Bait Digging in the Plymouth Sound & Estuaries European Marine Site And Tamar Estuary Sites Marine Conservation Zone

Data Analysis Report

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Contents

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Executive Summary

Plymouth Sound and its estuaries are protected under several pieces of European and UK legislation. The site is comprised of the Plymouth Sound & Estuaries Special Area of Conservation (SAC), the Tamar Estuaries Complex Special Protection Area (SPA), and the Tamar Estuary Sites Marine Conservation Zone (MCZ).

The area's popularity with sea anglers, combined with its easy to access mudflats mean that it is also an important area for bait digging. The management of bait collection activities fall under the remit of the Inshore Fisheries and Conservation Authority (IFCA) and so, to inform management decisions, data collection relating to bait digging was carried out.

Bait digging effort levels were monitored both within the EMS and MCZ, and on the Plym, just outside the designated areas. The majority of the effort seemed to be focussed in the Plym. The peak in activity occurred in the spring months and decreased throughout the year.

Although effort data have been collected over two separate studies, more information on bait digging behaviours may be required when reviewing the management of this activity.

1.0 Introduction

1.1 Rationale

Recreational Sea Angling is popular throughout Plymouth Sound and its adjoining estuaries and, as a result, so is the collection of bait species. Bait digging for polychaete worms is by far the most common activity, with two main species targeted; blow lugworm *Arenicola marina* and king ragworm *Alitta virens.* Other bait collection activities which are also popular in the Devon & Severn IFCA' District, such as the collection of shore crabs using man-made shelters ("crab tiling"), also occur in this site.

Under its obligations set out in the Marine and Coastal Access Act 2009 (MaCAA) Devon and Severn IFCA must 'seek to ensure that the exploitation of sea fisheries resources is carried out in a sustainable way'. In addition, the Plymouth Sound and Estuaries site is designated as a European Marine Site (Comprised of the Plymouth Sound and Estuaries Special Area of Conservation and the Tamar Estuaries Complex Special Protection Area) and as part of the work programme following Defra's "Revised approach to the management of commercial fisheries in European Marine Sites", data collection relating to bait collection was carried out. Although most of the bait collection in the Plymouth Sound and Estuaries EMS is thought to be for recreational purposes, placing it outside the scope of the revised approach, it can be difficult to delineate between commercial and recreational bait collection. D&S IFCA also have a responsibility to establish whether management measures are required to achieve the conservation objectives of Marine Conservation Zones (MCZs). Therefore, D&S IFCA is assessing the impacts of all bait digging, regardless of the intended purposes of the bait collection. Finally, D&S IFCA is currently in the early stages of considering the management of hand working activities (including bait digging, hand gathering, crab tiling etc.) and this report is intended to both inform the HRA and the development of management by D&S IFCA.

1.2 Potential Impacts of Bait Digging

Direct impacts of bait digging include the effect of the removal of worms on the abundance and population structure of the target species as well as effects on the structure of the wider benthic community. Indirect effects may relate to trampling surrounding habitats whilst accessing worm beds, or disturbance of bird feeding or roosting behaviour through increased presence on the foreshore.

1.3 Scope

The baseline survey has three primary aims; i) to identify the primary species targeted by bait collectors in the EMS and MCZ ii) to determine the key locations for bait digging activities and iii) to highlight areas for future research and evidence gaps, particularly in relation to bait digging within the EMS and MCZ

2.0 Methodology

2.1 Study Site

The Plymouth Sound & Estuaries EMS is made up of the Plymouth Sound & Estuaries SAC and the Tamar Estuaries Complex SPA. Plymouth Sound and its associated tributaries comprise a complex site of marine inlets. The ria systems entering Plymouth Sound (St John's Lake and parts of the Tavy, Tamar and Lynher), the large bay of the Sound itself,

Wembury Bay, and the ria of the River Yealm are of international marine conservation importance because of their wide variety of salinity conditions and sedimentary and reef habitats. The high diversity of habitats and conditions gives rise to communities both representative of ria systems, and some very unusual features, including abundant southern Mediterranean-Atlantic species rarely found in Britain. The designated habitats of the SAC on which bait digging occurs, and can therefore impact, are “Mudflats and sandflats not covered by seawater at low tide”. The mudflats are a highly productive system forming a critical part of the food chain (English Nature, 2000). The mudflats contain extensive and varied infaunal communities, rich in bivalves and other invertebrates, and provide key feeding grounds for internationally important numbers of wintering wildfowl and waders. These habitats provide important feeding and roosting areas for over wintering avocet and little egret, for which the Tamar Estuaries Complex SPA is designated. The EMS crosses the border between Devon & Severn IFCA and Cornwall IFCA.

The Tamar Estuary Sites Marine Conservation Zone (MCZ) provides sheltered habitats which are subject to various salinity levels and tidal exposures. This diverse estuarine environment supports a number of features of ecological importance, including coarse sediments on the shore and biogenic reefs formed by the blue mussel (*Mytilus edulis*). These living reefs are ecologically important as they provide a home for numerous species including seaweeds and animals such as sponges, barnacles, winkles and crabs. Areas of biogenic reef exposed at low tide provide a feeding ground for birds, whilst submerged areas are used by predators and scavengers like fish and crabs. Bait digging could occur, and impact, on the “Intertidal coarse sediment” designated feature of the MCZ. The site is made up of two separate areas; one in the Lynher estuary (within Cornwall IFCA’s District) and the other encompassing part of the Tamar and Tavy estuaries (cross-border between Cornwall and Devon & Severn IFCAs). Both parts of the MCZ fall within the Plymouth Sound and Estuaries European Marine Site.

There are extensive mudflats present throughout the estuaries surrounding Plymouth Sound, and being farther up the reaches of estuaries means they are exposed for relatively long periods at low tide. The close proximity to Plymouth and its urban areas means some of these mudflats of easily accessible, making them popular with bait diggers.

