MASTS Small Grant Report 2017

SG460: Estimating European lobster density using baited remote underwater video (BRUV) compared to traditional

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Rational

Traditionally crustacean stocks in Scotland are assessed and managed through length cohort analysis (LCA) and derived stock sizes based on relative abundance through landings data. This technique is not without its limitations, with the assessments dependant on having a representative samples size collected via landings data. Alternatives to LCA have been trialled in other locations with the successful use of capture mark recapture (CMR) in providing population estimates of European lobster (*Homarus gammarus*) (Schmalenbach *et al.*, 2011), these can subsequently be used with future CMR to monitor changes in abundance (Howarth *et al*, 2017).

However, the use of CMR is not without its limitations. The successfulness of CMR is based on the cooperation of fishers and reporting of tagged individuals, with the underreporting of recaptures skewing perceived levels of abundance. CMR also depends on the catchability of the species in question, in the case of lobsters there catchability is known to be effected by multiple biotic and abiotic variables (Lizárraga-Cubedo *et al.*, 2015). One being the primary method of capture/sampling, in this case creels; which are a poor method for efficiently sampling a population (Smith et al, 2004).

In comparison, the use of baited under water video (BRUV) has been developed as a low cost efficient alternative method to LCA and CMR (Roberson *et al*, 2017). BRUV's are regularly used to monitor the recovery and stability of fish and crustacean populations in marine protected area and provide estimates of relative abundance both spatially and temporally (Becker *et al*, 2017).

This study will look to compare the population size estimates derived from traditional methods such as LCA and CMR compared to BRUV population estimates. Exploring the reliability of the estimates between the techniques. The trial will also look at the deployment of BRUV's with extended battery power packs. Traditionally BRUV's are deployed multiple times, with each deployment occurring for approximately an hour and restricted to daylight hours. In the case of lobster, the species is generally nocturnal (Skerrit, 2014) highlighting the potential need for camera deployment for longer periods to encompass the primary period of activity.

Main Objective

- Trial the use of Baited Underwater Video (BRUV) to estimate European lobster density compared to traditional length cohort analysis (LCA) and capture mark recapture (CMR) technique.
- Trial the use of extended battery BRUV systems in observing a nocturnal decapods

Summary of Work Funded by MASTS

BRUV frames were developed using commercial creel frames negating the need to develop new sampling equipment (Figure 1). The BRUV set up consisted of a transitional 24" creel, the outer mesh was removed from 7 of the 10 panels. Mesh remained in 3 of the panels to protecting the camera from being potential obscured by its buoy rope or underwater flora. A GoPro camera and underwater red light was mounted on a wooden board secured to the creel bars base and attached to one side of the BRUV frame with a 0.5l bait box fixed to the opposite side. A bait box was fixed approximately 12 inched from the camera, standardising the field of view in all BRUV, a total of 4 BRUVS were

developed. The development of BRUVS based on creel frames increased the versatility of the unit, allowing it to be deployed singularly or swapped into commercial strings of creels if required.

Figure 1. BRUV set up structured around a traditional creel base

Trails of the BRUV system were carried out in summer 2018 using the fishing vessel Caspian K994 along the Southwest coast of the island of Hoy, Orkney. Trails were conducted on two habitat types; shallow sand (Figure 2) and Kelp forests (Figure 3). Deployments lasted for the duration of the battery life of the cameras (Approx. 180mins) with the underwater light battery lasting a similar time (Approx. 170mins). Additional shore battery trials were conducted to ascertain the optimum set up for deployment. These tests have resulted in the adoption of time lapse set ups, as this provided optimum battery life to observation time

The preliminary footage obtained from the trial deployments were presented at the ICES Crab Working Group, Jersey, 2018. The project received great interest with additional areas of improvements highlighted by the researchers present.

Full scale stratified sampling is scheduled to occur across the study site in summer 2019 alongside conventional tagging work over the same time period.

Relevance to MASTS

This project is closely aligned to MASTS "Productive Seas" theme and the Fisheries Forum hosted by MASTS. This project plans to deliver evidence-based science that can be used by Marine Scotland Science and Scottish Inshore Fisheries Groups to directly affect management decisions, aiding in longer term sustainability of Scotland's valuable inshore fisheries and the communities that depend upon it.

Outputs

- Use of BRUV's to estimate lobster population density, comparing the technique to both CMR and LCA;
- Contribution to Heriot-Watt PhD Study;
- Presentation of Results at ICES WGCRAB 2018;

References:

