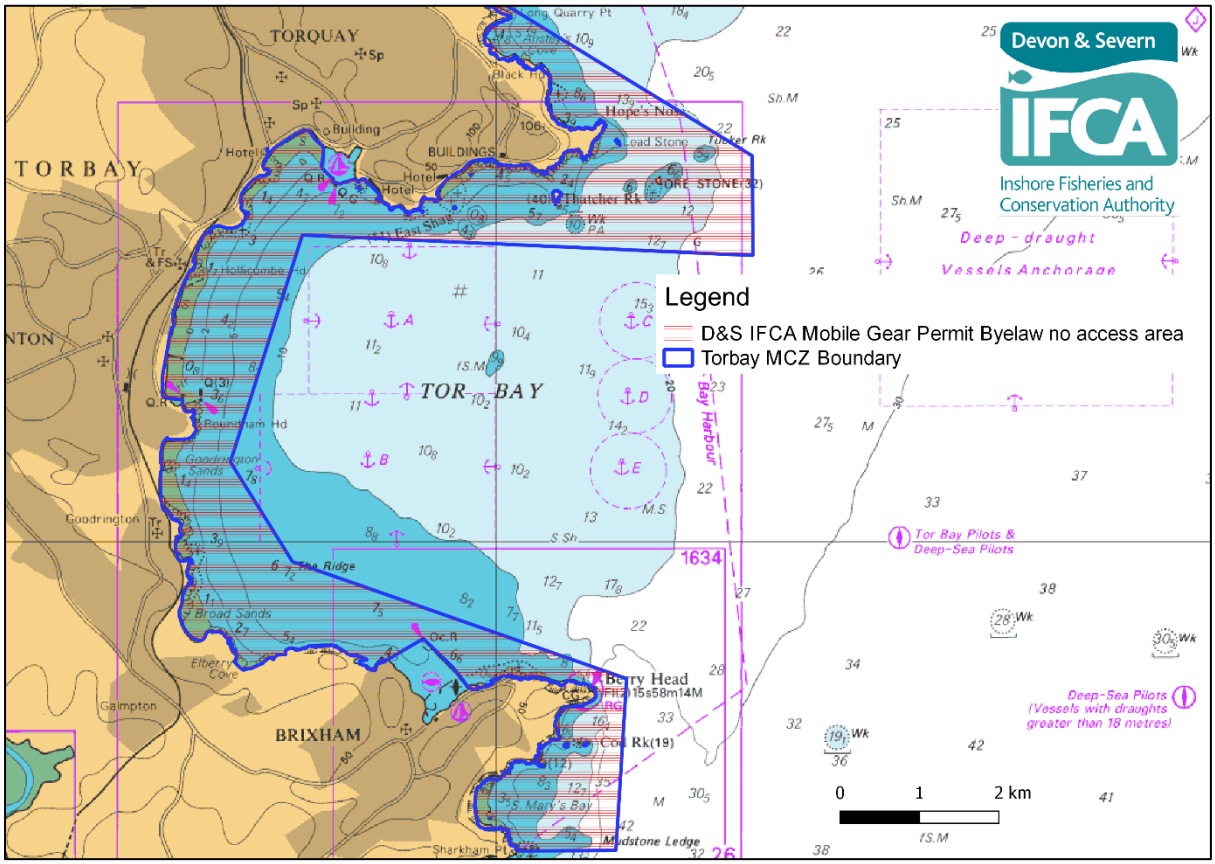
Bait Digging and Hand Gathering in the Torbay Marine Conservation Zone

Data Analysis Report



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Inshore Fisheries and Conservation Authority

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Version	Date	Creator/Reviewer	Change
1.0	February 2019	Sarah Curtin	
1.1	6th March 2019	Katherine Stephenson	Minor amendments
1.2	18th March 2019	Sarah Clark – QA'ing	Minor amendments

Executive Summary

Torbay Marine Conservation Zone (MCZ) is an inshore site located in the south west of England. The area around Torbay supports a high level of biodiversity due to the range of habitats that are exposed to different environmental conditions. The MCZ protects eleven features including the various sediments, rock and underboulder communities, seagrass beds and the seahorse.

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 in the area falls under the remit of the Devon and Severn Inshore Fisheries and Conservation Authority (D&S IFCA) and so, to inform management decisions, data collection relating to bait digging was carried out.

Bait digging effort levels were monitored within the MCZ over two separate survey periods. The majority of the effort seemed to be focussed during the 2017 period and at Goodrington and Broadsands.

The data reviewed in this report will be used to assess the impacts of bait digging on the features of the MCZ, including intertidal sediment and intertidal seagrass. This will be done through MCZ assessments. Dependant on the outcome of the MCZ assessments, D&S IFCA may need to consider and review byelaws relating to hand working (including bait digging). Options for management will include, no action, voluntary measures and the IFCA may consider the potential introduction of a Hand Working Byelaw, which would allow the IFCA to monitor levels of this activity in the future and adapt to changes in effort/ environmental conditions if necessary. Any management may include a requirement to backfill holes/trenches.

1.0 Introduction

1.1 Rationale

Recreational Sea Angling is popular throughout the Torbay MCZ 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 popular elsewhere in the D&S IFCA's District, such as the collection of shore crabs using man-made shelters – 'crab tiling', do not occur in the Torbay MCZ (Davies 2016).