2.2 Survey Design

2.2.1 2014-2015 Survey

Surveys were carried out at three sites within the Plymouth Sound area which were highlighted by local angling clubs as being important (Figure 1). The sites were primarily sandy and muddy shores where lugworm, *Arenicola marina,* was the target species. There were also some patches with more mixed sediments were, which were primarily targeted for king ragworm (*Alitta virens*). The sites sampled were: Embankment on the Plym, the east bank of the Plym, and Ernesettle. Although the Plym falls just outside the EMS, it was highlighted as the main bait digging site in the area so was included in the study to gauge activity levels surrounding the EMS.

Surveys carried out in 2014-2015 were semi-stratified in order to attempt an even coverage of spring and neap tides, weekends and weekdays. Surveys were planned to fall around low tide, starting two hours before low tide and finishing two hours after low tide. Details of the weather conditions, time, tidal state, number of bait diggers present, number of holes or trenches observed, and GIS co-ordinates of the area dug were recorded for each trip. Interviews were conducted on all surveys where bait digging was observed. Interviews

provided additional information on bait digging behaviour, effort and perceptions. These surveys ran for a full year.

2.2.2 2017 Survey

To collate more information on bait digging at the Ernesettle site, which falls within the EMS and MCZ, further surveys were carried out at this site only in 2017. The surveys followed the same methodology as the 2014-2015 surveys, with the exception that they started one hour before low tide and finished one hour after low tide. These surveys were carried out from June to October.

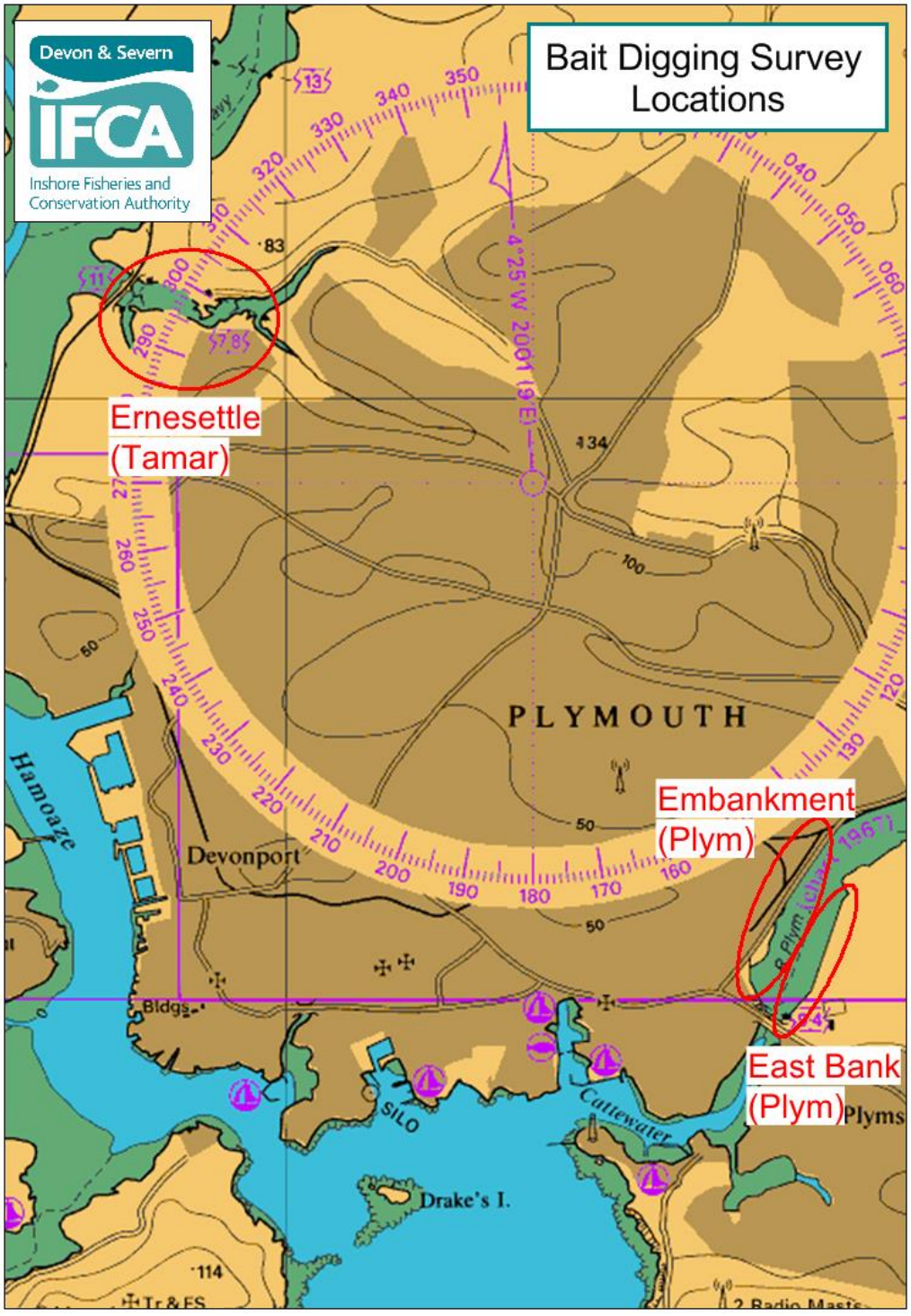

Figure 1. Survey locations

3.0 Results

3.1 Survey Effort

A total of 23 visits were carried out in 2014-2015. These were comprised of 13 visits to the Embankment site, eight visits to Ernesettle, and two visits to the East Bank site (which could also be viewed through binoculars from Embankment). Only Ernesettle was re-visited in 2017, for a total of nine visits (Figure 2).

