Recreational Boating Study

Project Update

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Overview:

The Recreational Boating Study is investigating the direct physical impacts (scour and abrasion) of moorings and pontoon anchorage systems on the epifauna and infauna within the Fal & Helford Special Area of Conservation (SAC). The remit of this project has been scaled down from the original broad overview reflecting the timescale available in which to conduct the study and the desire to achieve a statistically robust management output. The last project plan outlined the intention to survey single point 'block' moorings across 4 prolific moorings locations, split broadly across 2 habitat types: muddy gravels in Falmouth and Mylor, fine sand within St. Mawes and Helford. It was also planned to survey 2 marinas: an anchored marina (Falmouth Yacht Haven) and a piled marina (Port Pendennis marina), both located in similar habitat. The intention of this document is to give a broad interim update to all project partners with regards to the survey work successfully achieved, prior to progressing on to the sample processing and analysis phase of the project.

Summary:

As mentioned briefly in the last project update a scoping study had been successfully completed, although the scope was limited due to the time and equipment restrictions involved with this project. As a result of the scoping study the final selections were made for the study sites and the experimental design for the project was conceived and preliminarily tested. This design was forwarded to the project partners in August for approval prior to the start of the survey work. The video surveys were all completed as planned, however electrical problems with the remote operated vehicle (ROV) meant that this work was undertaken in two distinct sessions – one in August and one in September. The methodology for the ROV video surveys continued to be refined during the initial survey to reflect the conditions encountered and the operational capability of the equipment. Despite initial issues with the diving operations, co-ordinated in conjunction with Natural England, these progressed well and infaunal core samples were successfully collected at 3 of the 4 moorings locations. The marina surveys, which were removed from the diving schedule at late notice, required a change of methodology to allow their completion. Given the short notice with which to develop an alternative experimental plan this was discussed with the project initiators and scientific advisors and the decision was made to progress with the best possible option. The marinas were sampled remotely utilising a hand-operated grab as opposed to in-situ cores, with this work was completed shortly after the initial dive work. All samples from the infaunal work have been initially processed and preserved. The next step, expected to run through to late spring of 2011, is to process the ROV video footage and infaunal samples, and to complete a full statistical analysis of the results.

Scoping work:

Initial literature reviews and liaison with project partners were conducted across the initial few weeks of the project. During this time the location, types and densities of the relevant recreational boating infrastructure were identified, along with general information on habitat distributions and wider environmental impacts within the Fal and Helford SAC. This was collaborated with first-hand information put forward by project partners to identify potential study sites within the four study locations. Initial video scoping work was completed across July and early August 2011, with the aim of ground-truthing available information on habitat types to allow selection of comparable study sites. This work was limited by both the project timescale and equipment availability throughout this period, however scoping surveys did take place in three of the four locations (Falmouth, St. Mawes and Durgan) and across all three initial marina locations (Falmouth Yacht Haven, Port Pendennis marina and Mylor Yacht Harbour). This was completed with a SCUBAR remote video system for the marinas, a technique which proved viable for broadscale general identification of habitat types when operated within shallow waters and from stable workstations. Further scoping work was completed using the University of Plymouth and University of Exeter ROVs, which allowed identification of habitats within the mooring locations and visual confirmation of direct physical impacts on the seabed. This period was also used to trial potential transect methodologies prior to the completion of the full epifaunal survey, which were then reviewed with the scientific advisors. Due to the limitations of the survey schedule for this project, the level of detail initially anticipated was not achievable, however sites were selected using the best available information.

Figure 1: ROV (Video Ray Pro 4) used for initial scoping surveys and later epifaunal work. For the epifaunal surveys the ROV was modified to carry 2 lasers (visible at the bottom of the image).

Epifaunal Surveys:

The full epifaunal ROV surveys were scheduled for completion between the 22nd and 27th August 2011, using the University of Plymouth ROV (Video Ray Pro4; Atlantis Marine) and with the assistance of the University technician (Richard Ticehurst). Further transect methodology development was necessary prior to the start of this survey period to trial methodological recommendations put forward following the initial scoping work. These adjustments included standardisation of transect length using marked distances on the ROV umbilical, the use of a negatively buoyant umbilical (which greatly reduced the entanglement risk of for other vessels) and, as a result of the heavier umbilical cable, the requirement of the ROV base vessel to take up the survey mooring or raft alongside the vessel on the survey mooring (to minimise the deployment distance). The final survey methodology

Figure 2: Stills image showing the display output from the ROV and seabed communities within Falmouth

consisted of 30m transects through mooring areas or between anchorage systems in marinas, with transects along randomly selected bearings in control areas. The marina epifaunal surveys were completed successfully from workstations on the pontoons of Falmouth Yacht Haven (22nd August) and Port Pendennis (23rd August). The Mylor moorings were completed on the 24th August from 'J. A. Barringer' (Port of Truro) with the assistance of John Clarke, followed by the Durgan moorings on the 25th August from 'Kerwyn' (Cornwall Inshore Fisheries and Conservation Authority) with the assistance of Sam Davies and Zac Haining. The St. Mawes surveys were started on the 26th August onboard 'Killigrew' (Falmouth Harbour Commisioners) with David Townson, however an electrical fault with the ROV left us unable to complete all the transects. Unfortunately the fault could not be fixed on site, so the remaining St. Mawes transects and the Falmouth epifaunal surveys were not completed as part of this survey period. The ROV returned to complete the epifaunal survey work from 'Killigrew' (FHC, David Townson) on the first neap tides available. The Falmouth survey was successfully completed (19th September) and we aimed to completed the St. Mawes survey the following day (20th September), however adverse weather conditions prevented us from re-surveying the control area for site 1 at this location.