D&S IFCA has a responsibility to establish whether management measures are required to achieve the conservation objectives of Marine Conservation Zones (MCZs). The IFCA's responsibilities in relation to management of MCZs are laid out in Sections 124 to 126, & 154 to 157 of the Marine and Coastal Access Act 2009. To aid the decision-making process, D&S IFCA has gathered information relating to the occurrence of bait digging and hand gathering activities within each of the Marine Conservation Zones (MCZs) within the district. This report pools official information in order to define bait collection and hand gathering activities occurring, and at what levels, in the Torbay MCZ.

Most of the bait collection in the Torbay MCZ is thought to be for recreational purposes, although it can be difficult to delineate between commercial and recreational bait collection. For this reason, 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 (including bait digging, hand gathering, crab tiling etc.) and this report is intended to inform both the MCZ Assessment 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 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 MCZ.

2.0 Methodology

2.1 Study Site

Torbay MCZ (0 - 6nm) is an inshore site located in the south west of England. The site covers an area of coastline in South Devon between Oddicombe Beach and Sharkham Point, protecting a total area of 19.8 km^2. Beginning at the coastline, the boundary extends between 1 – 2.5 km out to sea, to a depth of 30m encompassing Hope's Nose near Torquay

and Berry Head near Brixham. The area provides a wide variety of habitats which are exposed to different environmental conditions supporting a diverse and rich array of species. There are extensive mud flats, seagrass beds and subtidal sandy shores present throughout the inshore areas of the MCZ making them easily accessible for bait diggers and hand gatherers during low tide.

2.2 Survey Design

2.2.1 2016-2017 Survey Bait Digging and Hand Gathering

Surveys were carried out at six sites within the Torbay MCZ which were highlighted by local angling clubs as being important (Figure 1). The sites were primarily sandy and muddy shores where lugworms (*Arenicola marina*) were the target species for bait diggers and razor clams and winkles were the target species for hand gatherers. There were also some patches with more mixed sediments which were primarily targeted for king ragworms (*Alitta virens*). The sites sampled were Broadsands, Goodrington, Hollicombe, Paignton, Preston and Torre Abbey.

Surveys carried out in 2016-2017 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 one hour before low tide and finishing one hour after low tide. Details of the weather conditions, time, tidal state, number of bait diggers/hand gatherers 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, or hand gathering was observed. Interviews provided additional information on bait digging/ hand gathering behaviour, effort and perceptions. These surveys ran for a full year.

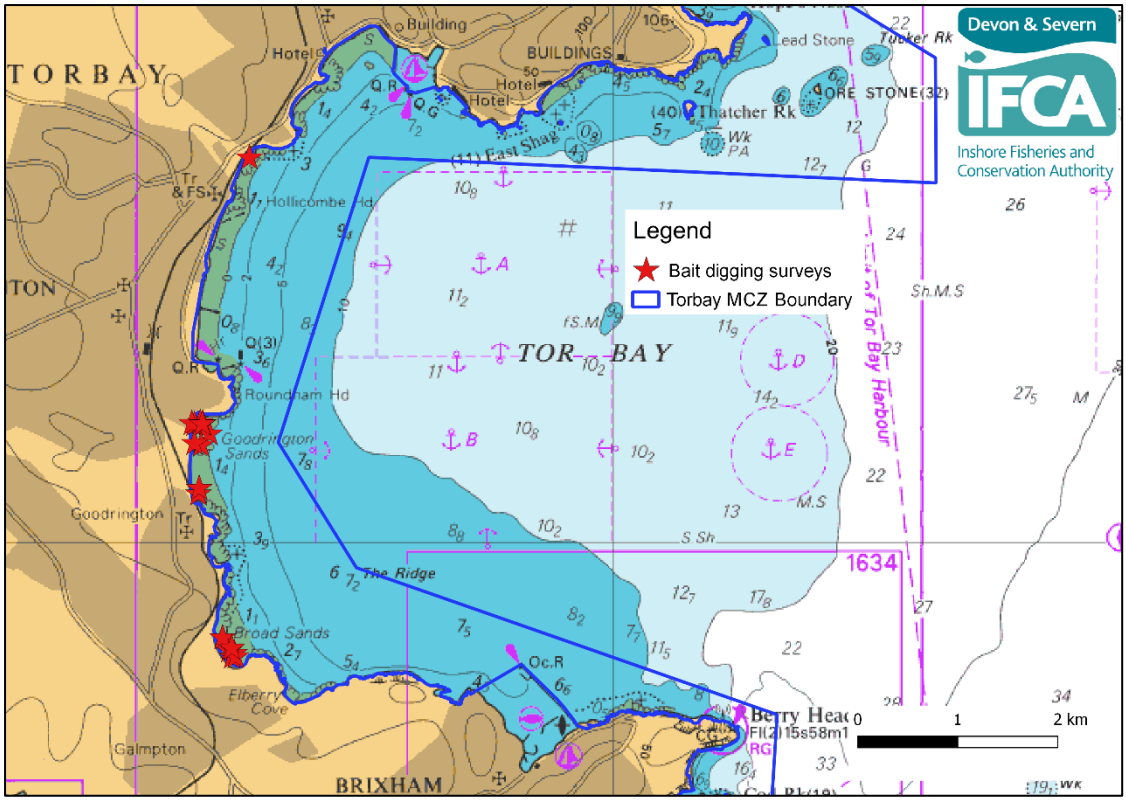

Figure 1. Location of bait diggers observed within the MCZ during surveys conducted by D&S IFCA officers during 2016- 2017.

