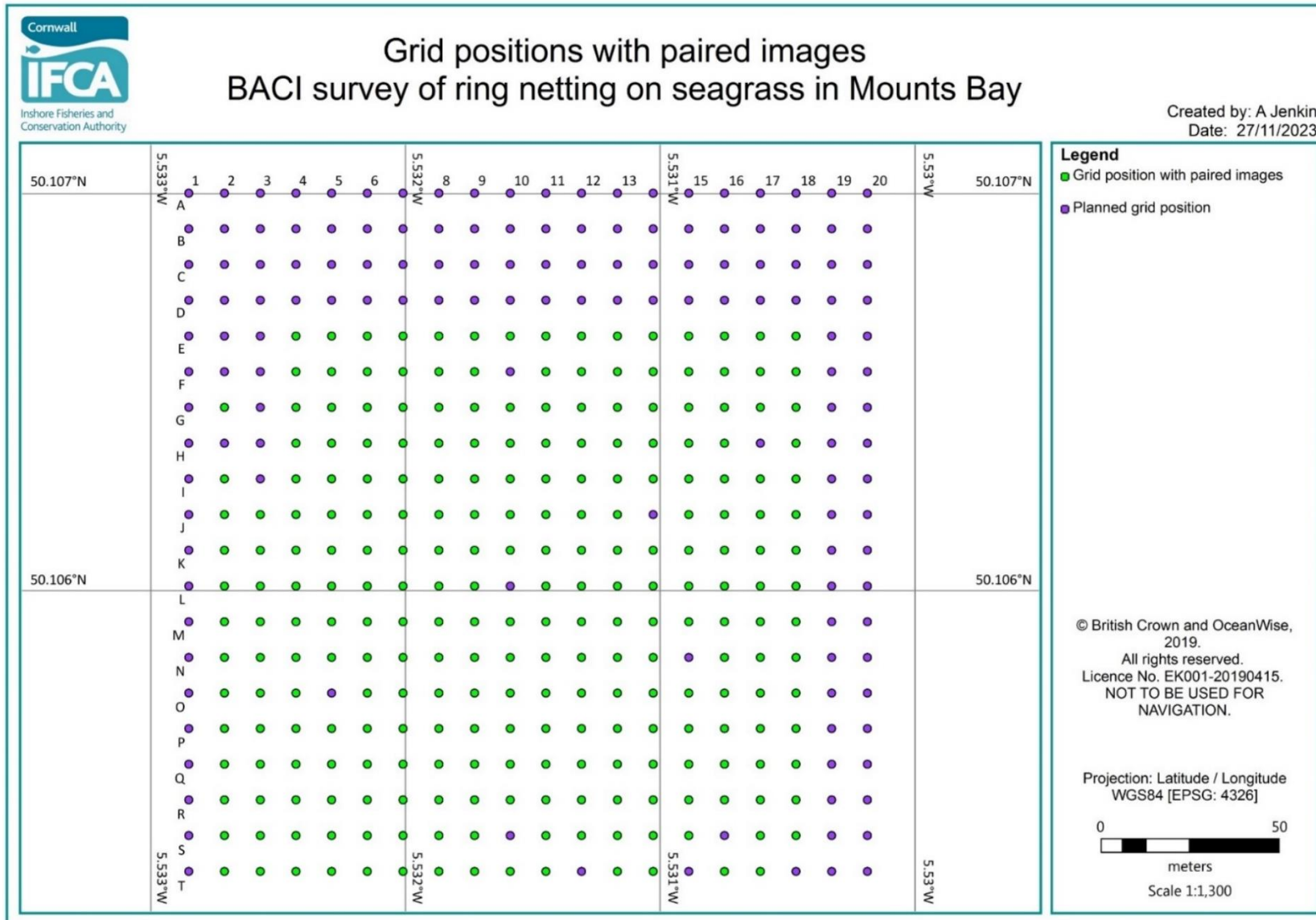


Figure 8: Planned grid positions with paired images from the 2023 impact of ring netting survey within Mounts Bay

3.6 Ring net positions

The estimated position of the ring net, the position of Tiger Lily VI, the still image positions and the planned grid positions are shown in Figure 9.