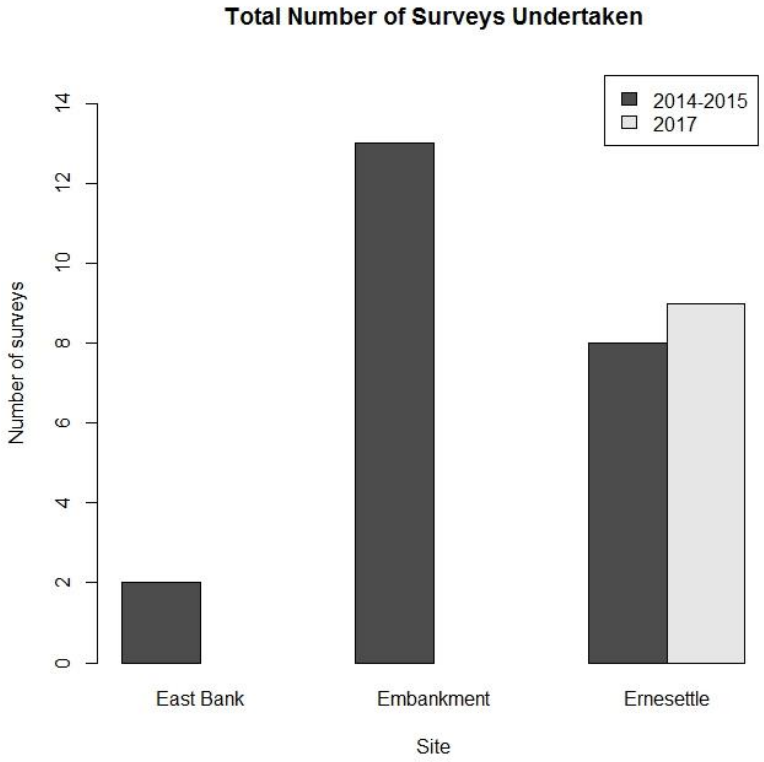

Figure 2. Total number of surveys at each site

An average of between three and four hours was spent on each survey during the 2014-2015 sampling period. Whilst in 2017 (Ernesettle only) an average of just under two hours was spent on each survey. This is due to a change in the survey protocol (detailed in Section 2), reducing the sampling period to one hour either side of low water (Figure 3).

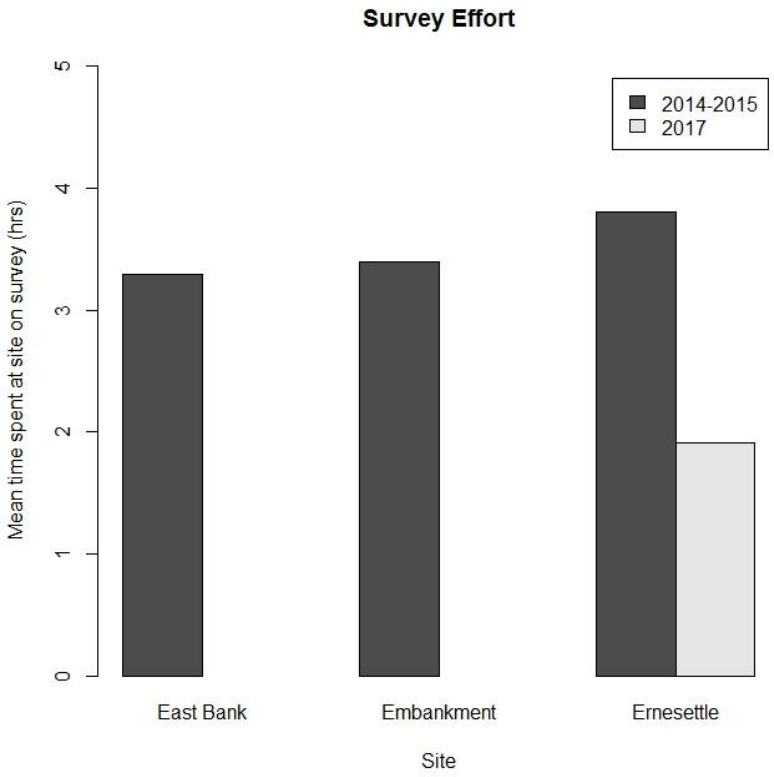

Figure 3. Mean amount of time spent on site for each survey

In 2014-2015, survey effort was highest in the winter (29.26 survey hours), slightly lower, but almost even in the spring and autumn (22 and 22.9 hours, respectively). But much lower in the summer (7 hours) (Figure 4). The survey ran from May 2014 to March 2015, meaning that April was never surveyed and, therefore, spring was one month shorter than the other survey seasons. In 2017, survey effort was higher in the summer (11.5 hours) than the autumn (5.75 hours). However, the survey ran from the beginning of June to mid-October, so there were twice as many surveys in the summer than the autumn. As described in Section 2, survey times were shorter in 2017 than 2014-2015, this is reflected in the depicted effort levels.

Figure 5 shows that survey effort at Embankment was relatively even across the seasons, with the exception of summer which was much lower, whereas survey effort at Ernesettle seemed to increase steadily from spring to winter. However, the 2017 surveys at Ernesettle only took place in summer and autumn, adding more effort to these seasons at this site compared to at Embankmet. Only two surveys were carried out at East Bank; one in summer and one in autumn.