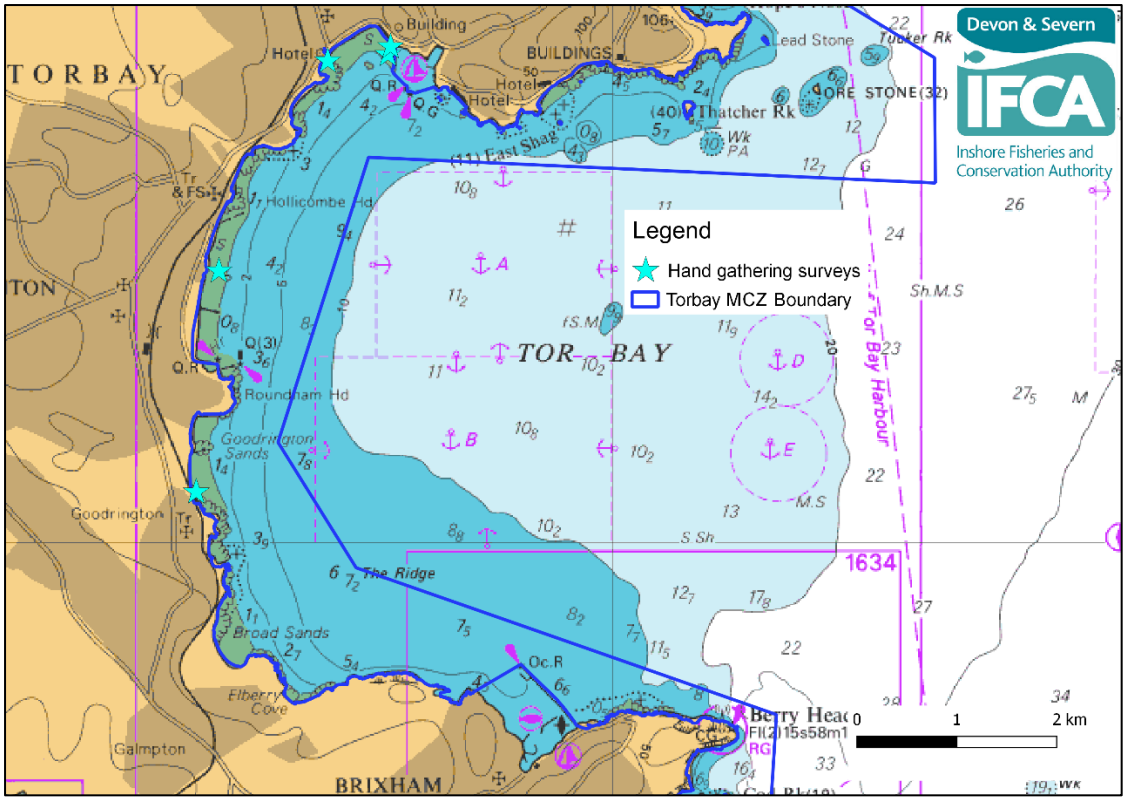

Figure 2. Location of hand gatherers observed within the MCZ during surveys conducted by D&S IFCA officers during 2016- 2017.

3.0 Results

3.1 Survey Effort

A total of 54 surveys were carried out during 2016-2017. Each survey comprised of two locations and therefore the survey time was split between the two locations. Figure 3 illustrates the number of visits to each site in 2016 and 2017. In 2016 16 visits were carried out, which is the equivalent of eight surveys. This is made up of two visits to Broadsands, Goodrington, Hollicombe and Torre Abbey and four visits to Paignton and Preston. In 2017 69 visits were carried out; 16 at Broadsands and Goodrington, six at Hollicombe, nine at Paignton and Preston, and 13 at Torre Abbey. This equates to 46 surveys being completed.

