Bait digging at High Tide Roost and *Sabellaria* Sites on the Severn Estuary

Research Report

April 2021

Sarah Curtin

Environment Officer

Dr James Stewart

Senior Environment Officer

Version Control			
Author/ Reviewer	**Date**	**Comments**	**Version**
Sarah Curtin	29/04/2020	Draft report	0.1
James Stewart	11/05/2020	Review	0.2
James Stewart	12/03/2021	Redraft	0.3
Sarah Clark	20/04/2021	Reviewed	0.4
James Stewart	23/04/2021	Finalised for publication	1.0

Contents

1. Introduction

Recreational Sea Angling (RSA) is popular throughout the Severn Estuary 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 being blow lugworm *Arenicola marina* and king ragworm *Alitta virens.*

Under its duties set out in the Marine and Coastal Access Act (MaCAA 2009), Devon and Severn Inshore Fisheries Conservation Authority (D&S IFCA) must 'seek to ensure that the exploitation of sea fisheries resources is carried out in a sustainable way'. However, prior to the implementation of the MaCAA and the subsequent formation of IFCAs in 2011, no management body existed within the Severn Estuary that included a remit to monitor or manage bait digging activities. Therefore, no existing data were available to indicate the level of bait digging activity, whether the existing activity was recreational or commercial, and whether there were any conflicts or concerns in relation to bait digging and other users of the marine environment. In addition, much of the Severn Estuary is designated as a European Marine Site (EMS) and Ramsar site with many smaller Sites of Special Scientific Interest (SSSIs) and National Nature Reserves (NNRs).

The Severn Estuary is the largest coastal plain estuary in the UK and one of the largest estuaries in Europe. As such, it has a number of International and European conservation designations including Special Area of Conservation (SAC), Special Protected Area (SPA) and Ramsar site covering an area of 73,715.4ha. About one third of this area is composed of intertidal habitats including intertidal mudflats and sand flats, saltmarshes, and rocky shores, which are accessible to bait collectors. Unlike many intertidal areas which are only accessible for short periods of time, the gently shelving mud and sandflats of the Severn result in large areas of intertidal habitat being accessible for long periods of time (Natural England and CCW, 2009), due to one of the largest estuarine tidal ranges in the world.

In 2012, the Department for Environment, Food and Rural Affairs (Defra) announced a revised approach to the management of commercial fisheries in EMS's. The objective of this revised approach was to ensure that all existing and potential commercial fishing activities are managed in accordance with Article 6 of the Habitats Directive. As a result, D&S IFCA conducted bait digging surveys during 2012-2015. Data from these surveys were used to inform Habitats Regulation Assessments (HRA's) for the Severn Estuary SAC and SPA. The purpose of these HRAs was to assess whether or not in the view of D&S IFCA the level of effort, recorded during the surveys, of use of digging with forks had a likely significant effect on the interest features of the Severn Estuary SAC or SPA. The HRAs concluded that bait digging had no adverse effect on the integrity of the EMS interest features.

In April 2019, Natural England provided D&S IFCA with feedback on the HRAs, highlighting a potential impact pathway at Hinkley point where *Sabellaria* (one of the qualifying features) was recorded in the lower shore during the Hinkley monitoring programme. Digging for king ragworm occurs in the coarse sediments and boulders at this location, which could have the potential to interact with the sensitive reef formations. Natural England therefore suggested further work was required to further evidence the D&S IFCA's conclusion that the level of activity is not sufficient to significantly affect the feature. Although this site was included in previous bait digging survey work carried out by D&S IFCA, sampling effort was relatively low.

In addition, several estuarine bird species use the EMS to roost and feed, and aggregate in relatively small roost areas at high tide (known as high tide roosts (HTR)), which temporarily restricts their available terrestrial habitat. In the HRA for bait digging in relation to the estuarine bird community, D&S IFCA concluded that bait digging would not significantly affect this feature, in part because bait digging only occurs around low tide. However, due to the extreme tidal range of the Severn Estuary, Natural England expressed concern that bait

digging might occur on upper shores while the tide is relatively high, potentially increasing the potential for disturbance to birds at HTRs. As a consequence, D&S IFCA has carried out additional bait digging surveys in order to increase confidence in the assessment of no likely significant effect of bait digging on the estuarine bird community, hard substrate habitats and S*abellaria* in the SAC and SPA. This report presents the data collected to date and discusses the level of bait digging occurring in order to establish whether further surveys are required throughout the remaining year.