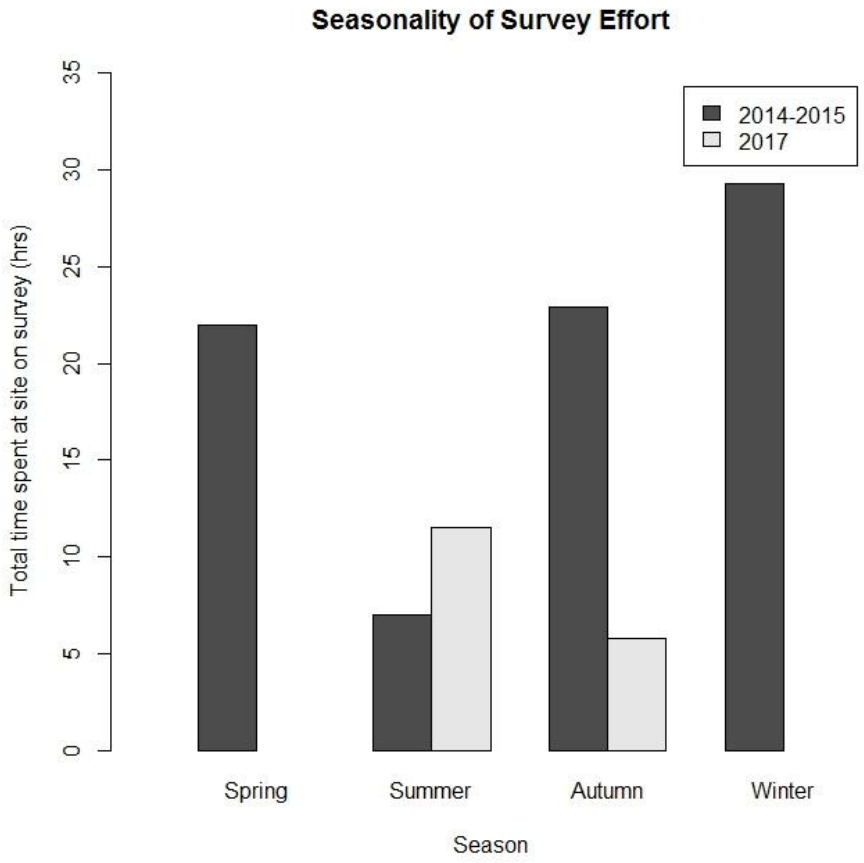

Figure 4. Total time spent on survey, per season

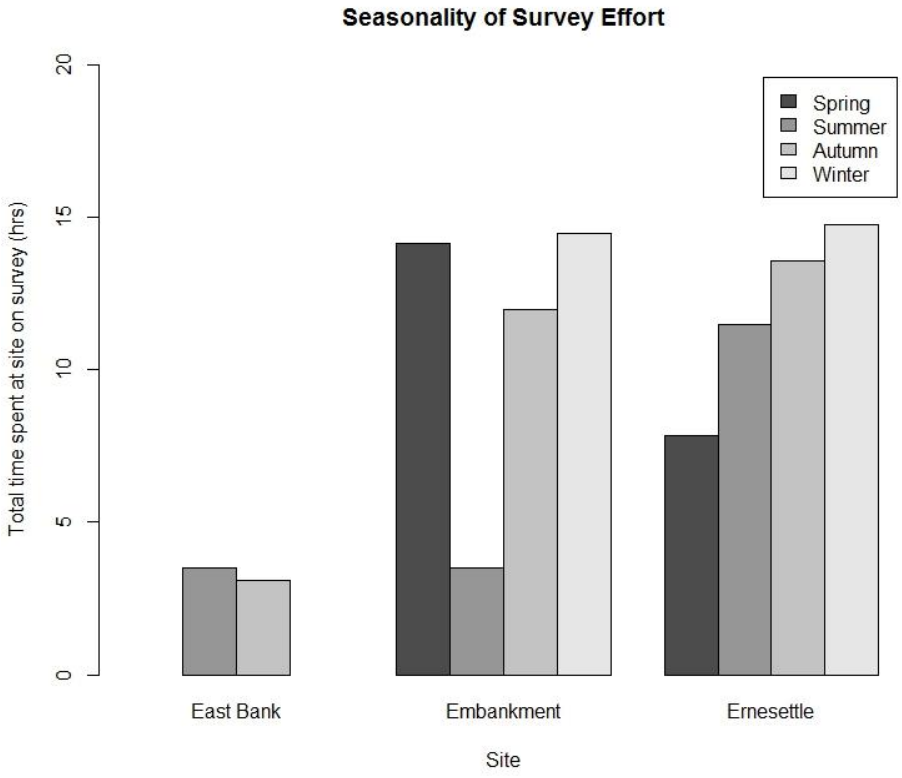

Figure 5. Total time spent on each site, per season

The area surveyed on the Plym covered 43.8 hectares for the Embankment site, and 18.2 hectares at East Bank (Figure 6). The area surveyed at Ernesettle, in the Tamar, covered 15.13 hectares (Figure 7).