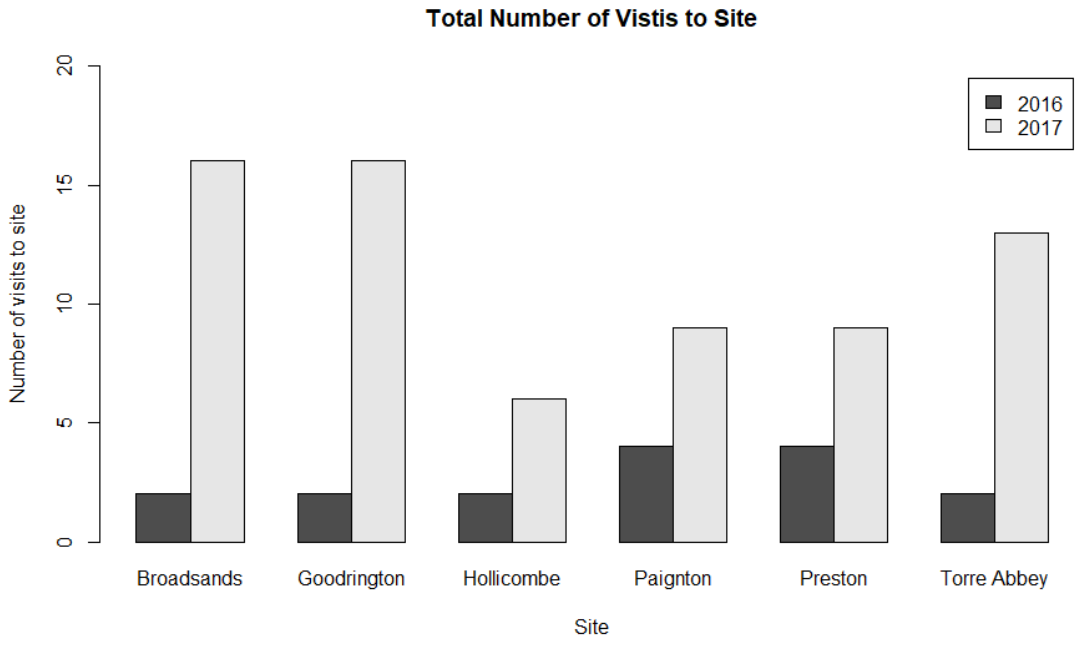

Figure 3. Total number of visits to each site in 2016 and 2017

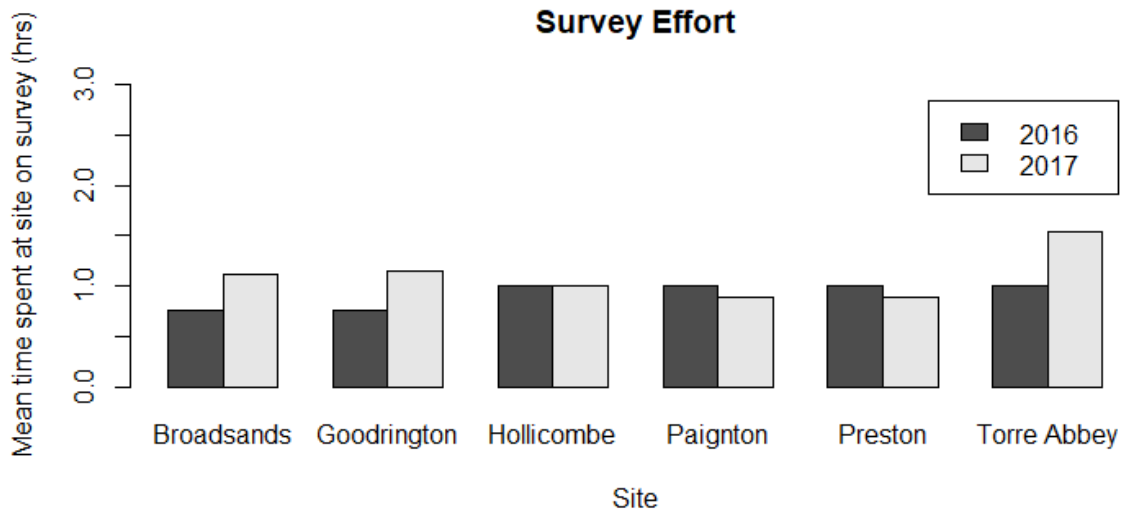

Figure 4. Mean amount of time spent on site for each survey in 2016 and 2017

In 2016 an average of one hour was spent at each site. As mentioned above, one survey comprised of two locations being visited and therefore effort was split equally between the locations. In 2017 survey effort was varied between the sites ranging from just under one hour at Paignton and Preston to an hour and a half at Torre Abbey (Figure 4). Survey effort slightly increased in 2017 at Broadsands, Goodrington and Torre Abbey but declined at Paignton and Preston (Figure 4).

In 2016 survey effort was concentrated during autumn and winter (November to December), with a total of eight and seven hours respectively, being spent on site. During 2017 survey effort increased from spring to summer (20.5 to 24 survey hours respectively) and then decreased in autumn and winter to 21 and 16 survey hours (Figure 5).