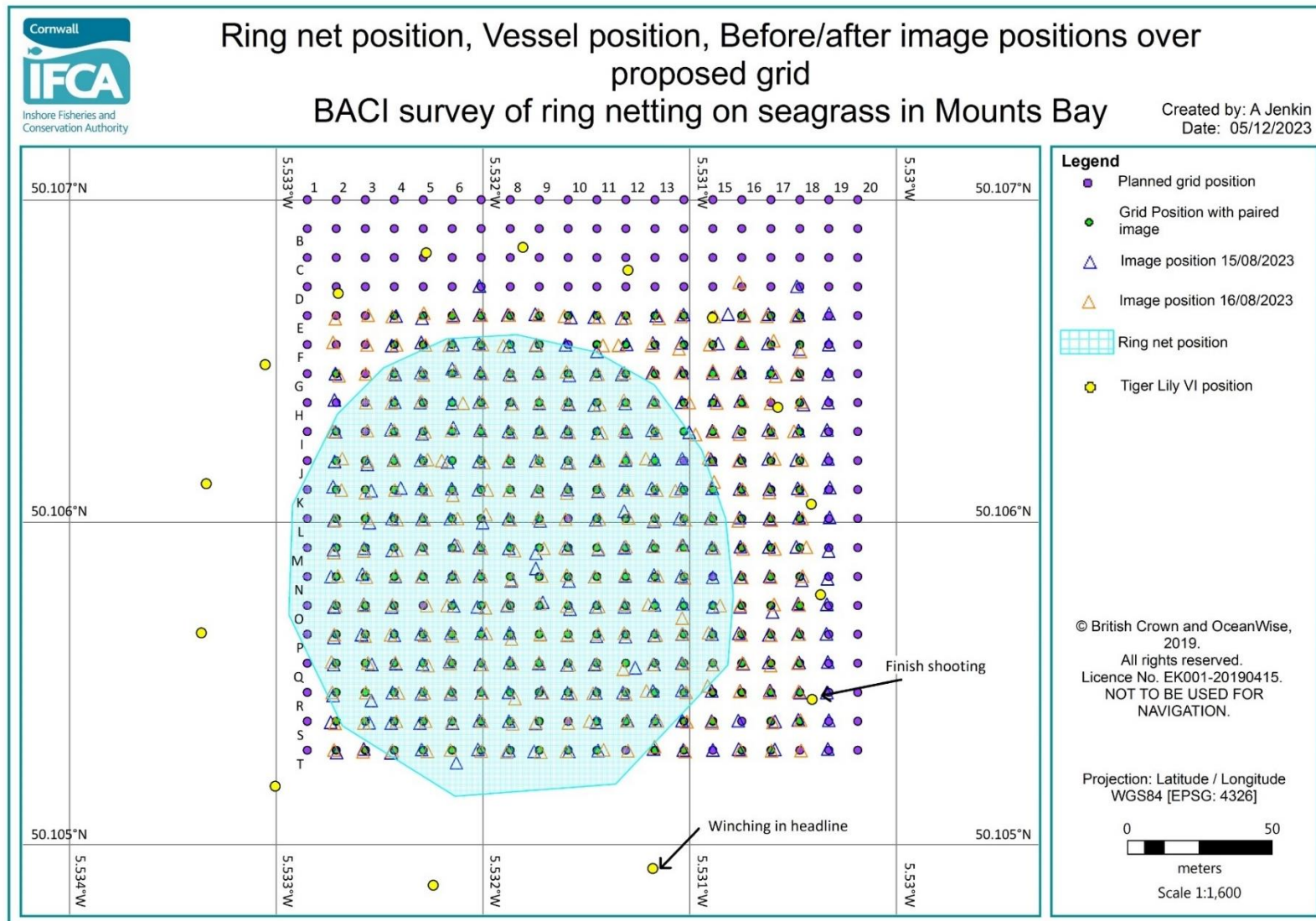


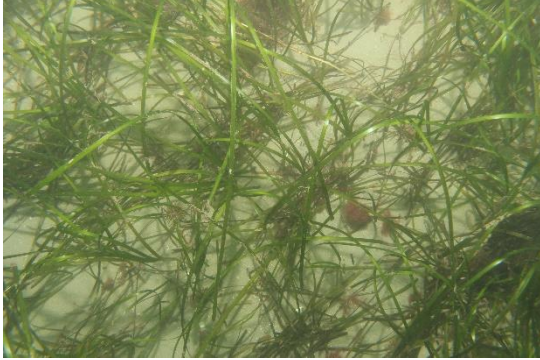







Figure 9: Approximate ring net position, Tiger Lily VI position, Still image positions and planned survey grid positions taken before the ring netting activity on 15th August and after the ring netting activity on 16th August from the 2023 impact of ring netting survey within Mounts Bay.

3.7 Representative Paired Still Images

A selection of paired images from the survey, chosen at random are shown in Table 3.

Table 3: Digital stills representative of the habitats recorded during the 2023 impact of ring netting on seagrass survey within Mounts Bay

Tow and Grid ID	15/08/2023	16/08/2023
T2 - G2		
T6 - F6		
T10 - E10		
T14 - K14		

T18 - O18



4 Discussion

The survey was successful in collecting before and after still images to assess the potential impact of ring netting on seagrass.

Full analysis of the images to assess the fishing method for potential impacts was outsourced and a redacted version (all references and information pertaining to the fishing activity removed) of this report was sent to the contractor. This was to ensure that due to the potentially controversial nature of the activity/habitat interaction there was no potential for any bias in the analysis. It is recommended that the externally provided report is read in conjunction with this field report.

5 Limitations

There were a number of limitations during the survey which included the following;

- The USBL beacon was not used on the day so the exact position of the camera on the seabed was unknown, however the position of the vessel was used for the still image position and was thought to be fairly accurate due to the shallow depth of the survey area and limited tidal influence.
- The before and after image for each site is not in the same place.
- The net was not filmed in action on the seabed.
- There was a lot of sediment in the water column on the first day which affected the quality of the before imagery. It had settled out by the second day.

6 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

Ecospan, 2021. Mounts Bay seagrass survey 2021. Report Number: ER21-479.

Seafish, 2023. Purse Seine, Seafish. [PS - Purse Seine | Gear | Seafish Fishing Gear Database](#) [Accessed 04/12/2023]

7 Appendices

Appendix 1. Vessel specification

R/V Tiger Lily VI

The survey was undertaken from Cornwall IFCA's Research Vessel (R/V) Tiger Lily VI (Annex Figure A). Tiger Lily VI is an MCA coded Cat 2 vessel. She is a South Boats 11 m Island MkII catamaran with twin IVECO 450hp engines; her Callsign is MRWR7. The general layout of Tiger Lily VI is shown in Appendix 1. The vessel has been refitted for survey work and includes a purpose built survey station within the wheelhouse, fitted with an inverter and uninterruptable power supply (UPS) to provide stable, continuous 240 v power, NMEA outputs and a dedicated Global Positioning System (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.

Annex Table A: Research Vessel Tiger Lily VI Vessel Specification

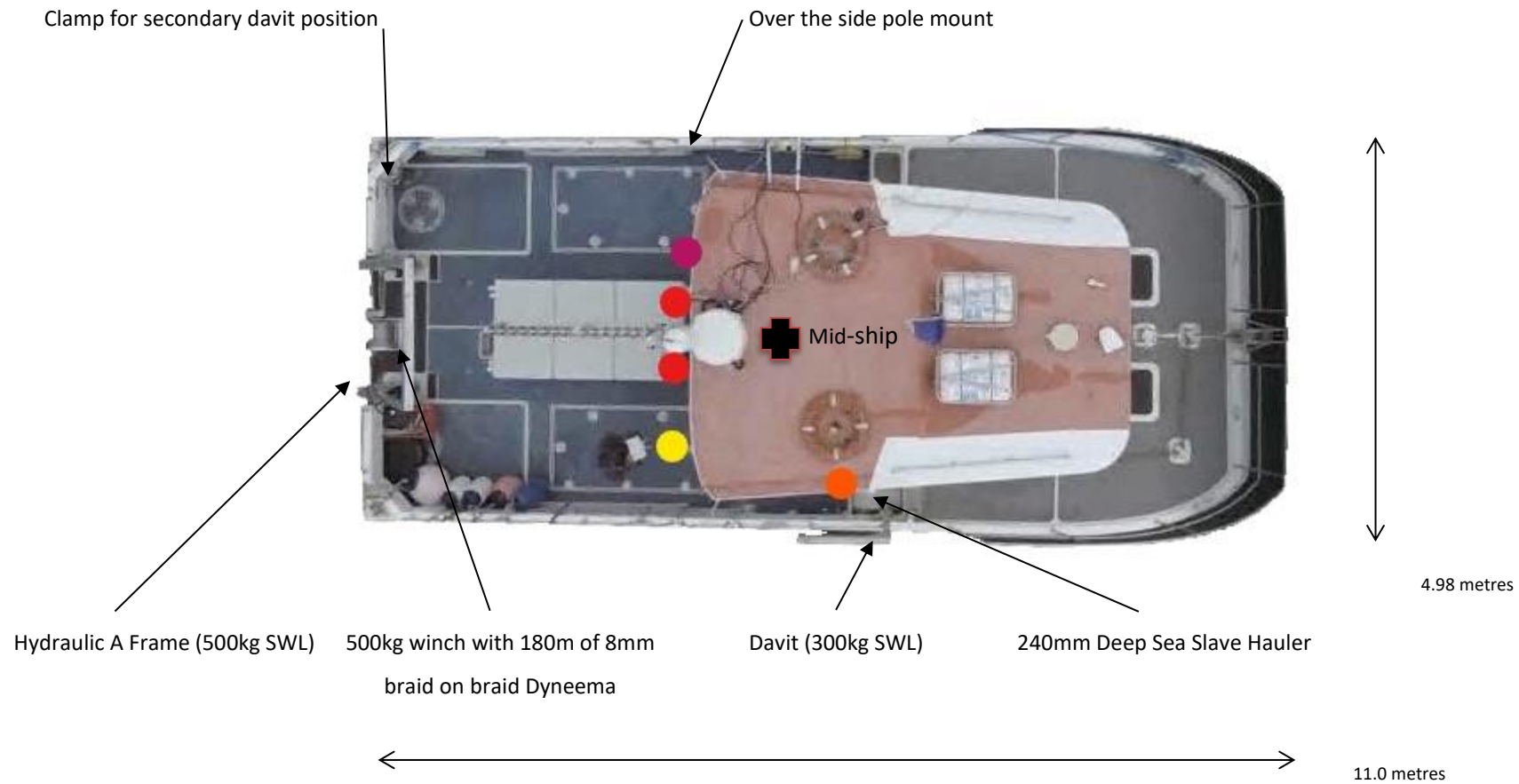
Builder	South Boats Ltd
Model	Island MkII
Built	2007
LOA	11.0m
Beam	4.98m
Draught	1.1m (aft)
Tonnage	c.10 tonnes
Area of operation	MCA Category 2
Call sign	MRWR7
MMSI Number	235054954
MECAL Certification number	M07WB0111059
Complement	14 (including min 2 crew)
Propulsion	2 x 450hp Iveco NEF series
Speed	Cruising: 16 – 18 knots