2. Methodology

2.1. Surveys of bait digging near *Sabellaria*

Surveys were carried out at Hinkley point (Figure 1) between June 2019 – February 2020, then from July 2020 – September 2020. Surveys ceased over March 2020 – June 2020 due to the COVID-19 pandemic. Surveys were semi-stratified to attempt an even coverage of spring and neap tides, weekends, and weekdays. Surveys were planned to fall around low tide, starting three hours before low tide and finishing one hour after low tide. Details of the time, tidal state, number of bait diggers present, number of holes or trenches observed, number of hand gatherers and anglers observed, and GIS co-ordinates of the vantage points were recorded for each trip. The proximity of bait digging to *Sabellaria* was also estimated. An interview was carried out with a single bait digger during a survey in which two observers were present; further interviews were precluded by lone working conditions.

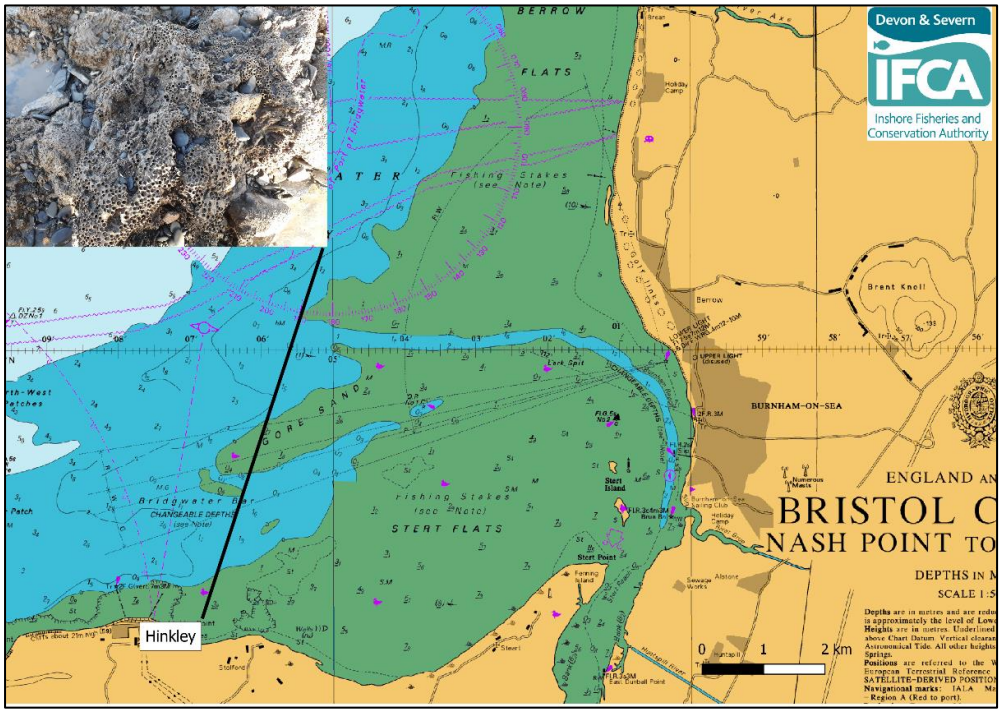

Figure 1. Survey location for bait digging near *Sabellaria* reef.

2.2. Surveys of bait digging disturbance to high tide roosts

Sites were selected based on known presence of bait digging (even where effort is low) and presence of sensitive high tide roosts (HTR). Sites included Berrow, Brean, Clevedon, Sand Bay and Uphil (Figures 2 and 3). Surveys at Clevedon were often postponed or cancelled due to site access issues. Surveys occurred between October 2019 – March 2020 and were semi- stratified to attempt an even coverage of spring and neap tides, weekends, and weekdays. Surveys were planned to fall around high tide, starting two hours before high tide and finishing two hours after high tide. Details of the time, tidal state, number of bait diggers present, number of holes or trenches observed, number of hand gatherers and anglers

observed, and the GIS co-ordinates of the vantage points were recorded for each trip. Additional observations included; proximity of bait digging to HTR, whether bird disturbance from bait digging or other activities was witnessed.

