

Orkney Sea Bottom Temperature Monitoring Project

Progress Report – November 2015



Matthew T. Coleman

17/11/2015

Orkney Sea Bottom Temperature Monitoring Project: November Progress Report

Rational

Environmental variables can be highly influential on inshore fisheries, dictating target species seasonal biological processes (Hearn, 2004; Schmalenbacj & Buchholz, 2013) and the number fishing days, ultimately influencing catches and local incomes of those targeting these resources (Lizárraga *et al*, 2015). One such variable is sea surface temperature (SST). The role of SST has been well documented within crustacean species; within homarid lobsters sea temperatures influences behaviour and subsequently interaction with traps over short temporal scales (McCleese and Wildner, 1958). Whilst seasonal spikes in the fishery can be related to the subsequent recruitment of previous sub legal individuals after post moult, following sea surface increases (Thomas, 1957).

Within regional contexts the availability of such fine scale information can be difficult to obtain or localised in one specific point, therefore not representative over large spatial extents or complex tidal areas. This project aims to collect baseline data on sea bottom temperature (SBT) over a wide geographic area that can be used to investigate spatial and temporal changes in catch rates and its influence on regional biological process, specifically that of crustaceans. This project will also look to compare SBT against SST and investigate its application as a more suitable variable in investigating crustacean biology and fishery.

Update

Following the first initial deployment of eighteen temperature loggers (seventeen in creels, two at a fixed position) between June – July 2015 (Figure 1), a further six loggers have been re-allocated to three new vessels (figure 1). Temperature loggers have been re-allocated from previously designated fixed point location to creel deployment. This change is due to difficulties associated in securing loggers to stable moorings and after consulting with fishermen regarding wave action and associated weight needed to perform this role if done independently.

Re-allocated loggers have increased spatial coverage through the placement of logger's on-bard vessels operating out of; Kirkwall, Tingwall and Wetsray¹ (figure 1).

Temperature loggers are currently recording data at intervals of 1 hour, providing a recording life of 3 years based on current setting and optimum performance of battery life. At these time intervals data will be downloaded at 6 monthly intervals, providing opportunity to inspect equipment and increase equipment life span.

Four temperature loggers have been recovered since the first deployment in June 2015 off the west coast of Hoy. This initial Recovery enabled equipment to be checked and preliminary data downloaded. Results from one of the data loggers from a depth of approximately 80metres demonstrate a steady daily increase in SBT from 5th June - 25th September 2015 (figure 2). Outliers could be attributed to hauling occurrences and hence the rapid positive or negative change in temperature being recorded due to air temperature. Aggregated monthly changes in SBT (figure 3) illustrate the increase in temperature from June – August and the high variability in those months, until a more constant temperature is reached in September.

¹ Westray Temperature Loggers are scheduled for deployment in late 2015/Early 2016.