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	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)
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 V500 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
Connectivity	SATFI 4G Mobile broadband

Appendix 2. Equipment specification

Positioning Software and Offsets



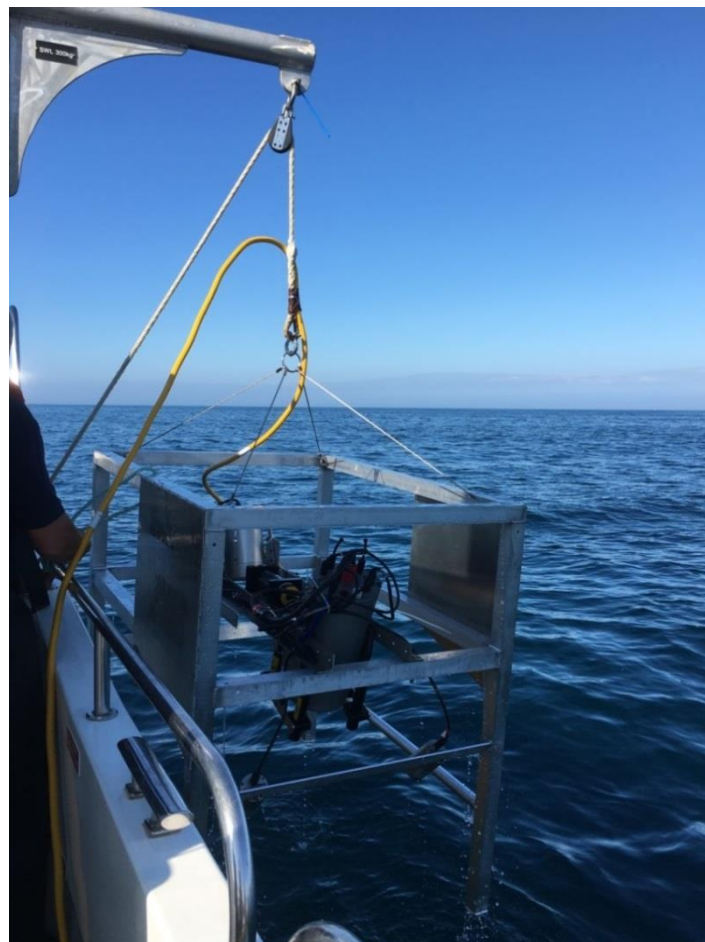
Equipment				Offset (m)				
NMEA Device	Plan Symbol	Make/Model	Offset Name	X (from bow)	X (mid-ship)	Y (from bow)	Y (mid-ship)	Z (from WL)
Navigation depth sounder	●	Furuno Navnet	Furuno transducer	6.10m	-0.60m	0.40m	2.09m	- 0.50m
GPS	●	Furuno GP32 x 2	Furuno mushroom antenna	6.40m	-0.90m	2.30m/2.85m	0.19m/-0.36m	+ 4.25m
GPS	●	Furuno GP32	Furuno mushroom antenna	4.80m	0.70m	0.80m	1.69m	+ 2.90m
GNSS	●	Hemisphere V500	Main GPS	6.40m	-0.90m	3.20m	-0.71m	+ 3.85

STR SeaSpyder drop camera system

Annex Table B shows the camera system specification and Annex Figure B shows the camera system on the starboard side of R/V Tiger Lily. Further details of the system are available online¹.

Annex Table B: SeaSpyder Drop Camera specification

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

¹ Available from: <https://www.str-subsea.com/products/geophysical-equipment/drop-camera-system/str-seaspyder-hd-drop-camera-system> [Accessed 04/01/2024]

Appendix 3. Daily Logs


15th August 2023

Project	2023_CIFCA_DDV_MB_RingNet_Seagrass		Survey code	20230815_CIFCA_DDV_MB_Ringnet_Seagrass				
Date	2023-08-15		Coordinate reference system	WGS84				
Location	Mounts Bay		Position Fix (Vessel)	Hemisphere V500 GNSS (GPS)	Wind direction		WN W	
Survey Type	DDV		Horizontal Accuracy	0.5 m			Wind speed	10 mph
Vessel	Tiger Lily VI		Time zone	UTC			Beaufort scale	2
Skipper	David Raymond		Depth reference system	Lowest Astronomical Tide			Cloud coverage	2/8
IFCA officers	Colin Trundle, Annie Jenkin (remote), Stephanie Sturgeon (remote)				Time recorded		08:00	
Visitors	None				Weather			
Time depart Mylor (UTC)	05:00		Camera make and model	STR SeaSpyder drop camera system.			Wind direction	-
Time return Newlyn	16:05		Height of camera	0.6 m		Wind speed	-	
High water time	04:06 (UTC)		Calibration Notes	Laser scaling: horizontal 210 mm		Beaufort scale	-	
High water (m)	4.86 m		Toolbox time	08:15		Cloud coverage	-	
Tide recorded from	Penzance		Induction	Not required		Time recorded	-	
Description of survey	Impact of ring netting on seagrass in Mounts Bay. Day 1 - Before activity							
Time (UTC)	Type	Details/description						
04:30		On board, setting up						
05:00		Depart Mylor						
07:00		Arrive Newlyn						
07:30	DDV	Setting up camera and hypack						
08:24	DDV	Deploying camera frame. Camera in water						
08:27	DDV	Tow TT SOL - Trial for camera height						
08:33	DDV	Tow TT EOL						
08:51	DDV	Tow 2 SOL						
09:08	DDV	Tow 2 EOL						
09:10	DDV	Tow 3 SOL						
09:25	DDV	Tow 3 EOL						
09:28	DDV	Tow 4 SOL						
09:43	DDV	Tow 4 EOL						
09:54	DDV	Tow 5 SOL						
10:13	DDV	Tow 5 EOL						
10:14	DDV	Tow 6 SOL						
10:39	DDV	Tow 6 EOL						
10:43	DDV	Tow 7 SOL						
11:01	DDV	Tow 7 EOL						
11:05	DDV	Tow 6b SOL						