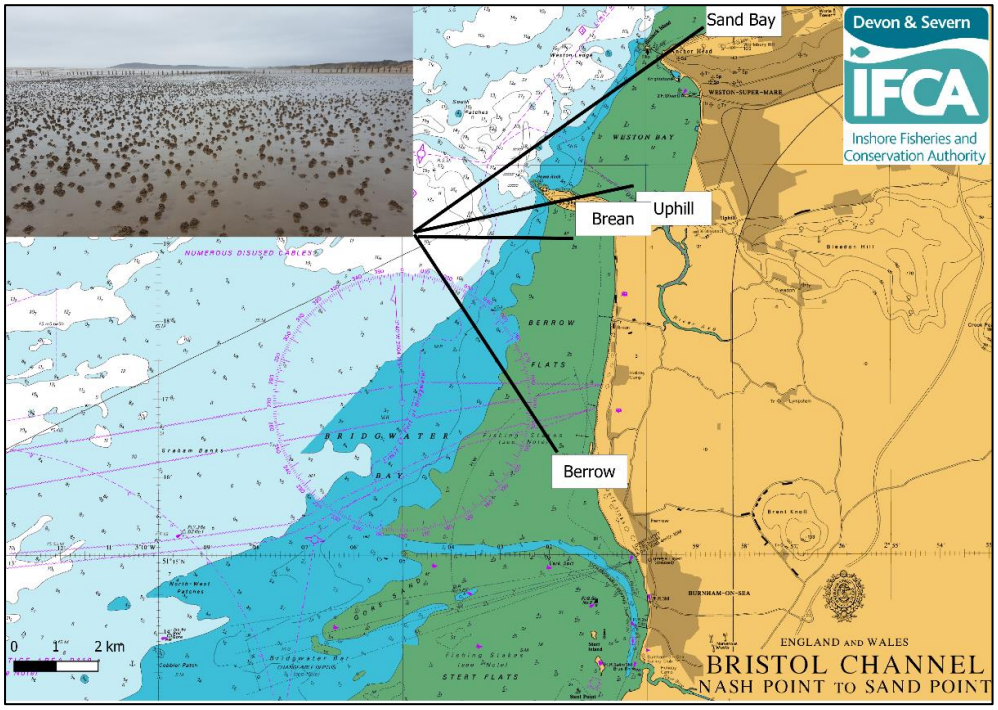

Figure 2. Survey location for bait digging disturbance to high tide roost sites (Berrow, Brean, Uphill and Sand Bay). Inset: Worm casts on Brean beach at low tide. Example vantage points: Berrow: 51° 15.87’ N 003° 01.18’ W; Brean: 51° 19.31’ N 003° 00.67’ W; Uphill: 51° 19.45’ N 002° 59.39’ W; Sand Bay: 51° 21.86’ N 002° 57.97’ W.