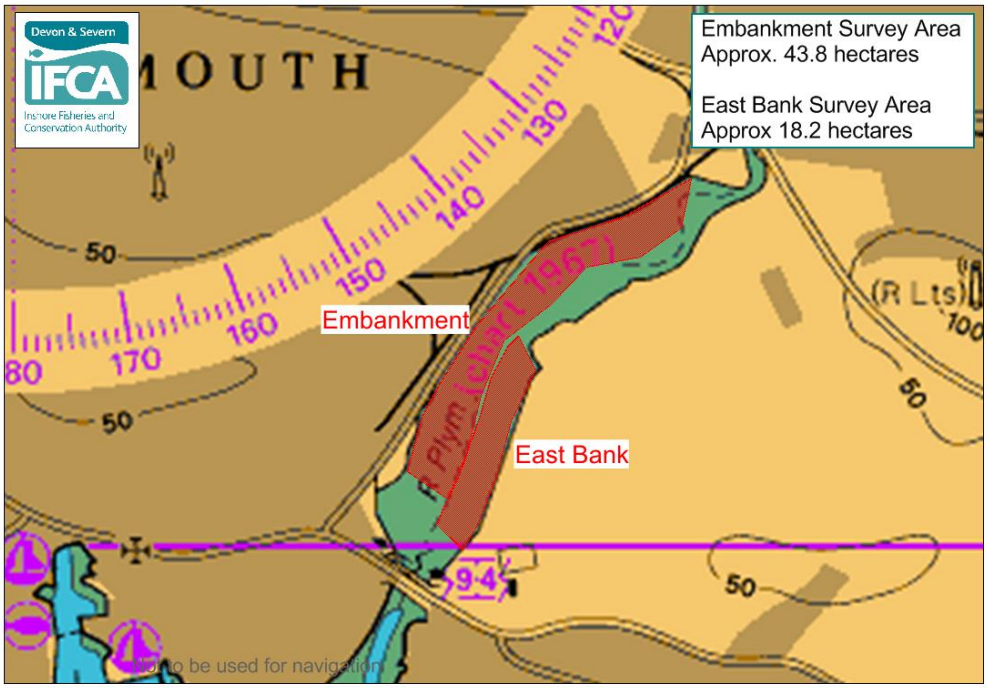

Figure 6. Area covered by survey effort on the Plym

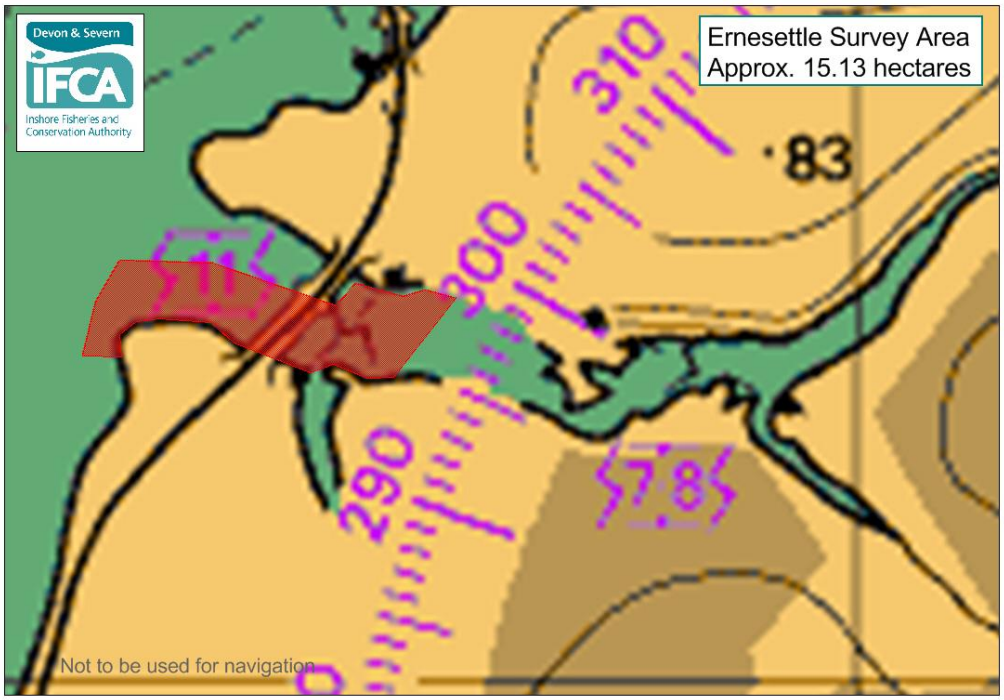

Figure 7. Area covered by survey effort on the Tamar

3.2 Bait Digging Effort, Location and Seasonality

In 2014-2015 the mean number of bait diggers seen per hour for each site was as follows: Embankment 0.3; Ernesettle 0.03; East Bank 0 (Figure 8). In 2017 the effort at Ernesettle rose to 0.1 diggers seen per hour (Figure 9).