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11:10		AJ connection disconnected, CT took over camera operation
11:12	DDV	Tow 6b EOL
11:21	DDV	Tow 8 SOL
11:41	DDV	Tow 8 EOL
11:43	DDV	Tow 9 SOL
12:01	DDV	Tow 9 EOL
12:05	DDV	Tow 10 SOL
12:22	DDV	Tow 10 EOL
12:25		Lunch
12:40	DDV	Tow 11 SOL
12:57	DDV	Tow 11 EOL
12:58		AJ connection reconnected
12:58	DDV	Tow 12 SOL
13:16	DDV	Tow 12 EOL
13:18	DDV	Tow 13 SOL
13:32	DDV	Tow 13 EOL
13:36	DDV	Tow 14 SOL
13:49	DDV	Tow 14 EOL
13:54	DDV	Tow 15 SOL
14:08	DDV	Tow 15 EOL
14:14	DDV	Tow 16 SOL
14:27	DDV	Tow 16 EOL
14:31	DDV	Tow 17 SOL
14:44	DDV	Tow 17 EOL
14:49	DDV	Tow 18 SOL
15:01	DDV	Tow 18 EOL
15:06	DDV	Tow 19 SOL
15:17	DDV	Tow 19 EOL
15:00	DDV	Camera recovered
15:25		Ring net shot
15:29		Winching in headline/ Pursing in ring net
15:45		Ring net recovered
16:05		Alongside at Newlyn

16th August 2023

Project	2023_CIFCA_DDV_MB_RingNet_Seagrass	Survey code	20230816_CIFCA_DDV_MB_Ringnet_Seagrass			
Date	2023-08-16	Coordinate reference system	WGS84	Weather		
Location	Mounts Bay	Position Fix (Vessel)	Hemisphere V500 GNSS (GPS)	Wind direction		Variable
Survey Type	DDV	Horizontal Accuracy	0.5 m	Wind speed		1 to 5 mph
Vessel	Tiger Lily VI	Time zone	UTC	Beaufort scale		1
Skipper	David Raymond	Depth reference system	Lowest Astronomical Tide	Cloud coverage		2/8
IFCA officers	Colin Trundle, Annie Jenkin (remote), Stephanie Sturgeon (remote)			Time recorded		07:15
Visitors	None			Weather		
Time depart Newlyn (UTC)	07:20	Camera make and model	STR SeaSpyder drop camera system.	Wind direction	-	<i>Data entered by</i>
Time return Mylor	17:00	Height of camera	0.6 m	Wind speed	-	SS (2023-08-15)
High water time	04:42 (UTC)	Calibration Notes	Laser scaling: horizontal 210 mm	Beaufort scale	-	
High water (m)	4.98 m	Toolbox time	N/A	Cloud coverage	-	QA
Tide recorded from	Penzance	Induction	Not required	Time recorded	-	AJ/ SS (2023-09-06)
Description of survey	Impact of ring netting on seagrass in Mounts Bay. Day 2 - After activity					
Time (UTC)	Type	Details/description				
07:00		On board				
07:20		Depart Newlyn				
07:30		Arrive Survey site				
07:45	DDV	Deploying camera frame. Camera in water				
07:58	DDV	Tow 2 SOL				
08:13	DDV	Tow 2 EOL				
08:15	DDV	Tow 3 SOL				
08:33	DDV	Tow 3 EOL				
08:36	DDV	Tow 4 SOL				
08:47	DDV	Tow 4 EOL				
08:49	DDV	Tow 5 SOL				
09:06	DDV	Tow 5 EOL				
09:08	DDV	Tow 6 SOL				
09:23	DDV	Tow 6 EOL				

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09:24	DDV	Tow 7 SOL
09:41	DDV	Tow 7 EOL
09:43	DDV	Tow 8 SOL
09:56	DDV	Tow 8 EOL
10:08	DDV	Tow 9 SOL
10:28	DDV	Tow 9 EOL
10:29	DDV	Tow 10 SOL
10:44	DDV	Tow 10 EOL
10:46	DDV	Tow 11 SOL
11:00	DDV	Tow 11 EOL
11:02	DDV	Tow 12 SOL
11:15	DDV	Tow 12 EOL
11:48	DDV	Tow 13 SOL
12:07	DDV	Tow 13 EOL
12:09	DDV	Tow 14 SOL
12:29	DDV	Tow 14 EOL
12:30	DDV	Tow 15 SOL
12:47	DDV	Tow 15 EOL
12:51	DDV	Tow 16 SOL
13:20	DDV	Tow 16 EOL
13:22	DDV	Tow 17 SOL
13:40	DDV	Tow 17 EOL
13:42	DDV	Tow 18 SOL
14:15	DDV	Tow 18 EOL
14:20	DDV	Recovering camera
14:25	DDV	Camera recovered
14:35		Depart Newlyn
17:00		Arrive alongside at Mylor

Appendix 4. Position difference between paired images

Annex Table C: Difference in latitude and longitude between paired images from the 2023 impact of ring netting survey within Mounts Bay

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
E4	50.106641	-5.532421	50.106639	-5.532439	0.000002	0.000017
E5	50.106634	-5.532295	50.106649	-5.532287	-0.000015	-0.000008
E6	50.106643	-5.532144	50.106638	-5.532147	0.000004	0.000002
E7	50.106644	-5.532017	50.106643	-5.532009	0.000001	-0.000008
E8	50.106644	-5.531881	50.106644	-5.531873	0.000000	-0.000008
E9	50.106646	-5.531748	50.106644	-5.531732	0.000003	-0.000015
E10	50.106636	-5.531575	50.106640	-5.531607	-0.000004	0.000032
E11	50.106637	-5.531462	50.106636	-5.531440	0.000001	-0.000021
E12	50.106634	-5.531329	50.106635	-5.531311	0.000000	-0.000018
E13	50.106642	-5.531162	50.106633	-5.531148	0.000009	-0.000014
E14	50.106645	-5.531030	50.106639	-5.531043	0.000006	0.000013
E15	50.106646	-5.530815	50.106639	-5.530880	0.000007	0.000065
E16	50.106643	-5.530737	50.106641	-5.530736	0.000002	-0.000001
E17	50.106646	-5.530620	50.106640	-5.530627	0.000006	0.000007
E18	50.106644	-5.530473	50.106640	-5.530486	0.000004	0.000013
F4	50.106549	-5.532442	50.106551	-5.532418	-0.000002	-0.000024
F5	50.106559	-5.532299	50.106551	-5.532279	0.000008	-0.000019
F6	50.106552	-5.532146	50.106549	-5.532164	0.000003	0.000019
F7	50.106555	-5.532020	50.106552	-5.532003	0.000003	-0.000017
F8	50.106547	-5.531874	50.106548	-5.531902	-0.000002	0.000028
F9	50.106550	-5.531746	50.106552	-5.531742	-0.000002	-0.000005
F11	50.106530	-5.531449	50.106549	-5.531420	-0.000019	-0.000028
F12	50.106553	-5.531306	50.106550	-5.531345	0.000003	0.000038
F13	50.106557	-5.531179	50.106550	-5.531185	0.000007	0.000006
F14	50.106557	-5.531041	50.106539	-5.531052	0.000018	0.000011
F15	50.106555	-5.530863	50.106552	-5.530904	0.000003	0.000041
F16	50.106556	-5.530746	50.106559	-5.530751	-0.000003	0.000005