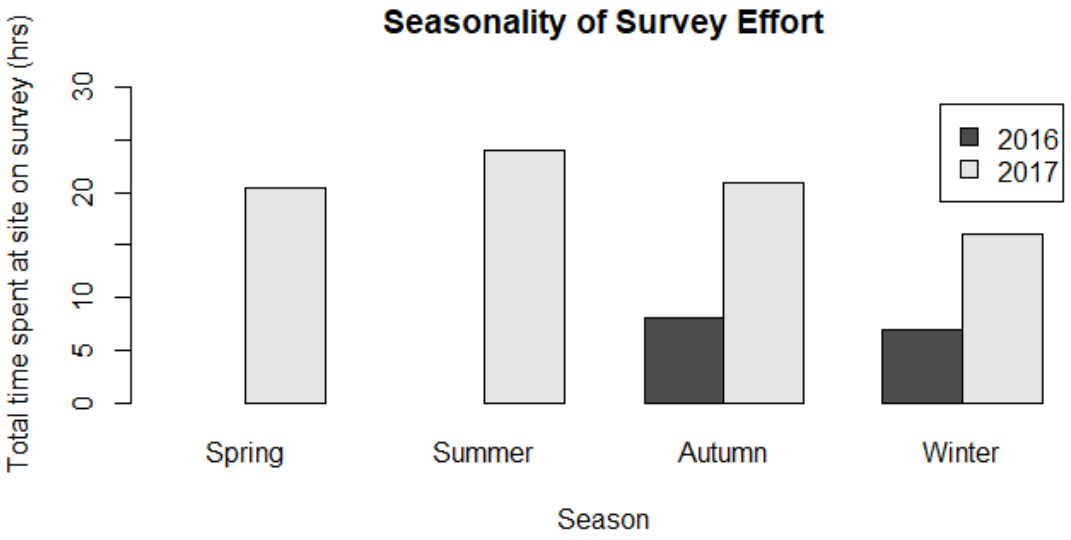

Figure 5. Total time spent on surveys per season for 2016 and 2017

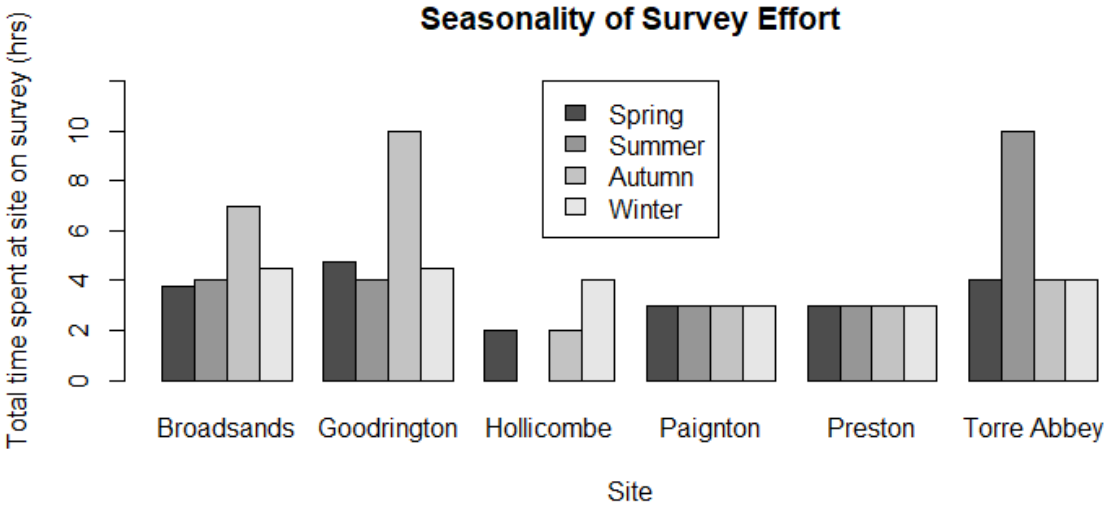

Figure 6. Total time spent on each site per season

Survey effort was more highly concentrated at Broadsands and Goodrington, (Figure 6) as it is believed this is where the majority of bait digging activity occurs. Survey effort in both these locations follows a similar trend of increasing from spring and peaking in autumn (7 hrs at Broadsands and 10hrs at Goodrington) and then decreasing in winter to 4.50 hours at both locations (figure 6). Survey effort at Paignton and Preston was evenly distributed between the seasons, which is in contrast to Torre Abbey which was consistent across all seasons apart from a peak in summer (10 hrs).

3.2 Bait Digging Effort, Location and Seasonality

Bait digging effort was relatively low across the survey sites, with Goodrington being the location where the majority of digging occurs. In 2016 Goodrington was the only site where bait diggers were observed (1.33 per hour). This reduced in 2017 to 1.11 per hour. There was little bait digging activity occurring at Broadsands and Hollicombe with a mean of 0.625 and 0.33 diggers seen per hour (Figure 7). No bait digging was observed at Paignton, Preston or Torre Abbey.