Infaunal sampling:

In-situ core samples:

The collection of infaunal samples, to investigate changes in infaunal community composition, was originally planned to be completed by the Natural England dive team. Due to problems with diver availability a compromise was established with Natural England supplying project support (Rhiannon Pipkin) and 2 divers (Roger Covey and Gavin Black) and the remainder of the team consisting of Cornwall Wildlife Trust (Tom Hardy and Angie Gall), University of Plymouth students (Sabrina Heiser and Tom Sale) and SeaSearch volunteers (Christina McClay and Brigid Armstead). The diving took place on the 5th – 9th September 2011 from the dive vessel Patrice II (skippered by Mike Tuffrey). Despite bad weather, equipment problems and unfamiliar methodology the dive team successfully managed to collect samples at three of the four intended mooring locations within the timeframe available. Prior to the diving operations Natural England raised concerns with regards to conducting the diving operations within the marinas. As a result of this the diving operations only completed the infaunal sample collection within the moorings areas and an alternative methodology had to be employed within the marinas.

Figure 3: Diver collecting infaunal cores from the seabed in St. Mawes. © Gavin Black/ Natural England

At all 3 locations sampled (Mylor, Falmouth and St. Mawes), samples were collected from 2 mooring sites (each containing 3 replicate moorings) and 2 control sites. The moorings were selected at random from within the study site. Divers laid out transects on a random bearing from the central eye of each mooring and collected 3 core samples and 1 particle size/ organic content sample at 2m, 5m and 11m out from the mooring. The distances were calculated to lie within the radius impacted by the thrash chain, the radius impacted by the riser chain and outside the maximum anticipated reach of the riser on spring tides. Within the controls, divers collected 3 replicate samples at 3 areas within the control site. These areas were separated by a standardised distance swim on random bearings.

Infaunal Sampling:

Remote grab samples:

Following the decision to not include the marina sampling in the diving operations an alternate methodology was sought. The most viable option was to locate a hand-operated grab, allowing us to remotely sample sediment in the marinas from the marina pontoons. The University of Plymouth sourced a hand-operated $0.01m^2$ Van Veen grab available from Ecospan Environmental Ltd which was suitable for our purpose. This grab was only available for a short period of time and all marina infaunal samples were completed across the 21^{st}, 22^{nd} and 23^{rd} September 2011 with the assistance of Harriet Knowles, Beth Wills, Ross Bullimore and Matt Ormond. Both marinas were split into 2 sites and infaunal samples were collected at replicate points of 'impact' from the 2 sites – 3 replicate samples and 1 particle size/organic content sample from 3 replicate pilings (Port Pendennis) and 3 anchor attachment locations (Falmouth Yacht Haven) at both sites within the marinas. Samples were also taken away from the point of impact, with 3 areas identified within each of the dredged marina areas. In each of these 3 areas 3 replicate infaunal samples were collected along with 1 particle size/ organic content sample. These samples were completed from the pontoons within Port Pendennis and from the FHC Motorboat for Falmouth Yacht Haven. 2 external control locations were identified with 3 replicate infaunal samples and 1 particle size/ organic content sample taken from 3 locations within the control areas.

Processing and analysis:

ROV video analysis:

The ROV footage from the epifaunal surveys revealed a diverse patchwork of habitats and large fluctuations in epifaunal abundance within the transects. As a result of this it has been decided to undertake the video analysis in 2 stages. The initial stage will analyse the whole video identifying large and rare fauna and flora, which would be easily missed by subsampling the transect. The second stage will subsample the video footage, taking random stills (frame grabs) from the video, allowing quantification of common species. The details for analysing the footage are currently being finalised under the guidance of Dr Emma Sheehan and it is intended that analysis will start shortly.

Sample preservation:

All infaunal diver core samples were processed immediately on board, with the assistance of Rhiannon Pipkin and several members of the dive team. Due to limited vessel availability and space the infaunal grab samples were batch processed shortly after collection, with the assistance of Harriet Knowles, Beth Wills and Ross Bullimore. All infaunal samples were suspended in seawater, elutriated and sieved through a 0.5mm sieve mesh before being transferred to storage pots and preserved in 75% ethanol. Preservation in ethanol, as opposed to formalin, was considered the best compromise considering the logistical and budget limitations of the project. All samples were placed into storage ready for further processing.

Sample processing:

The processing of the infaunal samples is to be completed working within the laboratories at Falmouth Marine School, with a microscope and other laboratory equipment supplied by the University of Plymouth. All organisms will be picked from the sample under a microscope, identified to intermediate taxonomic level (family group) before being counted, recorded and stored. Any unidentifiable specimens will be cross-referenced with experts from the Marine Institute, University of Plymouth. It is anticipated that the infaunal sample analysis will take approximately 4-5 months to complete. Arrangements are currently being made regarding the analysis of the particle size and organic content samples, to be completed at the University of Plymouth.