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
F17	50.106555	-5.530622	50.106564	-5.530594	-0.000010	-0.000029
F18	50.106538	-5.530471	50.106530	-5.530465	0.000009	-0.000007
G2	50.106462	-5.532714	50.106455	-5.532697	0.000007	-0.000017
G4	50.106459	-5.532425	50.106463	-5.532435	-0.000004	0.000010
G5	50.106465	-5.532301	50.106458	-5.532290	0.000006	-0.000012
G6	50.106477	-5.532150	50.106469	-5.532135	0.000008	-0.000015
G7	50.106465	-5.532014	50.106461	-5.532003	0.000003	-0.000011
G8	50.106459	-5.531872	50.106456	-5.531865	0.000003	-0.000007
G9	50.106463	-5.531731	50.106465	-5.531724	-0.000002	-0.000007
G10	50.106456	-5.531583	50.106468	-5.531596	-0.000012	0.000012
G11	50.106459	-5.531453	50.106460	-5.531444	-0.000001	-0.000009
G12	50.106459	-5.531329	50.106464	-5.531317	-0.000006	-0.000012
G13	50.106465	-5.531181	50.106465	-5.531174	0.000000	-0.000006
G14	50.106465	-5.531037	50.106465	-5.531045	0.000000	0.000007
G15	50.106463	-5.530888	50.106470	-5.530888	-0.000007	0.000000
G16	50.106466	-5.530756	50.106463	-5.530768	0.000004	0.000012
G17	50.106466	-5.530604	50.106454	-5.530585	0.000013	-0.000020
G18	50.106459	-5.530481	50.106463	-5.530477	-0.000004	-0.000004
H4	50.106373	-5.532427	50.106371	-5.532442	0.000002	0.000015
H5	50.106372	-5.532304	50.106377	-5.532298	-0.000005	-0.000006
H6	50.106370	-5.532149	50.106370	-5.532097	0.000000	-0.000052
H7	50.106373	-5.532019	50.106375	-5.532004	-0.000002	-0.000014
H8	50.106368	-5.531864	50.106368	-5.531856	0.000000	-0.000008
H9	50.106370	-5.531728	50.106373	-5.531728	-0.000002	-0.000001
H10	50.106367	-5.531585	50.106371	-5.531593	-0.000004	0.000008
H11	50.106364	-5.531462	50.106366	-5.531435	-0.000002	-0.000027
H12	50.106369	-5.531312	50.106378	-5.531319	-0.000009	0.000007

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
H13	50.106374	-5.531177	50.106374	-5.531170	0.000000	-0.000007
H14	50.106373	-5.531039	50.106372	-5.531003	0.000001	-0.000036
H15	50.106379	-5.530883	50.106371	-5.530869	0.000007	-0.000013
H16	50.106377	-5.530756	50.106376	-5.530746	0.000001	-0.000010
H18	50.106366	-5.530450	50.106374	-5.530461	-0.000009	0.000011
I2	50.106281	-5.532713	50.106283	-5.532725	-0.000002	0.000012
I4	50.106288	-5.532445	50.106286	-5.532431	0.000003	-0.000013
I5	50.106275	-5.532295	50.106281	-5.532281	-0.000006	-0.000014
I6	50.106294	-5.532144	50.106285	-5.532153	0.000009	0.000009
I7	50.106286	-5.532015	50.106284	-5.532008	0.000002	-0.000007
I8	50.106283	-5.531877	50.106279	-5.531863	0.000004	-0.000013
I9	50.106282	-5.531728	50.106280	-5.531717	0.000003	-0.000011
I10	50.106283	-5.531595	50.106279	-5.531584	0.000003	-0.000011
I11	50.106278	-5.531446	50.106278	-5.531426	0.000000	-0.000020
I12	50.106282	-5.531308	50.106287	-5.531316	-0.000006	0.000008
I13	50.106286	-5.531183	50.106278	-5.531161	0.000008	-0.000023
I14	50.106280	-5.531003	50.106273	-5.530972	0.000007	-0.000032
I15	50.106284	-5.530890	50.106282	-5.530886	0.000001	-0.000003
I16	50.106283	-5.530764	50.106274	-5.530759	0.000009	-0.000005
I17	50.106287	-5.530620	50.106280	-5.530604	0.000007	-0.000016
I18	50.106285	-5.530474	50.106283	-5.530496	0.000002	0.000022
J2	50.106189	-5.532718	50.106198	-5.532681	-0.000009	-0.000038
J3	50.106180	-5.532560	50.106189	-5.532560	-0.000010	0.000000
J4	50.106193	-5.532432	50.106194	-5.532428	-0.000001	-0.000004
J5	50.106193	-5.532302	50.106195	-5.532269	-0.000002	-0.000033
J6	50.106187	-5.532171	50.106192	-5.532200	-0.000005	0.000029
J7	50.106189	-5.532020	50.106186	-5.531996	0.000002	-0.000024
J8	50.106190	-5.531876	50.106193	-5.531876	-0.000003	0.000000
J9	50.106192	-5.531746	50.106192	-5.531729	0.000000	-0.000018

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
J10	50.106186	-5.531593	50.106183	-5.531582	0.000003	-0.000011
J11	50.106192	-5.531455	50.106192	-5.531442	0.000000	-0.000013
J12	50.106194	-5.531311	50.106201	-5.531308	-0.000006	-0.000002
J13	50.106196	-5.531171	50.106198	-5.531212	-0.000002	0.000041
J15	50.106196	-5.530898	50.106200	-5.530909	-0.000004	0.000012
J16	50.106193	-5.530757	50.106191	-5.530763	0.000002	0.000005
J17	50.106197	-5.530620	50.106197	-5.530589	0.000000	-0.000031
J18	50.106194	-5.530485	50.106194	-5.530457	0.000000	-0.000028
K2	50.106111	-5.532726	50.106100	-5.532685	0.000011	-0.000041
K3	50.106098	-5.532541	50.106092	-5.532570	0.000006	0.000029
K4	50.106107	-5.532398	50.106100	-5.532427	0.000007	0.000029
K5	50.106105	-5.532298	50.106101	-5.532271	0.000004	-0.000027
K6	50.106105	-5.532151	50.106084	-5.532146	0.000021	-0.000005
K7	50.106101	-5.532023	50.106100	-5.531979	0.000001	-0.000043
K8	50.106099	-5.531872	50.106099	-5.531874	-0.000001	0.000003
K9	50.106098	-5.531738	50.106096	-5.531733	0.000003	-0.000005
K10	50.106102	-5.531592	50.106091	-5.531594	0.000011	0.000002
K11	50.106096	-5.531445	50.106100	-5.531439	-0.000004	-0.000006
K12	50.106100	-5.531319	50.106100	-5.531301	0.000000	-0.000017
K13	50.106106	-5.531184	50.106100	-5.531159	0.000006	-0.000025
K14	50.106105	-5.531042	50.106098	-5.531069	0.000007	0.000027
K15	50.106106	-5.530891	50.106126	-5.530883	-0.000021	-0.000008
K16	50.106104	-5.530759	50.106102	-5.530746	0.000002	-0.000013
K17	50.106103	-5.530615	50.106093	-5.530615	0.000010	0.000000
K18	50.106106	-5.530478	50.106100	-5.530458	0.000006	-0.000019
L2	50.106006	-5.532722	50.106007	-5.532714	-0.000001	-0.000009
L3	50.105999	-5.532550	50.106013	-5.532559	-0.000014	0.000008
L4	50.106012	-5.532440	50.106008	-5.532415	0.000004	-0.000024
L5	50.106010	-5.532295	50.106008	-5.532285	0.000002	-0.000009

