Flying Camera Array SOP

Equipment

HD waterproof camera
LED lamp (s)
2 lasers
Sledge
Plastic tubes, with end caps
Drop weight
Chain
Rope
Floats
Laptop/Recording box
GPS overlay

Set up

The flying camera methodology was developed following the procedures set out in Sheehan et al. (2010) to allow the habitats on the seabed to be studied in a non-destructive way.

The camera is mounted to the sledge, with one laser on either side. The lasers are set at 30cm apart. Above the camera a LED light is mounted (Photo 1). To make this set-up neutrally buoyant when towing, high strength (pressure resistant) plastic tubes are mounted to the sides of the sledge, and are adjusted until the sledge is just positively buoyant (Photo 2). A short drag chain is then added to the back of the sledge, adding enough weight to slowly sink the sledge. The length and weight of the chain determine the height at which the sledge flies above the seabed. The chain should be the only part of the seabed which touches the seabed. Changes in bottom topography result in less or more of the chain touching the seabed, and the array adjusts its height until equilibrium is again achieved (Sheehan et al., 2010). The drag chain should be attached to the base of the sledge using lightweight rope, which acts as a “weak link”, breaking if the chain catches on the seabed. This allows complete recovery of the array, and prevents strain on the umbilical.

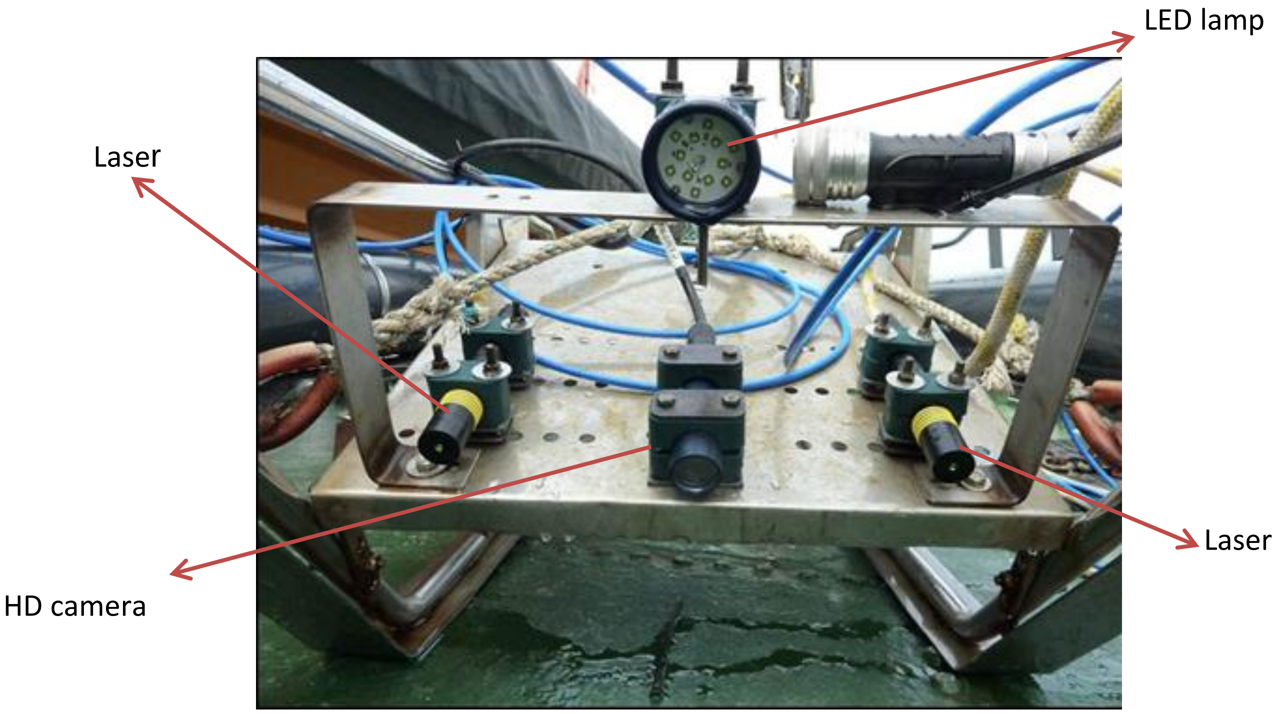

Photo 1. Equipment set up.