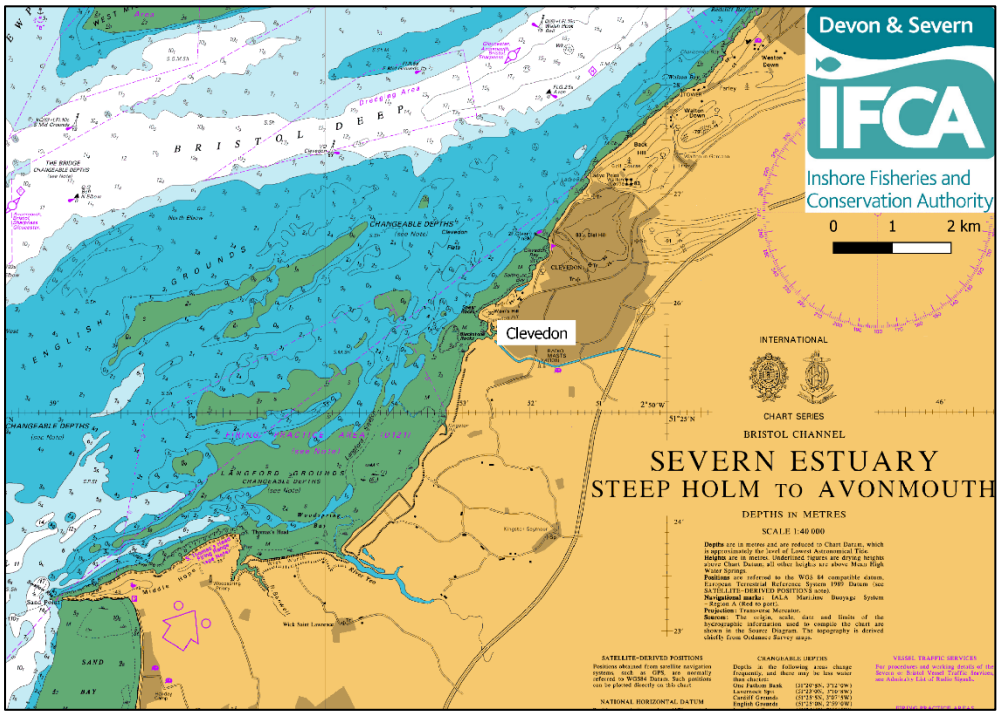

Figure 3. Survey location for bait digging disturbance to high tide roost sites at Clevedon. Primary vantage point: 51° 25.85’ N 002° 52.61’ W.

All data management and plotting were performed in Microsoft Excel and R Statistical software, version 3.5.1 or later (R Core Team, 2018).

3. Results

3.1. Bait digging near *Sabellaria*

3.1.1. Survey effort

A total of 20 surveys were conducted during the survey period (Table 1), totalling 74.95 hours of survey effort distributed across summer, autumn and winter. An average of 3.75 (± 0.53, standard deviation) hours was spent on-site at each survey. This is slightly less than the four hours originally planned, primarily due to lack of daylight during the autumn and winter. Spring surveys in 2020 were not possible due to COVID-19 restrictions.

Table 1. Summary of survey and bait digging effort near Sabellaria

Season	Date range	Number of surveys	Total survey time (hours)	Diggers per hour of survey effort
Spring	N/A	0	0	N/A
Summer	June – Aug. 2019 & July – Aug. 2020	9	34.45	0
Autumn	Sept. – Nov. 2019 & Sept. 2020	6	23.5	0.128
Winter	Dec. 2019 – Feb. 2020	5	17	0.058
Overall	June 2019 – Sept. 2020	20	74.95	0.053

3.1.2. Bait digging effort and seasonality

An average of 0.05 bait diggers were seen per hour across the 74.95 hours of surveys (four bait diggers over 20 surveys; Table 1). This low digging effort precludes robust conclusions regarding bait digging seasonality.

3.1.3. Additional observations

Whilst conducting the surveys it was found that the *Sabellaria* reef only becomes exposed during large spring tides. One interview was conducted during a survey in February 2020, with a bait digger mainly targeting ragworm. The bait digger was a local angler turning over rocks to locate the ragworm which was being used immediately as bait for recreational angling purposes. The bait digger was not in close proximity to the *Sabellaria*.

The site is popular with anglers, with a total of 23 anglers being observed across the entire survey period. The maximum number of anglers seen on a single visit was four. These individuals were observed walking from a nearby car park along the shore to angling marks that did not appear to be near to the *Sabellaria.* The routes taken to the angling marks appeared to follow hard substrate of the upper foreshore near to the sea wall at Hinkley Point power station, towards areas east-southeast/southeast of the *Sabellaria* reef.

3.2. Bait digging disturbance to High Tide Roost (HTR) sites

3.2.1. Survey effort

A total of 15 surveys were carried out during 2019-2020 (Table 2), equating to 21 site visits: visits to Berrow and Brean were conducted during the same survey, therefore the survey time was split between the two locations.

Table 2. Summary of survey and bait digging effort near high tide roosts. B&B = Berrow & Brean; SB = Sand Bay. Surveys at Clevedon were interrupted by access issues, while surveys in Spring and Summer 2020 were not possible due to COVID-19.