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
L6	50.106011	-5.532159	50.106012	-5.532124	-0.000001	-0.000035
L7	50.105999	-5.532002	50.106025	-5.531987	-0.000026	-0.000015
L8	50.106011	-5.531877	50.106009	-5.531868	0.000002	-0.000009
L9	50.106005	-5.531724	50.106014	-5.531731	-0.000008	0.000008
L11	50.106008	-5.531455	50.106010	-5.531438	-0.000002	-0.000017
L12	50.106035	-5.531317	50.106014	-5.531296	0.000021	-0.000021
L13	50.106003	-5.531175	50.106009	-5.531168	-0.000006	-0.000007
L14	50.106012	-5.531049	50.106008	-5.531022	0.000004	-0.000026
L15	50.106013	-5.530899	50.106011	-5.530895	0.000001	-0.000004
L16	50.106015	-5.530759	50.106005	-5.530766	0.000010	0.000007
L17	50.106012	-5.530614	50.106007	-5.530606	0.000005	-0.000008
L18	50.106015	-5.530472	50.106012	-5.530457	0.000003	-0.000015
M2	50.105915	-5.532724	50.105906	-5.532722	0.000009	-0.000002
M3	50.105919	-5.532575	50.105911	-5.532578	0.000008	0.000003
M4	50.105913	-5.532439	50.105914	-5.532416	-0.000001	-0.000023
M5	50.105918	-5.532299	50.105918	-5.532293	0.000000	-0.000006
M6	50.105930	-5.532137	50.105927	-5.532123	0.000003	-0.000014
M7	50.105922	-5.532019	50.105919	-5.532006	0.000003	-0.000013
M8	50.105919	-5.531875	50.105912	-5.531848	0.000008	-0.000026
M9	50.105904	-5.531745	50.105919	-5.531706	-0.000014	-0.000039
M10	50.105919	-5.531592	50.105922	-5.531603	-0.000003	0.000012
M11	50.105916	-5.531444	50.105919	-5.531442	-0.000003	-0.000002
M12	50.105921	-5.531317	50.105925	-5.531309	-0.000004	-0.000008
M13	50.105927	-5.531179	50.105925	-5.531175	0.000002	-0.000004
M14	50.105929	-5.531033	50.105929	-5.531039	-0.000001	0.000006
M15	50.105922	-5.530893	50.105919	-5.530882	0.000003	-0.000011
M16	50.105925	-5.530755	50.105918	-5.530742	0.000007	-0.000012
M17	50.105924	-5.530617	50.105918	-5.530588	0.000006	-0.000028
M18	50.105924	-5.530485	50.105923	-5.530436	0.000001	-0.000049

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
N2	50.105831	-5.532735	50.105834	-5.532703	-0.000003	-0.000032
N3	50.105839	-5.532584	50.105830	-5.532565	0.000009	-0.000019
N4	50.105832	-5.532425	50.105835	-5.532424	-0.000003	0.000000
N5	50.105831	-5.532294	50.105832	-5.532298	-0.000001	0.000004
N6	50.105831	-5.532149	50.105832	-5.532137	-0.000001	-0.000013
N7	50.105833	-5.532018	50.105834	-5.532007	-0.000001	-0.000011
N8	50.105819	-5.531864	50.105823	-5.531861	-0.000003	-0.000003
N9	50.105857	-5.531745	50.105834	-5.531716	0.000023	-0.000030
N10	50.105818	-5.531585	50.105836	-5.531595	-0.000019	0.000010
N11	50.105831	-5.531459	50.105831	-5.531457	0.000000	-0.000002
N12	50.105834	-5.531313	50.105837	-5.531312	-0.000003	-0.000001
N13	50.105836	-5.531173	50.105833	-5.531154	0.000003	-0.000019
N14	50.105833	-5.531042	50.105828	-5.531025	0.000004	-0.000017
N16	50.105830	-5.530755	50.105829	-5.530747	0.000001	-0.000007
N17	50.105833	-5.530613	50.105830	-5.530608	0.000003	-0.000005
N18	50.105820	-5.530459	50.105833	-5.530455	-0.000013	-0.000004
O2	50.105737	-5.532722	50.105741	-5.532713	-0.000004	-0.000009
O3	50.105745	-5.532577	50.105742	-5.532577	0.000003	0.000000
O4	50.105737	-5.532442	50.105744	-5.532439	-0.000008	-0.000003
O6	50.105741	-5.532142	50.105742	-5.532173	-0.000001	0.000031
O7	50.105738	-5.532028	50.105735	-5.531989	0.000004	-0.000039
O8	50.105742	-5.531884	50.105744	-5.531879	-0.000001	-0.000005
O9	50.105752	-5.531711	50.105747	-5.531726	0.000005	0.000016
O10	50.105731	-5.531580	50.105740	-5.531595	-0.000010	0.000015
O11	50.105738	-5.531454	50.105739	-5.531441	-0.000002	-0.000013
O12	50.105738	-5.531316	50.105745	-5.531315	-0.000007	-0.000001
O13	50.105744	-5.531170	50.105745	-5.531201	0.000000	0.000031
O14	50.105747	-5.531035	50.105703	-5.531037	0.000044	0.000002
O15	50.105738	-5.530888	50.105742	-5.530853	-0.000004	-0.000035

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
O16	50.105738	-5.530757	50.105743	-5.530756	-0.000005	-0.000001
O17	50.105722	-5.530600	50.105745	-5.530592	-0.000023	-0.000008
O18	50.105748	-5.530475	50.105744	-5.530471	0.000004	-0.000004
O19	50.105746	-5.530337	#N/A	#N/A	#N/A	#N/A
P2	50.105643	-5.532722	50.105652	-5.532720	-0.000009	-0.000002
P3	50.105652	-5.532589	50.105647	-5.532571	0.000006	-0.000017
P4	50.105650	-5.532430	50.105651	-5.532448	-0.000001	0.000018
P5	50.105654	-5.532300	50.105649	-5.532283	0.000006	-0.000017
P6	50.105656	-5.532156	50.105648	-5.532149	0.000009	-0.000007
P7	50.105656	-5.532009	50.105655	-5.531985	0.000001	-0.000024
P8	50.105657	-5.531871	50.105638	-5.531863	0.000020	-0.000008
P9	50.105653	-5.531723	50.105652	-5.531724	0.000001	0.000001
P10	50.105650	-5.531592	50.105652	-5.531591	-0.000002	-0.000001
P11	50.105646	-5.531451	50.105654	-5.531444	-0.000008	-0.000007
P12	50.105645	-5.531311	50.105656	-5.531317	-0.000011	0.000006
P13	50.105649	-5.531172	50.105650	-5.531162	-0.000001	-0.000009
P14	50.105653	-5.531037	50.105655	-5.531034	-0.000002	-0.000003
P15	50.105653	-5.530892	50.105658	-5.530909	-0.000005	0.000018
P16	50.105656	-5.530763	50.105651	-5.530751	0.000005	-0.000012
P17	50.105651	-5.530617	50.105650	-5.530607	0.000001	-0.000010
P18	50.105653	-5.530477	50.105653	-5.530470	0.000000	-0.000007
Q2	50.105558	-5.532723	50.105567	-5.532733	-0.000009	0.000010
Q3	50.105559	-5.532538	50.105564	-5.532557	-0.000005	0.000019
Q4	50.105561	-5.532422	50.105565	-5.532425	-0.000004	0.000003
Q5	50.105560	-5.532293	50.105556	-5.532267	0.000004	-0.000026
Q6	50.105568	-5.532162	50.105562	-5.532159	0.000006	-0.000003
Q7	50.105559	-5.532014	50.105559	-5.532004	0.000000	-0.000009
Q8	50.105565	-5.531870	50.105562	-5.531859	0.000003	-0.000011
Q9	50.105562	-5.531730	50.105566	-5.531729	-0.000004	-0.000001