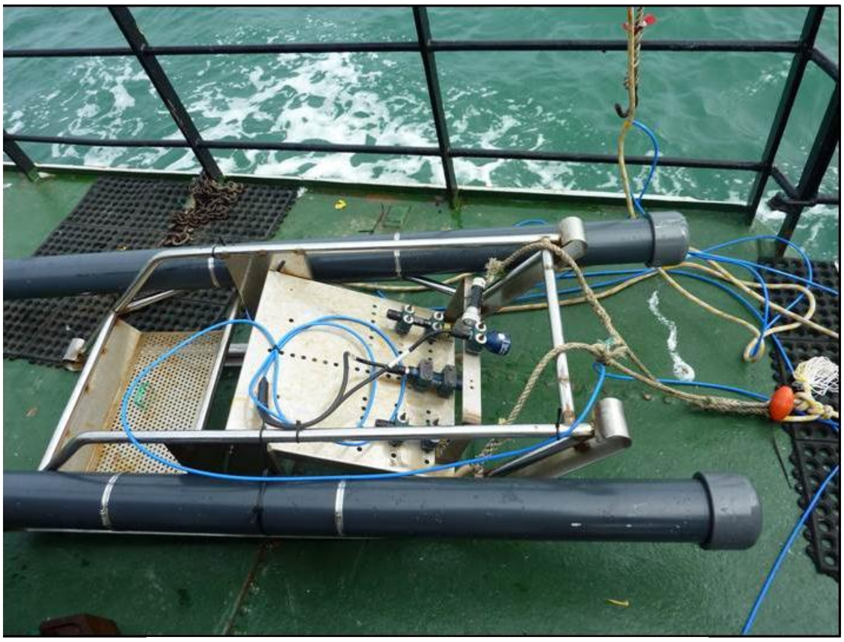

Photo 2. Array with buoyancy tubes

Deployment

The sledge is attached to a tow rope, approximately 15m in length via a bridle with the umbilical from the camera loosely attached to the rope using electrical tape. A small buff is attached to the point where the bridle meets the rope to add buoyancy and stop it hanging down in front of the camera. The rope is then attached to the wire from the winch allowing a crane to be used to control deployment.

To deploy the array a short rope is attached between the end of the wire and the sledge to take the weight and allow it to be manoeuvred over the side in a controlled manner. A crane is then used to winch the sledge up above the deck and over the side of the vessel (Photo 3). Once clear it is then lowered into the water, and once the water has taken its weight the short rope is detached. The drop weight is then attached in its place and the winch used to lower the sledge to the seabed. When the drop weight reaches the seabed a short length of wire was hauled back in so that the sledge is held above the seabed. The drop weight counteracts the pitch of the vessel, and the chain provides grounding to the sled which becomes neutrally buoyant when the chain contacts the seabed (Figure 1).

The array is towed at a constant speed of approximately 0.3 knots for 20 minutes allowing approximately 200m transects of the seabed to be filmed.