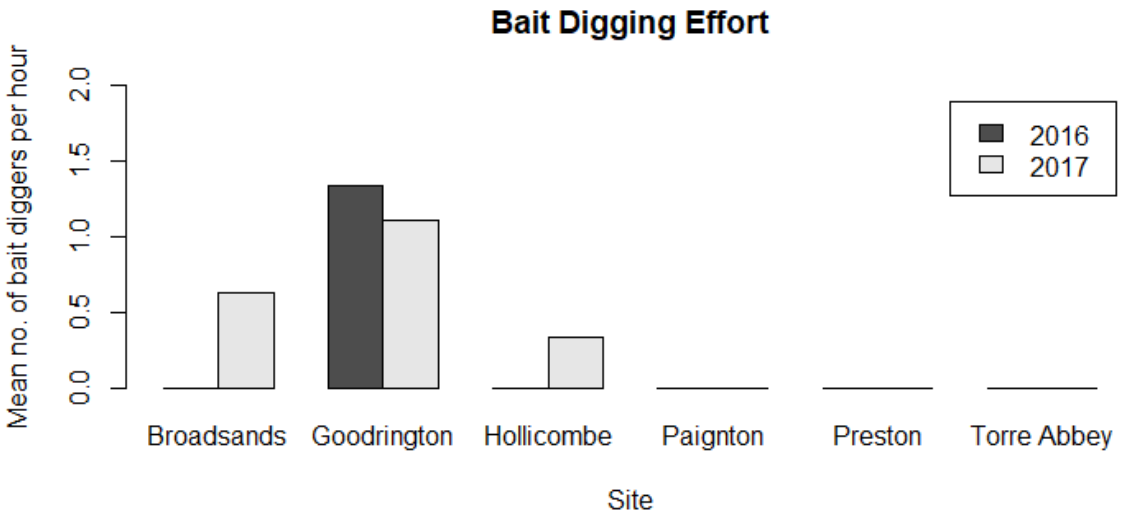

Figure 7. Mean number of bait diggers seen per hour in 2016 and 2017

Diggers were only seen on one out of the 16 visits conducted in 2016 which was at Goodrington. In 2017 diggers were seen on 17 out of 69 visits; six out of 16 in Broadsands, 10 out of 19 in Goodrington, and one out of six in Hollicombe. None were seen on any visit to Paignton, Preston or Torre Abbey. The maximum number of bait diggers seen on a single visit was two at Goodrington during 2016 which increased to three in 2017. Three diggers were observed at Broadsands and two at Hollicombe in 2017(Figure 8).

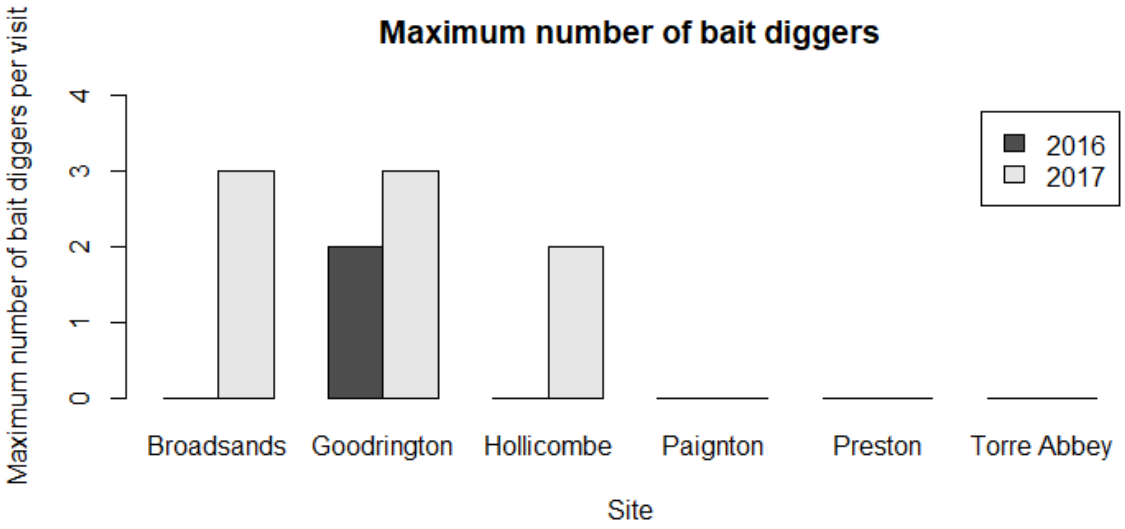

Figure 8. Maximum number of bait diggers seen at each site 2016 and 2017.

Bait digging effort (mean number of diggers seen per hour) has decreased from 0.33 in 2016 to 0.125 in 2017 in the winter. During 2017 bait digging effort varies seasonally. There was an increase in effort from spring (0.23) to summer (1.05), followed by a decrease in autumn (0.35) and winter (0.13) (Figure 9).

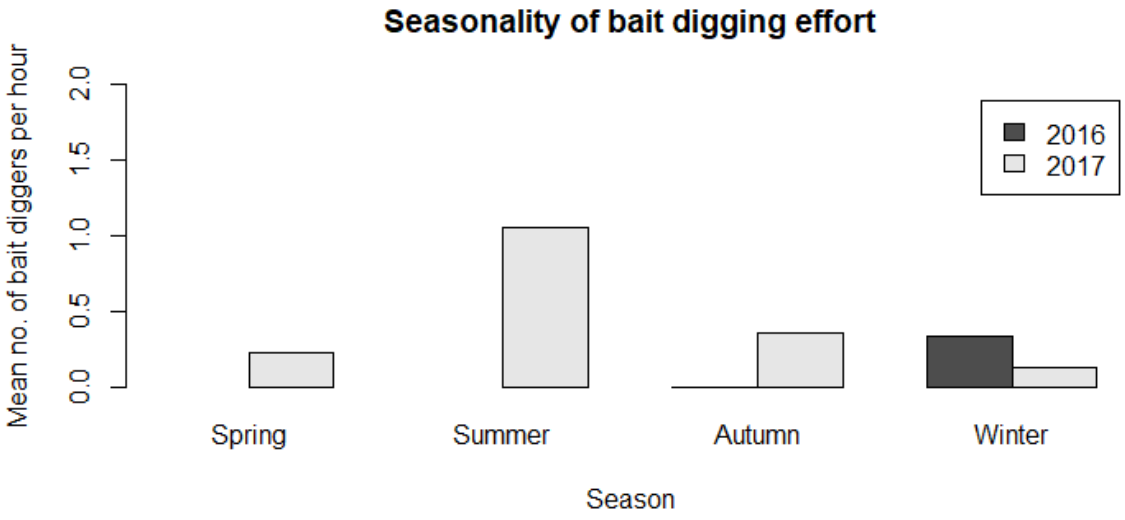

Figure 9. Mean number of bait diggers seen per hour per season for 2016 and 2017.