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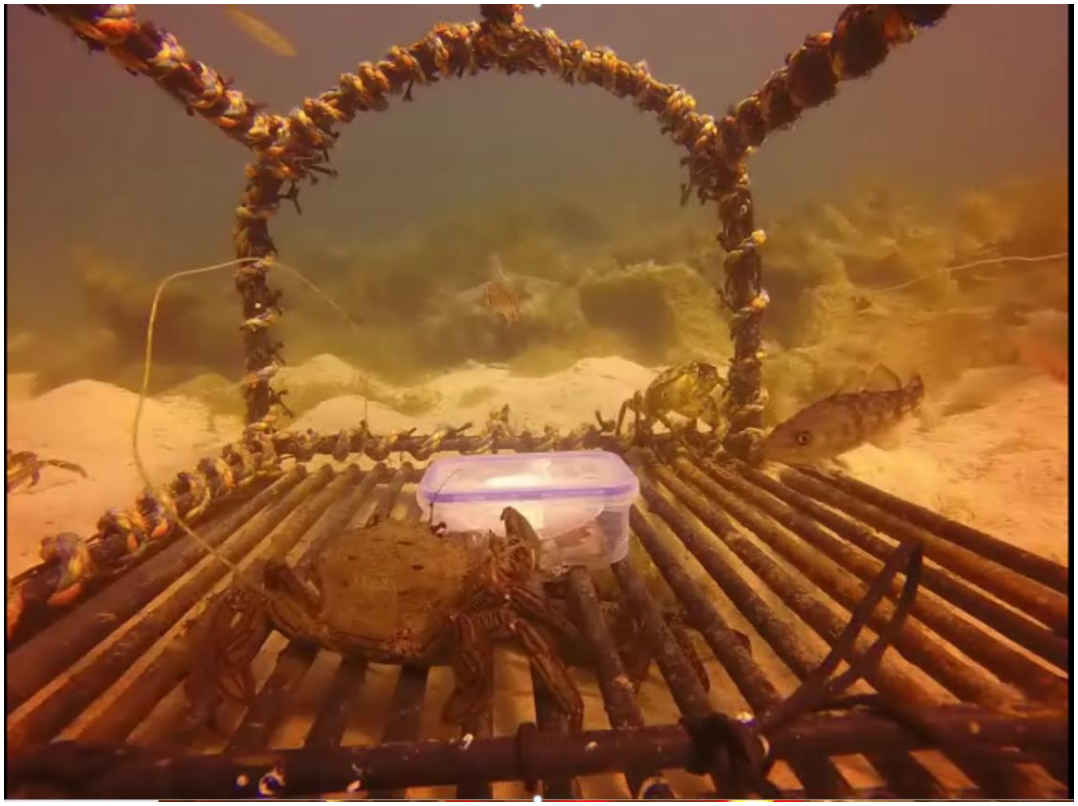

Figure 2. Still image from the BRUV deployment on a sand bank.

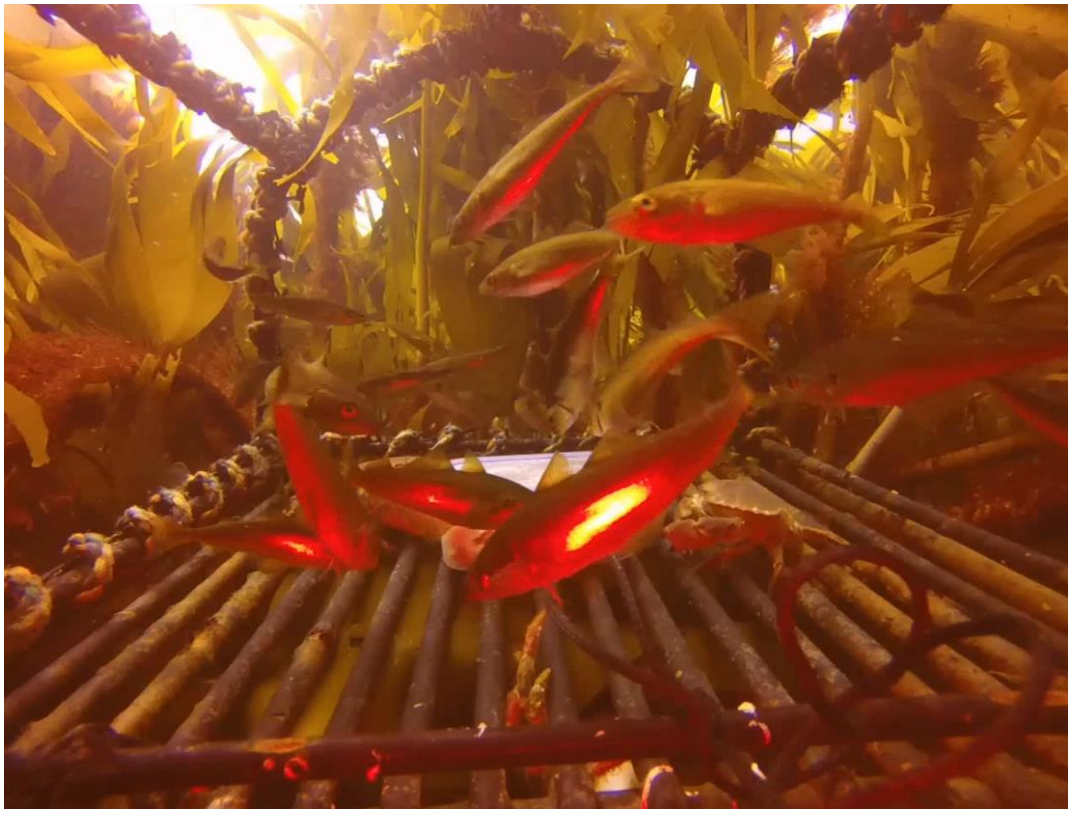

Figure 3. Still image from BRUV deployed in a kelp forest