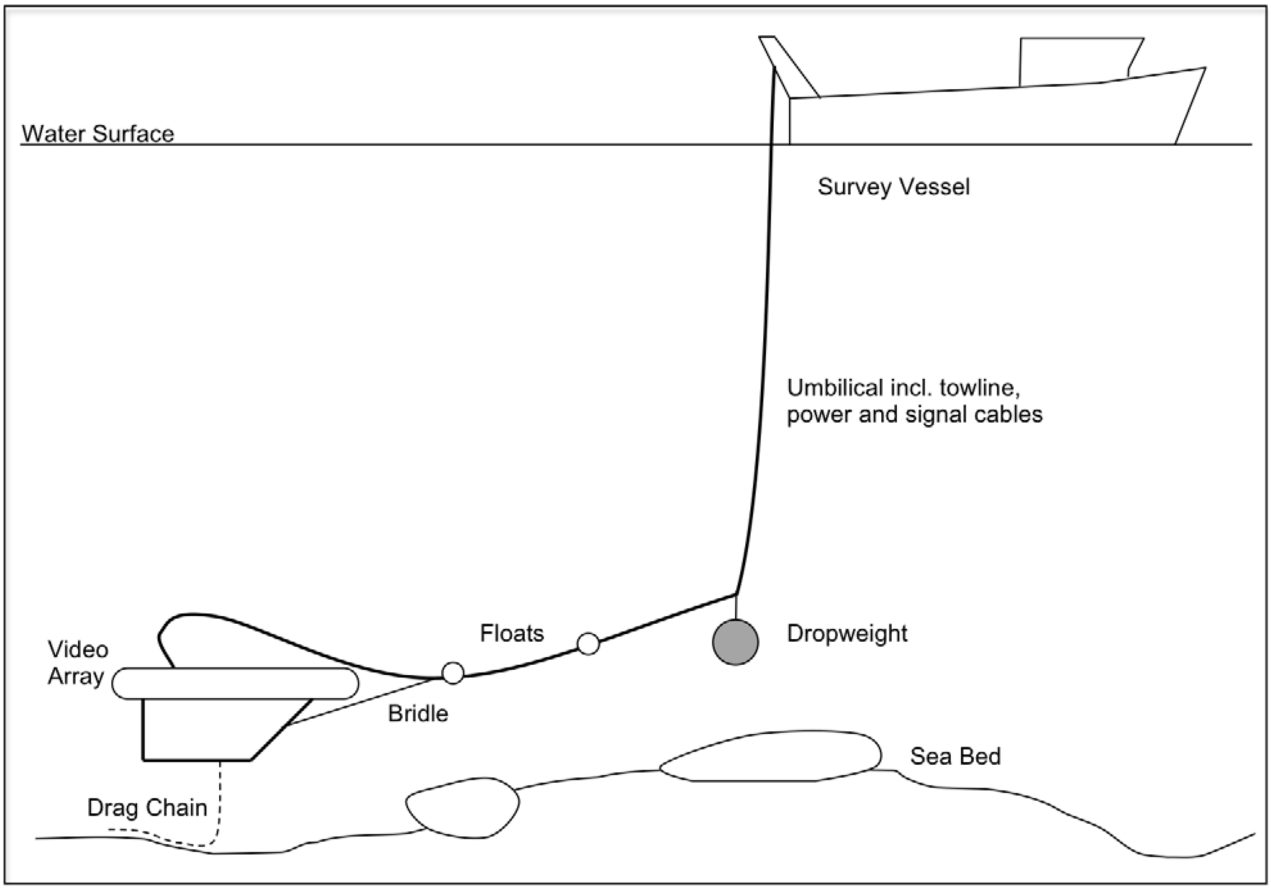

Figure 1. Deployment of equipment and flying array. (Taken from Sheehan et al., 2010)

Photo 3 : Winching the Array aboard

Data analysis

Footage can be recorded directly onto a computer/laptop via USB connection, or onto an SD card in a stand-alone recording system (Photo 4).

Habitat classification can be carried in real time, whilst watching the footage as the camera is towed, or at a later date from the recording (providing the coordinates are displayed on the footage). The habitat recording system used is adapted from that used by Seafish, in which the seabed can be classed as one of seven categories; mud, sand & gravel, mixed, pebbles, cobbles, boulders, and rocky reef. Key indicator species are also recorded. A survey form was developed (Figure 2) to record data whilst watching the footage. The coordinates, habitat, species present, and depth are all recorded at regular intervals, or whenever the habitat changes. JNCC guidelines (Irving, 2009) are followed to determine reef presence “To qualify as a stony reef, 10% or more of the seabed substratum should be composed of particles greater than 64mm across”. The lasers set 30cm apart are used to determine particle size. This data is then mapped using MapInfo GIS software (Figure 3).

Species identification can also be carried by using still images taken from the video footage at regular intervals, for more in depth analysis.

Photo 4 : Stand-alone recording system

Devon & Severn IFCA Video Survey Log Form

Site Name:	Date:
Video Station Number:	Warp Length:

	Time	Latitude	Longitude	Depth (m)
Start				
Finish				

video time/ mins	lat/long	General description of seabed on screen	Sea bed Type								Marine Life on seabed						
			Rocky reef	Boulders	Cobbles/pebbles	Mixed ground	Sand/Gravel	Mud	Artificial struct	kelp	Mixed Seaweeds	Enc Pink Algae	Animal Beds e.g brittles	burrrows/tube	Barren Sediment	Encrusting animals on rocks <10cm	Erect animals on rocks >10cm e.g PSF, DMF