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
Q10	50.105557	-5.531593	50.105558	-5.531583	-0.000001	-0.000010
Q11	50.105558	-5.531460	50.105562	-5.531450	-0.000004	-0.000010
Q12	50.105549	-5.531264	50.105544	-5.531322	0.000005	0.000059
Q13	50.105559	-5.531174	50.105559	-5.531179	0.000000	0.000006
Q14	50.105563	-5.531039	50.105561	-5.531032	0.000002	-0.000007
Q15	50.105558	-5.530889	50.105558	-5.530887	-0.000001	-0.000002
Q16	50.105561	-5.530742	50.105564	-5.530746	-0.000003	0.000004
Q17	50.105566	-5.530618	50.105556	-5.530609	0.000010	-0.000009
Q18	50.105565	-5.530471	50.105563	-5.530477	0.000002	0.000005
R2	50.105463	-5.532726	50.105473	-5.532730	-0.000011	0.000004
R3	50.105447	-5.532541	50.105472	-5.532567	-0.000024	0.000026
R4	50.105472	-5.532438	50.105470	-5.532409	0.000002	-0.000028
R5	50.105468	-5.532299	50.105471	-5.532285	-0.000002	-0.000014
R6	50.105468	-5.532157	50.105474	-5.532156	-0.000006	-0.000001
R7	50.105470	-5.532009	50.105471	-5.532003	-0.000001	-0.000006
R8	50.105473	-5.531877	50.105453	-5.531846	0.000020	-0.000031
R9	50.105472	-5.531718	50.105470	-5.531711	0.000002	-0.000007
R10	50.105471	-5.531591	50.105468	-5.531574	0.000003	-0.000016
R11	50.105470	-5.531454	50.105469	-5.531468	0.000002	0.000014
R12	50.105472	-5.531323	50.105467	-5.531310	0.000006	-0.000013
R13	50.105477	-5.531178	50.105477	-5.531209	0.000000	0.000031
R14	50.105479	-5.531039	50.105473	-5.531018	0.000006	-0.000021
R15	50.105477	-5.530894	50.105492	-5.530913	-0.000014	0.000019
R16	50.105477	-5.530757	50.105476	-5.530759	0.000000	0.000002
R17	50.105479	-5.530612	50.105473	-5.530613	0.000006	0.000001
R18	50.105472	-5.530467	50.105475	-5.530473	-0.000003	0.000006
S2	50.105379	-5.532737	50.105376	-5.532716	0.000004	-0.000022
S3	50.105378	-5.532551	50.105377	-5.532576	0.000001	0.000024
S4	50.105377	-5.532445	50.105382	-5.532419	-0.000006	-0.000026

Grid ID	Latitude 20230815	Longitude 20230815	Latitude 20230816	Longitude 20230816	Latitude difference	Longitude difference
S5	50.105377	-5.532305	50.105382	-5.532278	-0.000005	-0.000027
S6	50.105377	-5.532148	50.105380	-5.532152	-0.000003	0.000004
S7	50.105385	-5.532018	50.105383	-5.532006	0.000002	-0.000012
S8	50.105383	-5.531875	50.105375	-5.531857	0.000007	-0.000018
S9	50.105376	-5.531747	50.105379	-5.531745	-0.000003	-0.000002
S11	50.105379	-5.531452	50.105383	-5.531485	-0.000005	0.000033
S12	50.105385	-5.531301	50.105384	-5.531306	0.000002	0.000005
S13	50.105385	-5.531167	50.105384	-5.531156	0.000002	-0.000011
S14	50.105385	-5.531037	50.105381	-5.531015	0.000003	-0.000023
S15	50.105383	-5.530894	50.105378	-5.530892	0.000005	-0.000002
S17	50.105382	-5.530587	50.105379	-5.530598	0.000003	0.000011
S18	50.105387	-5.530475	50.105386	-5.530465	0.000002	-0.000010
T2	50.105286	-5.532709	50.105294	-5.532721	-0.000008	0.000012
T3	50.105297	-5.532577	50.105288	-5.532581	0.000010	0.000004
T4	50.105285	-5.532446	50.105292	-5.532439	-0.000007	-0.000007
T5	50.105295	-5.532297	50.105289	-5.532270	0.000007	-0.000028
T6	50.105254	-5.532130	50.105293	-5.532158	-0.000039	0.000029
T7	50.105295	-5.532025	50.105290	-5.532009	0.000005	-0.000016
T8	50.105292	-5.531875	50.105287	-5.531886	0.000005	0.000010
T9	50.105289	-5.531753	50.105287	-5.531721	0.000002	-0.000032
T10	50.105289	-5.531585	50.105289	-5.531597	-0.000001	0.000012
T11	50.105292	-5.531444	50.105294	-5.531417	-0.000002	-0.000027
T13	50.105297	-5.531175	50.105304	-5.531170	-0.000007	-0.000005
T14	50.105294	-5.531031	50.105289	-5.531023	0.000005	-0.000008
T16	50.105296	-5.530764	50.105292	-5.530754	0.000004	-0.000010
T17	50.105295	-5.530588	50.105291	-5.530605	0.000004	0.000017

Appendix 5. Grid positions with paired images

Annex Table D: Paired images for the Cornwall IFCA drop down video impact of ring netting survey within Mounts Bay

Grid ID	20230815	20230816	Pair
E2	N	Y	N
E3	N	Y	N
E4	Y	Y	Y
E5	Y	Y	Y
E6	Y	Y	Y
E7	Y	Y	Y
E8	Y	Y	Y
E9	Y	Y	Y
E10	Y	Y	Y
E11	Y	Y	Y
E12	Y	Y	Y
E13	Y	Y	Y
E14	Y	Y	Y
E15	Y	Y	Y
E16	Y	Y	Y
E17	Y	Y	Y
E18	Y	Y	Y
E19	Y	N	N
F2	N	Y	N
F3	N	Y	N
F4	Y	Y	Y
F5	Y	Y	Y
F6	Y	Y	Y
F7	Y	Y	Y
F8	Y	Y	Y
F9	Y	Y	Y
F10	Y	N	N
F11	Y	Y	Y
F12	Y	Y	Y
F13	Y	Y	Y
F14	Y	Y	Y
F15	Y	Y	Y
F16	Y	Y	Y
F17	Y	Y	Y
F18	Y	Y	Y
F19	Y	N	N
G2	Y	Y	Y
G3	N	Y	N
G4	Y	Y	Y
G5	Y	Y	Y
G6	Y	Y	Y
G7	Y	Y	Y
G8	Y	Y	Y