Season	Site	Number of surveys	Total survey time (hours)	Diggers per hour of survey effort
Spring (March 2020)	B&B	1	3.5	0
	Clevedon	1	3	0
	SB	0	0	0
	Uphill	0	0	0
	Overall	2	6.5	0
Summer (N/A)	B&B	0	0	N/A
	Clevedon	0	0	N/A
	SB	0	0	N/A
	Uphill	0	0	N/A
	Overall	0	0	N/A
Autumn (Oct. – Nov. 2019)	B&B	1	2.5	0
	Clevedon	1	4	0
	SB	1	3.5	0
	Uphill	3	10	0
	Overall	6	20	0
Winter (Dec. 2019 – Feb. 2020)	B&B	4	12.75	0
	Clevedon	0	0	0
	SB	2	6	0.333
	Uphill	1	3.5	0
	Overall	7	22.25	0.090
Overall	Overall	15	48.75	0.041

Berrow and Brean were subject to the highest survey effort, totalling 18.75 hours spent at these two sites, and almost half of the survey effort occurred during winter 2019–20.

3.2.2. Bait digging effort, location and seasonality

Bait digging effort appears to be not occurring or occurring at a low level at the surveyed HTR sites, with Sand Bay being the only site where bait digging was recorded during the survey period. At Sand Bay, two bait diggers were seen on a single visit, in close proximity to the southern extent of a mixed waterbird high tide roost site (site 2B in Figure 1 of Annex 1). Minimal bird disturbance was observed on this occasion (4 birds changed position on the beach); however the bait diggers were leaving the beach as the surveyor arrived (two hours prior to high tide). This means that bird disturbance during the bait digging activity could not be quantified but, if it occurred, the disturbance would not have been at high tide, giving the birds more room to roost nearby following potential avoidance behaviours.

Due to surveys not being conducted for a full year it is not possible to fully determine the seasonality of bait digging effort at each HTR site. However, bait digging effort was low (0.041 diggers per hour), and only observed during the winter at a single site (Sand Bay) two hours prior to high tide.

3.2.3. Additional observations

Brean and Clevedon appear to be popular with anglers, with seven and two anglers seen on one visit at these sites, respectively. No disturbance to birds was observed in relation to these anglers. Dog walkers were observed during 12 surveys, at all sites except Clevedon. Bird disturbance was observed in relation to dogs during 50% of these surveys.

4. Discussion

As a result of feedback received from Natural England, D&S IFCA carried out additional bait digging surveys in order to increase confidence in the assessment of no likely significant effect of bait digging on the estuarine bird community, hard substrate habitats and S*abellaria*.

In general, bait digging can have various direct and indirect ecological impacts ranging 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). Bird disturbance can be a major concern, particularly where peak bait digging activity coincides with peak bird abundance or intertidal activity (Townshend & O'Connor, 1993). A review by Hockin *et al.* (1992) demonstrated that disturbance can displace birds from preferred roosting and feeding areas, reducing their overall feeding efficiency. In some cases and species, compensatory feeding at night can make up for the energy losses due to disturbance. Long-term effects arise when high-level recreational disturbance reduces available feeding time and increases energy expenditure beyond a threshold at which the site is no longer profitable as a feeding area to the bird populations, causing site abandonment (Hockin *et al.,* 1992). With specific reference to the estuarine roosts of birds, both tide height and disturbance are the primary determinants of roost distribution. Few specific studies have been undertaken in this area, though habitat type and disturbance level are known to modify the distribution and abundance of wading birds, which may be affected by disturbance that reduces feeding time in food-rich areas (reviewed in Hockin *et al.,* 1992).

Surveys conducted to date would suggest that bait digging activity is occurring at a low level within the Severn Estuary EMS. The bait digging activity that was observed was not found to be occurring on or directly adjacent to HTR sites at sensitive times (i.e. close to high tide). As a result, it is unlikely that the presence of bait diggers will alter the behaviour and distribution of estuarine birds (Goss Custard & Veboven, 1993). Disturbance is more likely to be caused by other activities such as dog walkers which were frequently observed at HTR sites. Several studies have shown dog walkers can induce anti-predator responses in birds including increased vigilance (Randler, 2006) and early flight, as well as disturbing some species of breeding shorebirds from their nests (Lord et al., 2001) which may lead to a cascade of related responses that negatively affect birds, such as areas of intertidal habitat being unavailable to the birds (Liley et al., 2011). This is consistent with the disturbance witnessed during surveys. However, the impact of dog walkers on wading birds will be subject to the duration, frequency and location of disturbance as well as being species specific.