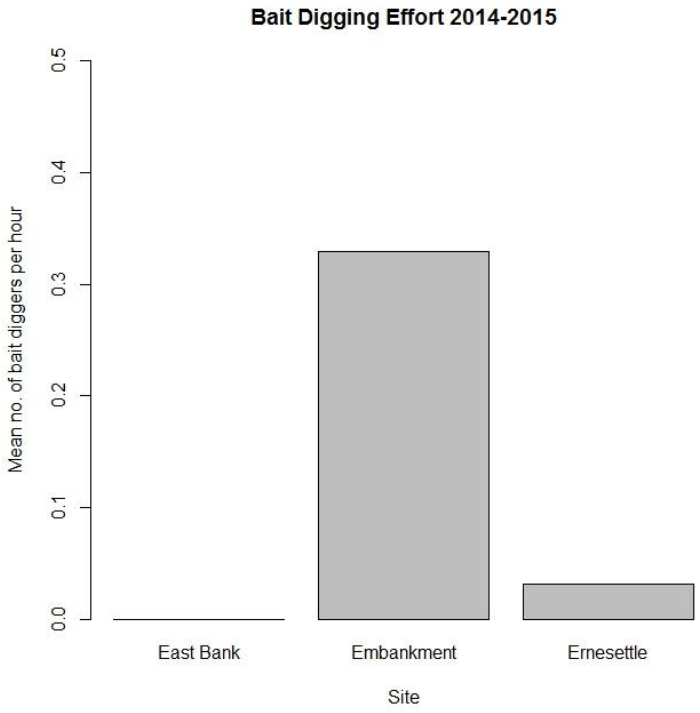

Figure 8. Mean number of bait diggers seen per hour in 2014-2015

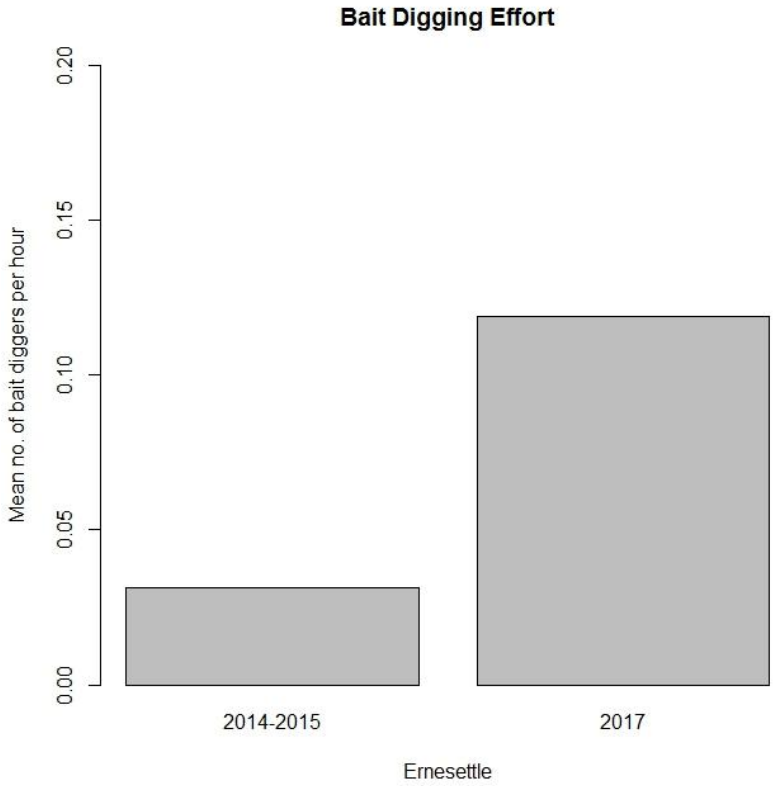

Figure 9. Mean number of bait diggers seen at Ernesettle

Diggers were seen on 10 out of 23 visits in 2014-2015: on nine out of 13 visits to Embankment; on one out of eight visits to Ernesettle; and none were seen on the two visits to the East Bank of the Plym. Diggers were present on two out of the nine visits to Ernesettle in 2017. The maximum number of bait diggers seen on any survey was three (at Embankment in 2015-2015). In both 2014-2015 and 2017 the maximum number of diggers seen at Ernesettle was one (Figure 10).

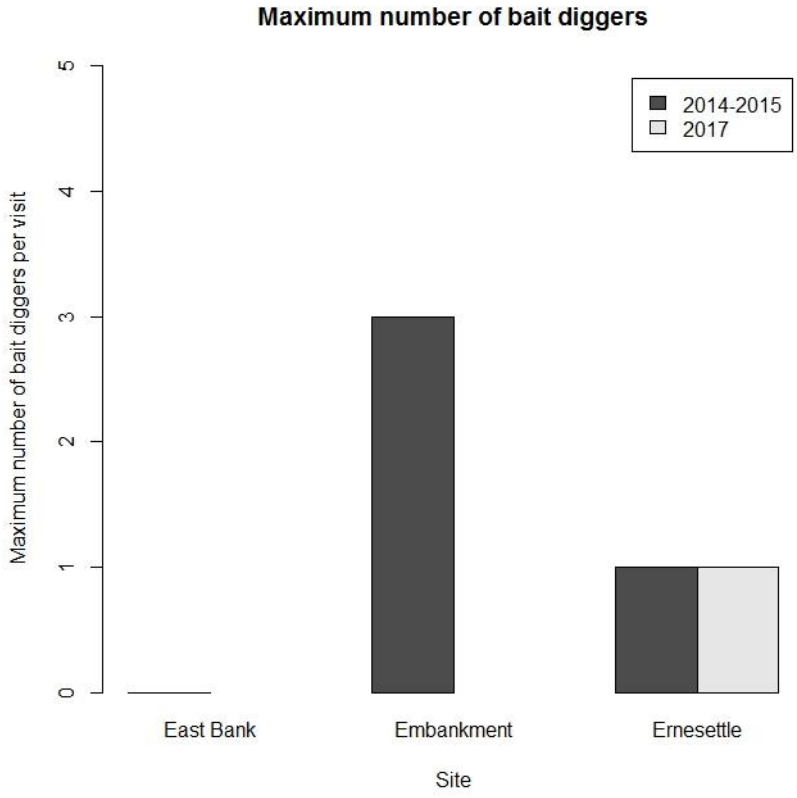

Figure 10. Maximum number of bait diggers seen at each site

Bait digging effort was highest in the spring, decreasing throughout the year, across all sites in 2014-2015 (Figure 11). This pattern is most pronounced at Embankment, with little variation over the year seen at Ernesettle (Figure 12).