Grid ID	20230815	20230816	Pair
G9	Y	Y	Y
G10	Y	Y	Y
G11	Y	Y	Y
G12	Y	Y	Y
G13	Y	Y	Y
G14	Y	Y	Y
G15	Y	Y	Y
G16	Y	Y	Y
G17	Y	Y	Y
G18	Y	Y	Y
G19	Y	N	N
H2	Y	N	N
H3	N	Y	N
H4	Y	Y	Y
H5	Y	Y	Y
H6	Y	Y	Y
H7	Y	Y	Y
H8	Y	Y	Y
H9	Y	Y	Y
H10	Y	Y	Y
H11	Y	Y	Y
H12	Y	Y	Y
H13	Y	Y	Y
H14	Y	Y	Y
H15	Y	Y	Y
H16	Y	Y	Y
H17	N	Y	N
H18	Y	Y	Y
H19	Y	N	N
I2	Y	Y	Y
I3	N	Y	N
I4	Y	Y	Y
I5	Y	Y	Y
I6	Y	Y	Y
I7	Y	Y	Y
I8	Y	Y	Y
I9	Y	Y	Y
I10	Y	Y	Y
I11	Y	Y	Y
I12	Y	Y	Y
I13	Y	Y	Y
I14	Y	Y	Y
I15	Y	Y	Y

Grid ID	20230815	20230816	Pair
I16	Y	Y	Y
I17	Y	Y	Y
I18	Y	Y	Y
I19	Y	N	N
J2	Y	Y	Y
J3	Y	Y	Y
J4	Y	Y	Y
J5	Y	Y	Y
J6	Y	Y	Y
J7	Y	Y	Y
J8	Y	Y	Y
J9	Y	Y	Y
J10	Y	Y	Y
J11	Y	Y	Y
J12	Y	Y	Y
J13	Y	Y	Y
J14	Y	N	N
J15	Y	Y	Y
J16	Y	Y	Y
J17	Y	Y	Y
J18	Y	Y	Y
J19	Y	N	N
K2	Y	Y	Y
K3	Y	Y	Y
K4	Y	Y	Y
K5	Y	Y	Y
K6	Y	Y	Y
K7	Y	Y	Y
K8	Y	Y	Y
K9	Y	Y	Y
K10	Y	Y	Y
K11	Y	Y	Y
K12	Y	Y	Y
K13	Y	Y	Y
K14	Y	Y	Y
K15	Y	Y	Y
K16	Y	Y	Y
K17	Y	Y	Y
K18	Y	Y	Y
K19	Y	N	N
L2	Y	Y	Y
L3	Y	Y	Y
L4	Y	Y	Y
L5	Y	Y	Y
L6	Y	Y	Y

Grid ID	20230815	20230816	Pair
L7	Y	Y	Y
L8	Y	Y	Y
L9	Y	Y	Y
L10	N	Y	N
L11	Y	Y	Y
L12	Y	Y	Y
L13	Y	Y	Y
L14	Y	Y	Y
L15	Y	Y	Y
L16	Y	Y	Y
L17	Y	Y	Y
L18	Y	Y	Y
L19	Y	N	N
M2	Y	Y	Y
M3	Y	Y	Y
M4	Y	Y	Y
M5	Y	Y	Y
M6	Y	Y	Y
M7	Y	Y	Y
M8	Y	Y	Y
M9	Y	Y	Y
M10	Y	Y	Y
M11	Y	Y	Y
M12	Y	Y	Y
M13	Y	Y	Y
M14	Y	Y	Y
M15	Y	Y	Y
M16	Y	Y	Y
M17	Y	Y	Y
M18	Y	Y	Y
M19	Y	N	N
N2	Y	Y	Y
N3	Y	Y	Y
N4	Y	Y	Y
N5	Y	Y	Y
N6	Y	Y	Y
N7	Y	Y	Y
N8	Y	Y	Y
N9	Y	Y	Y
N10	Y	Y	Y
N11	Y	Y	Y
N12	Y	Y	Y
N13	Y	Y	Y
N14	Y	Y	Y
N15	Y	N	N

Grid ID	20230815	20230816	Pair
N16	Y	Y	Y
N17	Y	Y	Y
N18	Y	Y	Y
N19	Y	N	N
O2	Y	Y	Y
O3	Y	Y	Y
O4	Y	Y	Y
O5	N	Y	N
O6	Y	Y	Y
O7	Y	Y	Y
O8	Y	Y	Y
O9	Y	Y	Y
O10	Y	Y	Y
O11	Y	Y	Y
O12	Y	Y	Y
O13	Y	Y	Y
O14	Y	Y	Y
O15	Y	Y	Y
O16	Y	Y	Y
O17	Y	Y	Y
O18	Y	Y	Y
O19	Y	N	N
P2	Y	Y	Y
P3	Y	Y	Y
P4	Y	Y	Y
P5	Y	Y	Y
P6	Y	Y	Y
P7	Y	Y	Y
P8	Y	Y	Y
P9	Y	Y	Y
P10	Y	Y	Y
P11	Y	Y	Y
P12	Y	Y	Y
P13	Y	Y	Y
P14	Y	Y	Y
P15	Y	Y	Y
P16	Y	Y	Y
P17	Y	Y	Y
P18	Y	Y	Y
P19	Y	N	N
Q2	Y	Y	Y
Q3	Y	Y	Y
Q4	Y	Y	Y
Q5	Y	Y	Y
Q6	Y	Y	Y

Grid ID	20230815	20230816	Pair
Q7	Y	Y	Y
Q8	Y	Y	Y
Q9	Y	Y	Y
Q10	Y	Y	Y
Q11	Y	Y	Y
Q12	Y	Y	Y
Q13	Y	Y	Y
Q14	Y	Y	Y
Q15	Y	Y	Y
Q16	Y	Y	Y
Q17	Y	Y	Y
Q18	Y	Y	Y
Q19	Y	N	N
R2	Y	Y	Y
R3	Y	Y	Y
R4	Y	Y	Y
R5	Y	Y	Y
R6	Y	Y	Y
R7	Y	Y	Y
R8	Y	Y	Y
R9	Y	Y	Y
R10	Y	Y	Y
R11	Y	Y	Y
R12	Y	Y	Y
R13	Y	Y	Y
R14	Y	Y	Y
R15	Y	Y	Y
R16	Y	Y	Y
R17	Y	Y	Y
R18	Y	Y	Y
R19	Y	N	N
S2	Y	Y	Y
S3	Y	Y	Y
S4	Y	Y	Y
S5	Y	Y	Y
S6	Y	Y	Y
S7	Y	Y	Y
S8	Y	Y	Y
S9	Y	Y	Y
S10	N	Y	N
S11	Y	Y	Y
S12	Y	Y	Y
S13	Y	Y	Y
S14	Y	Y	Y
S15	Y	Y	Y

Grid ID	20230815	20230816	Pair
S16	Y	N	N
S17	Y	Y	Y
S18	Y	Y	Y
S19	Y	N	N
T2	Y	Y	Y
T3	Y	Y	Y
T4	Y	Y	Y
T5	Y	Y	Y
T6	Y	Y	Y
T7	Y	Y	Y
T8	Y	Y	Y

Grid ID	20230815	20230816	Pair
T9	Y	Y	Y
T10	Y	Y	Y
T11	Y	Y	Y
T12	N	Y	N
T13	Y	Y	Y
T14	Y	Y	Y
T15	Y	N	N
T16	Y	Y	Y
T17	Y	Y	Y
T18	N	Y	N
T19	Y	N	N