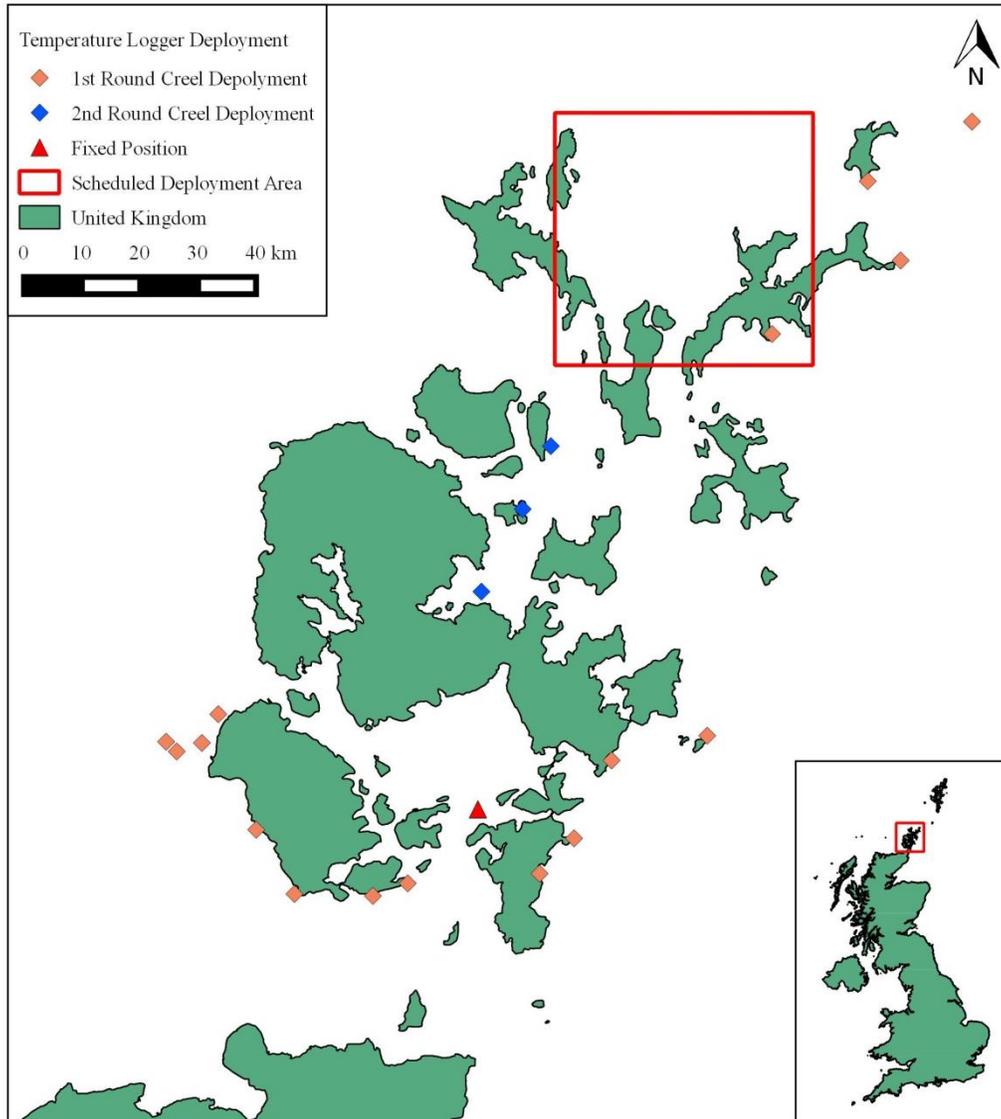


Figure 1. Current and future deployment locations of temperature loggers in the Orkney Islands, UK.