Figure 2: Habitat Recording Form

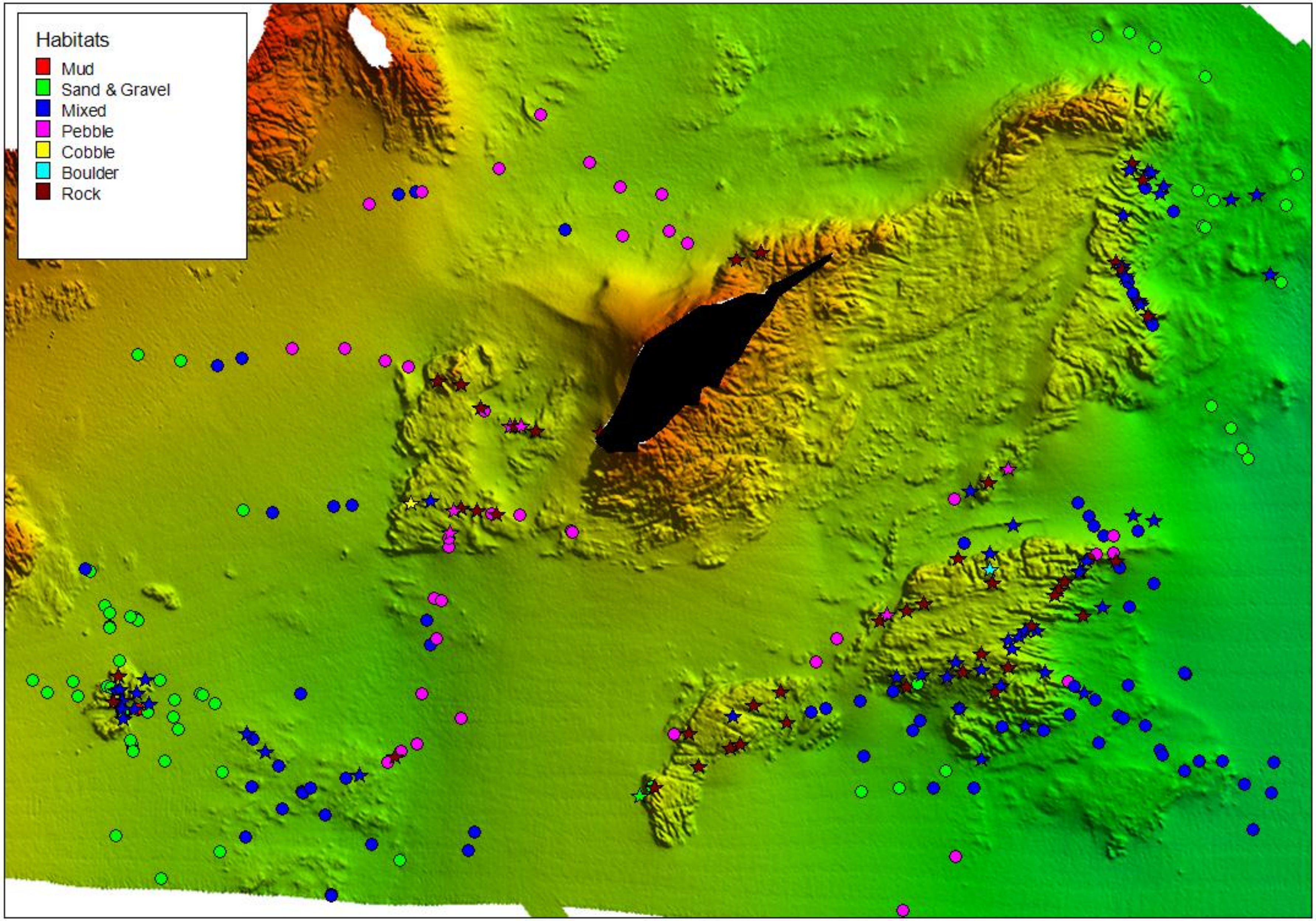

Figure 3. Habitats in Torbay, with reef presence indicated by stars.

References

Irving, R. (2009) The identification of the main characteristics of stony reef habitats under the Habitats Directive. Summary report of an inter-agency workshop 26-27 March 2008. *JNCC Report* No. 432

Sheehan, E.V., Stevens, T.F., Attrill, M.J. (2010) A quantitative, non-destructive methodology for habitat characterisation and benthic monitoring at offshore renewable energy developments. *PLoS ONE* 5(12): e14461. doi:10.1371/journal.pone.0014461

Seafish Standard Sampling Operating Procedure: Basic Video Mapping Seabed Habitats