The seasonality of bait digging effort (mean number of diggers seen per hour) follows a similar pattern at Broadsands and Goodrington sands in that the effort peaks in the summer (1.5) and (3) respectively and then declines in autumn winter. At Hollicombe diggers were only seen during the winter.

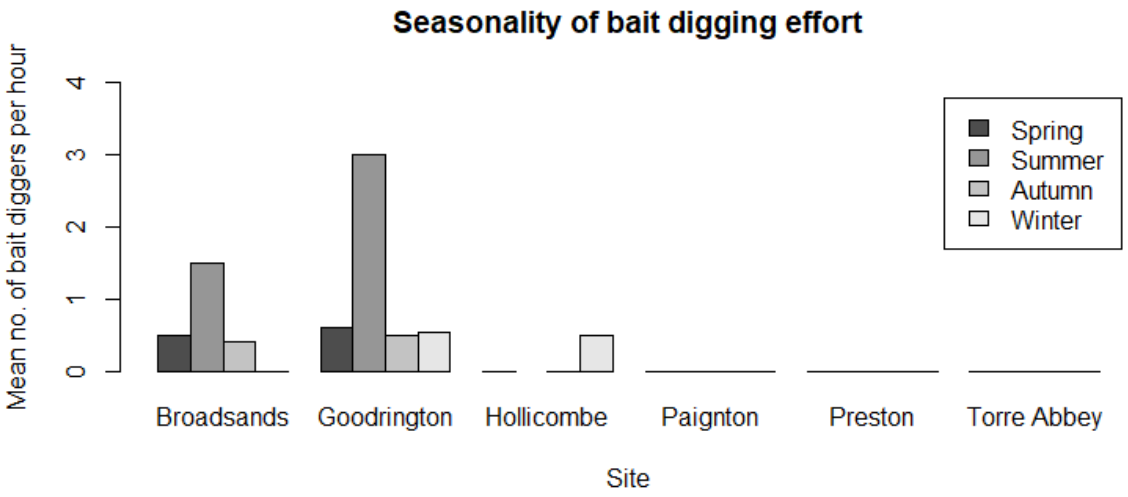

Figure 10. Seasonal effort of bait digging at each site during the 2016-2017 period

All bait diggers seen were digging holes rather than trenches. The largest number of holes observed in one trip was 100 at Goodrington, which coincides with the survey where the maximum number of diggers seen. The highest observed at Broadsands was 85, and 60 were observed at Hollicombe. (Figure 11). There are no data for the number of holes that were seen during the survey carried out in 2016. It should be noted that during some of the surveys bait diggers were often still working beyond the end of the survey time, so the final number of holes dug would not have been recorded, therefore these figures may be an underrepresentation.

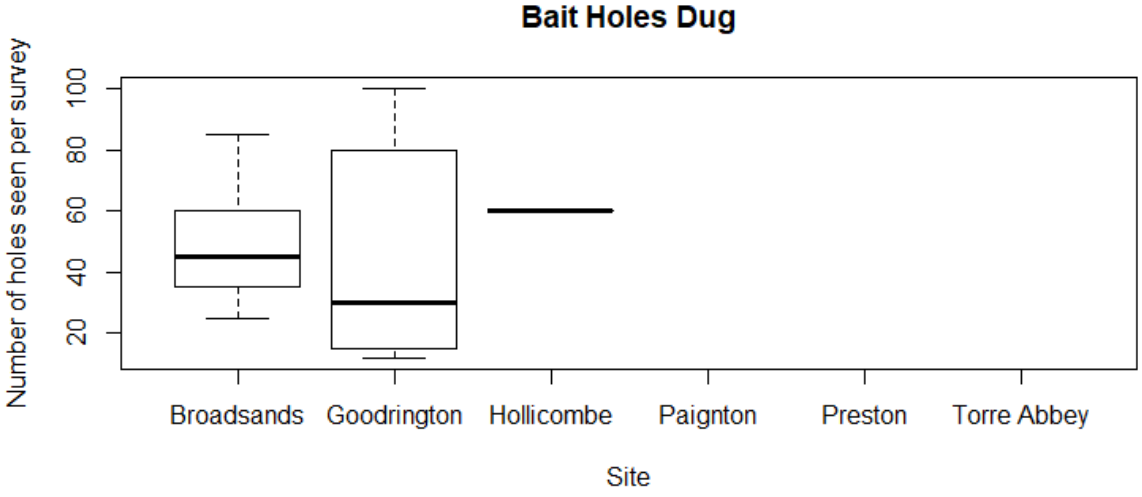

Figure 11. Box and whisker plot of number of bait holes dug per site across the survey season (2016-2017). Showing median (dark line), the lower and upper quartiles (25% and 75%) (the top and bottom of the box).

3.3 Bait Collection Behaviour

The majority of bait diggers, seen during the surveys, were interviewed. The main species targeted across all sites was lugworm, with ragworm being targeted at just Broadsands and Goodrington. All individuals interviewed confirmed that they were digging recreationally and there was no sign or indication from the respondents that commercia digging takes place.