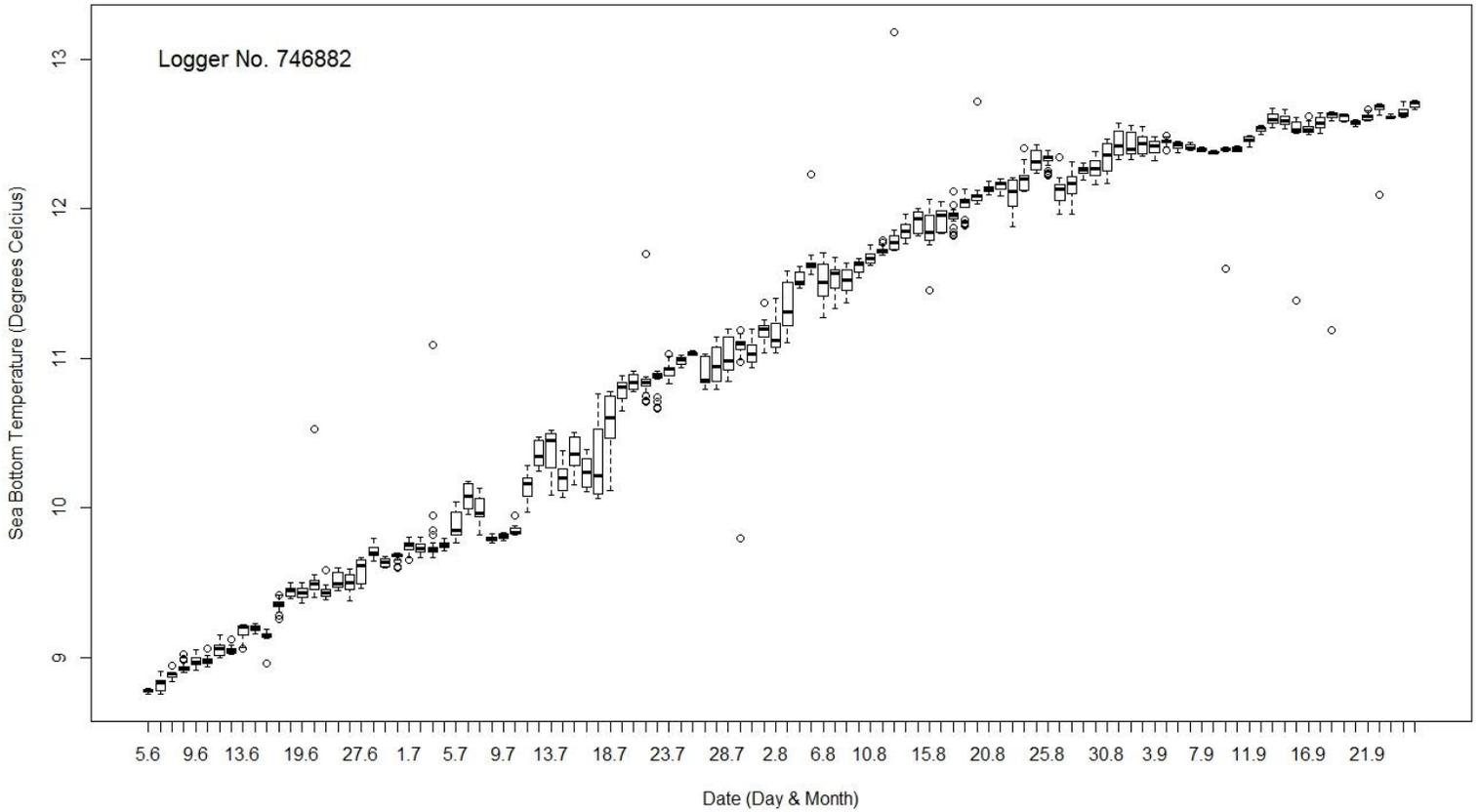


Figure 2. Boxplots of Daily Sea Bottom Temperature Recordings extracted from temperature logger: 746682 at an approximate depth of 80metres from 5th June to 25 September 2015.

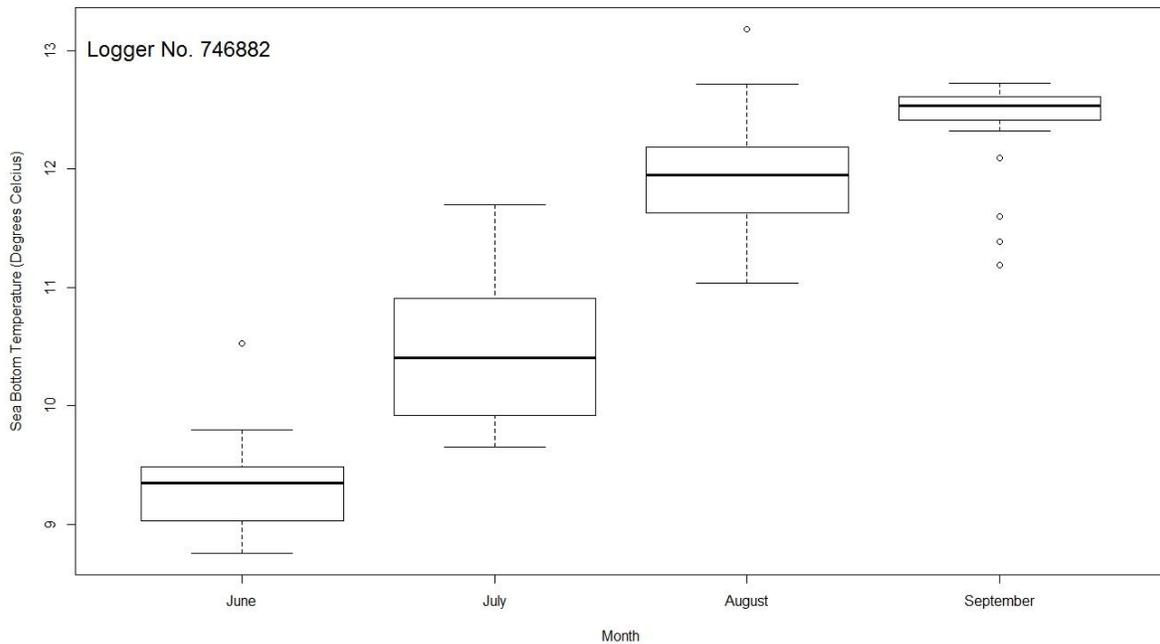


Figure 3. Boxplots of aggregated monthly sea bottom temperature extracted from temperature logger: 746682 at an approximate depth of 80metres from 5th June to 25 September 2015.

References:

Lizárraga-Cubedo H A., Tuck I., Bailey N., Pierce G J., Zuur A F., Bova D. (2015) *Scottish lobster fisheries and environmental variability*. ICES Journal of Marine Science; doi:10.1093/icesjms/fsu248.

Hearn, A R. (2004) *Reproductive biology of the velvet swimming crab, *Necora puber* (Brachyura: Portinidae), in the Orkney Islands, UK*. Sarisa, DOI 10.1080/003648210410002578.

Thomas H J. (1957) *Some Seasonal Variations in the Catch and Stock Composition of the Lobster*. ICES.CM.1957.ShellfishCommittee_18

McCleese D W., Wildner D G., (1958) *Overview of the inshore lobster resources in the Scotia-Fundy Region*. Canadian Atlantic Fisheries Scientific Advisory Committee (CAFSAC) Research Document. 85 20pp.