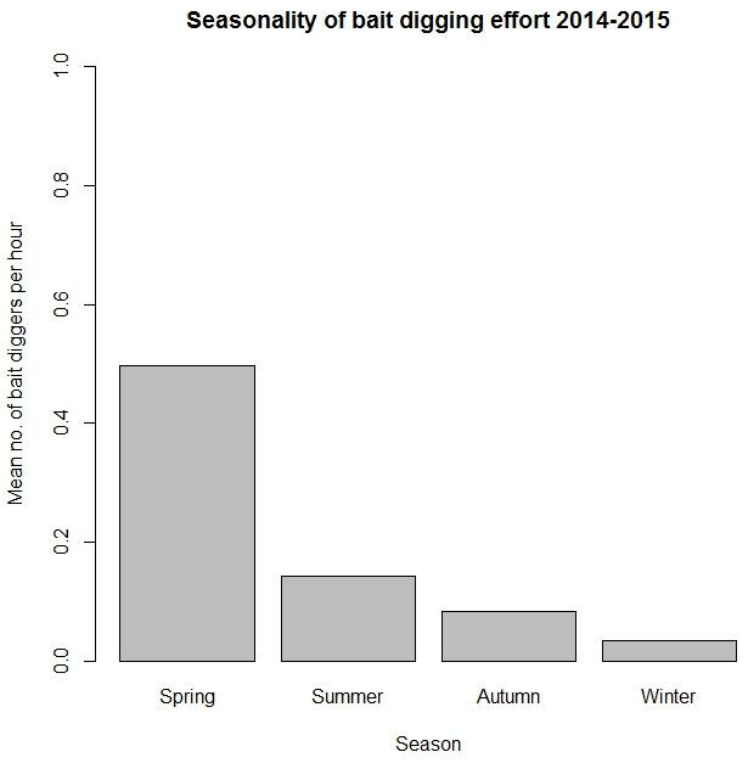

Figure 11. Mean number of bait diggers seen per hour over 2014-2015

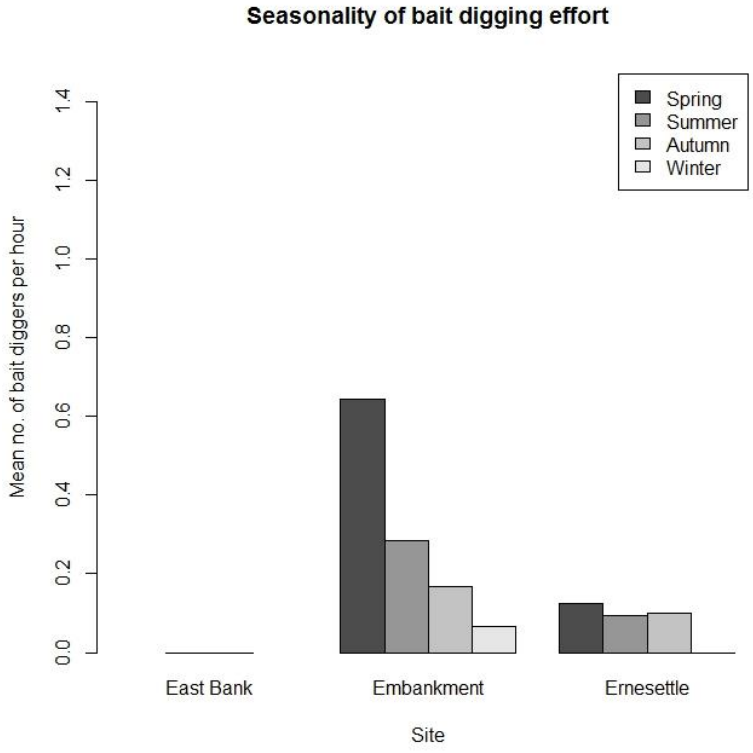

Figure 12. Seasonal effort of bait digging at each site

The majority of bait diggers seen were digging holes, rather than trenches. The largest number of holes seen dug in one trip was 13 at Embankment, whilst the highest at

Ernesettle was four, in 2014-2015 (no bait digging were seen at East Bank). However, this is likely to be an underrepresentation of the number of holes dug on average, this is due to the extremely soft nature of the sediment making it difficult for surveyors to get close enough to accurately count the holes. Therefore, the total number of holes or trenches dug was not always recorded. Also, particularly on the Plym, bait diggers were still working beyond the end of the survey time, so the final number of holes dug would not have been recorded.

3.3 Bait Collection Behaviour

Despite seeing bait diggers on numerous visits, the extremely soft nature of the sediment on the estuaries often made it difficult to safely approach them for interview. Therefore, only one interview was conducted from these surveys (at Ernesettle in 2014-2015). The findings of the interview are summarised as follows:

- The digger was aiming to collect approximately 100 ragworms (enough for one fishing trip) over a minute period.
- The interviewee found the best time to dig at Ernesettle was 1 hour before low tide.
- The interviewee was not a regular bait digger, only going out a few times per year to get bait for occasional fishing trips.
- The interviewee reported that he believed commercial bait digging occurs at the Embankment on the Plym, which he thinks is responsible for a current decline in bait availability. He believes management, such as a bag limit, would help.

4.0 Discussion

The highest levels of bait digging found by these studies were in the Plym, just outside the Plymouth Sound & Estuaries EMS. The highest levels of bait digging occur over the spring months then decrease throughout the year, with little activity seen over the winter months when the over-wintering bird populations, for which the SPA is designated, would be present. The decline in observed digging effort between spring and summer could be explained by the decline in survey effort over the summer months. During the summer months of 2014-2015 a lot of officer time was taken up with sea-based surveys, whilst weather conditions were good, meaning less bait digging surveys were able to be completed. Survey effort was fairly even across spring, autumn and winter, indicating the decline in observed activity throughout autumn and winter is a true reflection of the seasonality of bait digging effort. Extra surveys were carried out at Ernesettle in the summer and autumn of 2017, which may explain why the observed activity levels at this site are more even across the seasons than at Embankment, which was only surveyed in 2014-2015.

In 2017 the Tamar Estuaries Consultative Forum (TECF) published the results of a “Survey of recreational use within the Plymouth Sound and Estuaries European Marine Site” (Langmead *et al*., 2017). This study included both angling and bait collection, with stakeholders attending workshops and marking on maps the main areas for their activity. They reported that the Plymouth Sound area is popular all year round for sea angling, both from the shore and from vessels. Therefore, seasonal angling patterns cannot be used to explain the peak in bait digging activity in the spring. Langmead *et al*. also identified bait collection sites, within the EMS (and the Plym) and found that the main areas of bait digging, within the designated EMS are around Torpoint and Saltash, and in the Lynher (which fall within Cornwall IFCA’s District) (Shown in yellow in Figure 13). This confirms that the key areas of bait digging within the parts of the EMS and MCZ that fall within D&S IFCA’s District are those that were captured by the IFCA’s surveys. Another stage of Langmead *et al*.’s

study was to conduct visitor interviews at 19 key locations around the EMS, from March to December. Of the 562 interviews conducted, only four respondents said that the purpose of their visit was “bait digging/crab tiling/cockling”. These were all within the SAC and were local residents. No respondents were hand-gathering in the SPA areas of the site. The final stage of the study by Langmead *et al*. was an online questionnaire. They reported that “few respondents visited the EMS for bait collecting/crab tiling”. However, those that were carrying out these activities did so in a limited number of areas, which coincide with those identified in the workshops (Figure 13).