Eleven interviews were conducted over the course of the survey period. The responses are summarised as;

- Six of the respondents dug once every two to three weeks with one of those respondents being in a group of three that only dig from April to October.
- Two diggers together go about 20 times a year to collect bait for night fishing.
- One respondent advised that the best digging is on the turn of the tide.
- The majority of respondents dig all year round.
- Only three of the respondents confirmed that they back fill their holes.

3.4. Hand Gathering Data

Out of the 16 visits carried out in 2016 only one hand gatherer was observed at Preston during the autumn. During 2017 a total of 13 hand gatherers were observed with the maximum amount seen on a single trip being seven at Torre Abbey. No hand gatherers were observed at Broadsands, Hollicombe or Paignton (Figure 12). The main species targeted was razor clam at Torre Abbey and Preston and winkles at Torre Abbey and Goodrington.

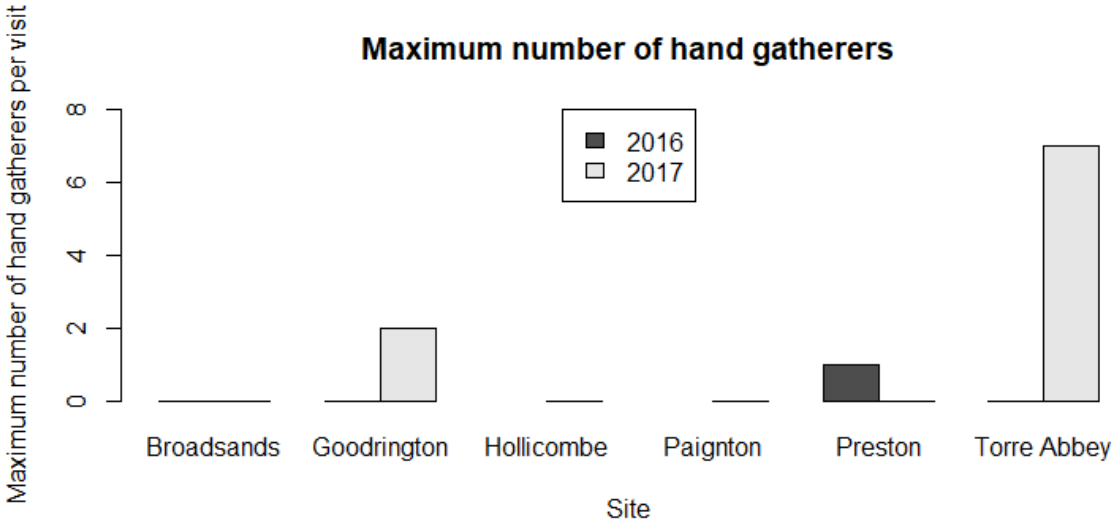

Figure 12. Maximum number of hand gatherers seen at each site 2016 and 2017

4.0 Discussion

Bait digging can have various direct and indirect impacts raging from declines in abundance of local species, to disturbance to birds. The severity of these impacts will ultimately depend on the nature, frequency and intensity of the activity (Olive, 1993). The main species targeted across all sites is lugworm, with some ragworms being targeted at Goodrington. This is in contrast with Watson et al. (2017) who suggests ragworms are the major group collected in inter-tidal soft sediment shores. This is likely due the muddy/sandy sediment characteristics across all sites, which is the preferred habitat for lugworms.

Although survey effort and maximum number of bait diggers seen increased from 2016 to 2017, effort (mean number of bait diggers seen per hour) has decreased. The number of holes observed was also higher in 2017, however, data were not available on the number of holes observed during the 2016 survey. It may also be due to the fact that only one survey in 2016 observed bait digging being carried out and the amount of time spent at this location was shorter than that of the surveys conducted in 2017, therefore impacting the effort calculation. The increase in the number of holes dug may result in a decline of local abundance of lugworms. However, the capacity of a population to withstand bait digging activities relies on several factors including the size of the exploited area relative to the total lugworm bed, the relative exploitation of adult and juvenile lugworms, and the intensity and seasonality of bait digging. Effort within the MCZ is relatively low with a maximum of just over one bait digger per hour being observed at one site. In addition, lugworms have been shown to be relatively resilient to bait digging due to its fecundity and widespread distribution (Fowler, 1999).

Of the small amount of hand gatherers operating within the MCZ, the majority of hand gathering is being carried out at Torre Abbey with razor clams and winkles being the primary target species.

5.0 Conclusions and Future Work

Current activity levels of bait digging and hand gathering within the MCZ are low. There is currently no voluntary code of conduct for the MCZ. The findings from this report will assist in the completion of the MCZ assessment to determine if the activity of bait digging could have any adverse effects on the supporting features of the MCZ. The results of the assessment will feed into D&S IFCA's review of management of hand-working activities and be used to decide if further management measures are needed to protect the feature.

6.0 References

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Fowler SL. (1999). Guidelines for managing the collection of bait and other shoreline animals within UK European marine sites. UK Marine SAC project.

Olive P.J.W. (1993) Management of the exploitation of the lugworm Arenicola marina and the ragworm Nereis virens (Polychaeta) in conservation areas. *Aquatic Conservation: Marine and Freshwater Ecosystems* **3**: 1-24

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