Bait digging within an area containing *Sabellaria* could potentially impact the sub-feature by physical damage from digging and trampling. Cunningham et al. (1984) examined the effects of light to moderate trampling (i.e. treading or walking) on *Sabellaria alveolata* reefs. Severe damage (from kicking or jumping) resulted in large cracks and removal of sections, and subsequent wave action enlarged the holes or cracks. At some sites, the reef recovered within 23 days by repair of minor damage and tube growth. Surveys indicate that bait digging does not appear to be occurring on or adjacent to *Sabellaria* reefs. Despite this, Hinkley point is popular with local anglers which has the potential to impact *Sabellaria* reefs through access to angling sites causing trampling. However, the level of trampling

potentially occurring is not thought to be significant enough to affect the extent, distribution, species composition and communities.

5. Conclusions

The surveys conducted to date would indicate that little or no bait digging is occurring on *Sabellaria* reef or at HTR sites. Data presented in the Bait Digging in the Severn Estuary European Marine Site report (West, 2019) also indicated that bait digging effort was relatively low and activity levels declined during summer. Based on the current level of resource and the very low level of bait digging observed during surveys, D&S IFCA concludes that no additional surveys be carried out, and that the current evidence is sufficient to support D&S IFCA's previous conclusion of no likely significant effect of bait digging activities on features, sub-features and the integrity of the Severn Estuary EMS.

D&S IFCA is considering the formulation of a Hand Working Permit Byelaw to manage bait digging and other hand gathering activities within D&S IFCA's District. With the advice previous given by Natural England, D&S IFCA may consider the inclusion of high tide restrictions on hand gathering activity in any future hand working byelaws. However, as previously stated, the survey results support the conclusion of no likely significant effect of bait digging on the Severn Estuary EMS. D&S IFCA is also a member of the Association of Severn Estuary Relevant Authorities (ASERA) and holds the Chair of ASERA for 2021–22. Through ASERA, D&S IFCA has supported the implementation and dissemination of a set of good practice guidelines that encourage the sustainable use of the Severn Estuary and its coastlines. These guidelines contain a page on bait digging, which includes guidance to "keep your distance from groups of birds" and "Walk around saltmarsh and reefs of *Sabellaria* (honeycomb tubeworm)" when digging for bait, among other recommendations such as the promotion of backfilling of holes and trenches dug for bait, and to self-limit bait harvesting.

References

Cunningham, P.N., Hawkins, S.J., Jones, H.D. & Burrows, M.T., (1984) The geographical distribution of *Sabellaria alveolata* (L.) in England, Wales and Scotland, with investigations into the community structure of and the effects of trampling on *Sabellaria alveolata* colonies. Nature Conservancy Council, Peterborough.

Goss-Custard J & Verboven N (1993). Disturbance and feeding shorebirds on the Exe estuary. Wader Study Group Bulletin. 68: 59-66.

Hockin, D., Ounsted, M., Gorman, M., Hill, D., Keller, V., & Barker, M. A. (1992) Examination of the effects of disturbance on birds with reference to its importance in ecological assessments. Journal of Environmental Management, 36: 253-286

Liley D., Cruickshanks K., Waldon J. & Fearnley H. (2011). Exe Estuary Disturbance Study. Footprint Ecology Ltd., Wareham, Dorset.

Lord A, Waas JR, Innes J, Whittingham MJ (2001). Effects of human approaches to nests of northern New Zealand dotterels. Biological Conservation. 98: 233-240.

Natural England and the Countryside Council for Wales' Conservation Advice – formal advice given under Regulation 33(2)(a) of the Conservation (Natural Habitats, &c.) Regulation 1994, as amended. June 2009.

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

Randler, C. (2006). Disturbances by dog barking increase vigilance in coots Fulica atra. European Journal of Wildlife Research. 52. 265-270.

Tasker, M.L., Camphuysen, C.J., Cooper, J., Garthe, S., Montevecchi, W.A., Stephen, J.M.B. (2000) The impacts of fishing on marine birds. ICES Journal of Marine Science, 57: 531-547

Townshend, D.J. & O'Connor, D.A. (1993) Some Effects of Disturbance to Waterfowl from Bait Digging and Wildfowling at Lindisfarne National Nature Reserve, North-east England. Wader Study Group Bulletin. 68**:** 47–52.