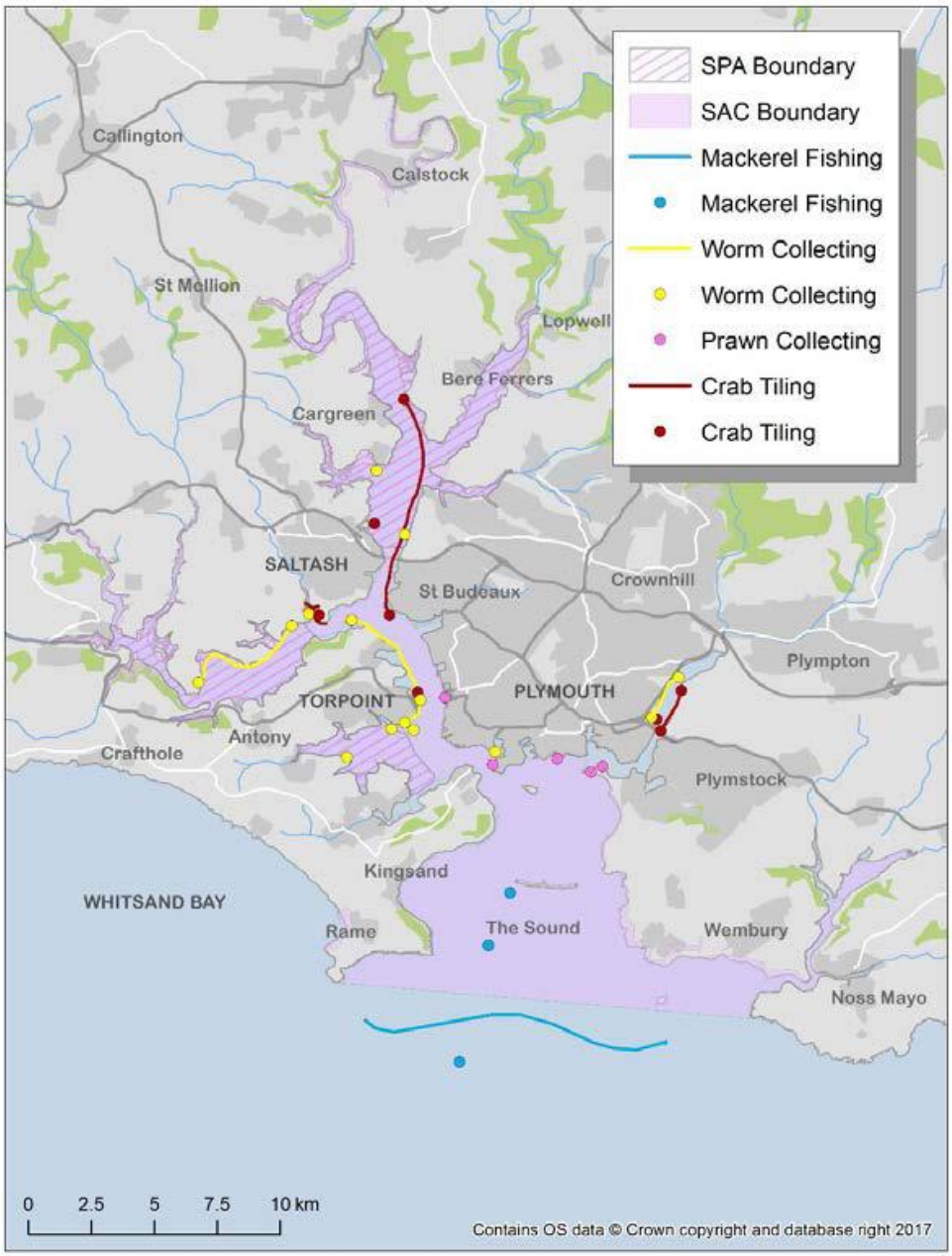

Figure 13. Bait collection sites within the Plymouth Sound & Estuaries European Marine Site (Langmead *et al*., 2017)

5.0 Conclusions and Future Work

Although two studies have now been completed within the EMS and MCZ, and observational data on effort have been collected, there are still little data on bait digging behaviour due to the lack of interviews completed. If, in the future, it is felt that more of this type of data should be collected the IFCA could consider alternative methods, such as holding workshops similar to those of Langmead *et al*., targeting anglers and bait diggers. This may be something for the IFCA to consider when looking into reviewing management measures for hand-working activities, including bait digging.

It is believed that commercial bait digging takes place in the Plym, just outside the EMS. Not only was this reported by the interviewee at Ernesettle, but the amount of time spent by the bait diggers in the Plym working in very muddy conditions would seem to indicate they were working at a commercial level. However, based on observational data alone it is hard to differentiate between, and quantify the level of, recreational and commercial activity within the EMS & MCZ. D&S IFCA is currently reviewing its management of hand-working activities, and if it is decided that a Permitting Byelaw is introduced could be brought in to manage these activities then this would provide more information on the levels of both commercial and recreational bait digging.

6.0 References

English Nature. 2000. Plymouth Sound and Estuaries European Marine Site. English Nature's advice given under Regulation 33 (2) of the Conservation (Natural Habitats &c.) Regulations 1994: English Nature.

Langmead, O., Tillin, H., Griffiths, C; and Bastos, E., Milburn, H., Butler, J., & Arnold, M. (2017). EMS Recreation Study Document 04. Survey of the recreational use within the Plymouth Sound and Estuaries European Marine Site: Scoping Report and Survey Results. A report for Plymouth City Council prepared by the Marine Biological Association of the UK.