West, E (2019). Bait digging in the Severn Estuary European Marine Site. Data Analysis Report. IFCA.

Annex 1

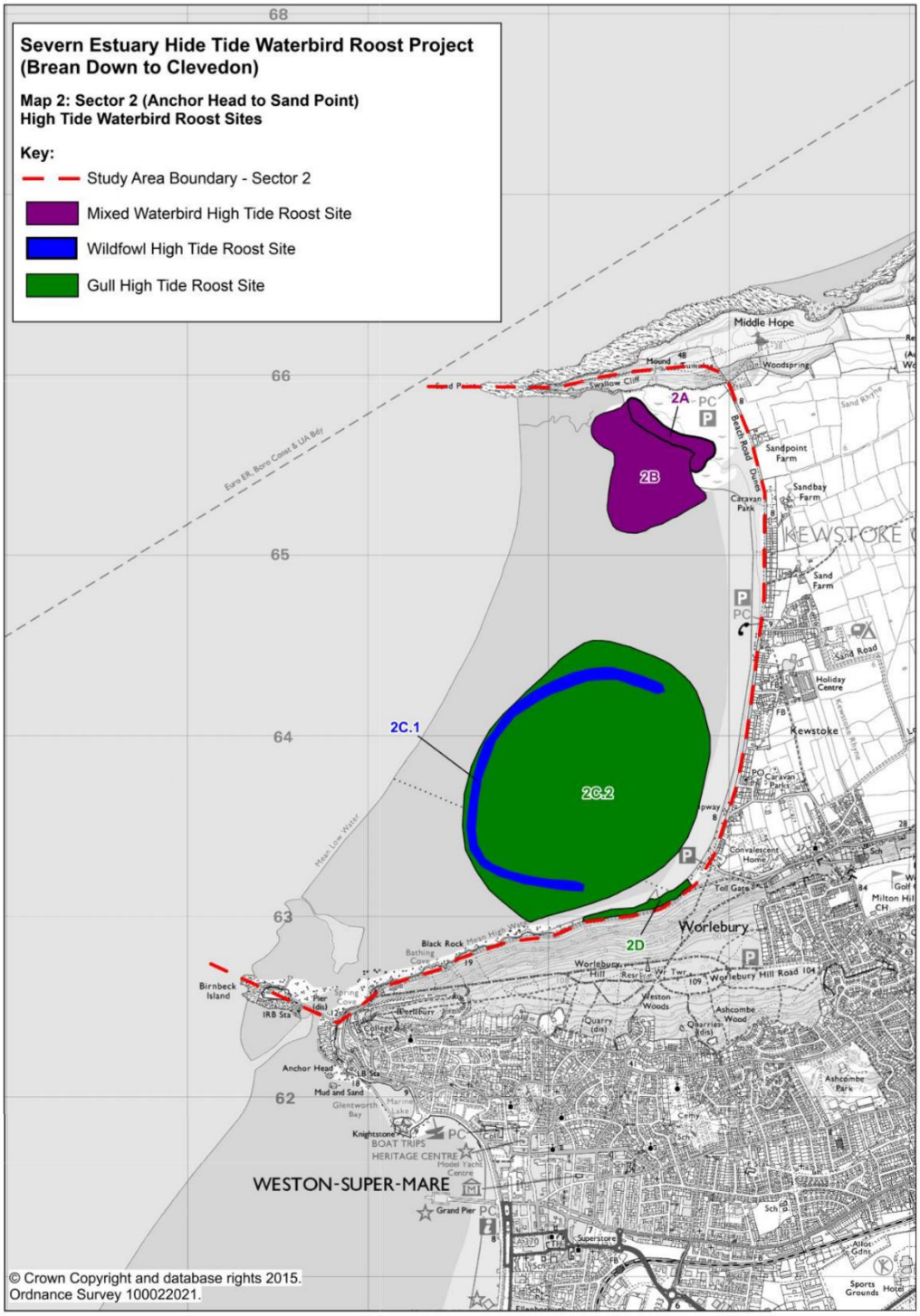

Figure 1. High Tide Roosts in Sand Bay, from Severn Estuary High Tide Waterbird Roost Project.