Marine Conservation Zone Assessment

Site name:	Tamar Estuary MCZ UKMO 20130023
Protected feature(s):	Intertidal biogenic reefs Intertidal coarse sediment Blue mussel (*Mytilus edulis*) beds Native oyster (*Ostrea edulis*)

Fishing activities assessed at this site:
Stage 1 Assessment
Bait collection: Digging with forks

D&S IFCA Reference
TAM-MCZ-004

Version Control History			
Author	**Date**	**Comment**	**Version**
Katherine Stephenson	07/03/2019	Final draft complete to be sent to NE.	1
Sarah Clark	18/04/2019	QA'ing	

Contents

1. Introduction

This assessment has been undertaken by Devon & Severn Inshore Fisheries and Conservation Authority (D&S IFCA) in order to document and determine 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.

2. MCZ site name(s), and location

The Tamar Estuary MCZs are located in two spatially separate areas. The MCZs cover an area of approximately 15km² and include the upper reaches of the Tamar and Lynher estuaries of South Devon and Cornwall. As this site crosses the border between Devon & Severn IFCA and Cornwall IFCA, this assessment will be solely for the Tamar Estuary MCZ in Devon & Severn IFCA's District.

Further information regarding the MCZ and its protected feature can be found in the Tamar Estuary MCZ Factsheet[1].

3. Feature(s) / habitat(s) of conservation importance (FOCI/HOCI) and conservation objectives

Table 1 - Protected features relevant to this assessment

Feature	**General management approach**
Intertidal biogenic reefs	Maintain to favourable condition
Intertidal coarse sediment	Maintain to favourable condition
Blue mussel (*Mytilus edulis*) beds	Maintain to favourable condition
Native oyster (*Ostrea edulis*)	Recover to favourable condition

The conservation objectives for these features are that they are brought to, and remain in, favourable condition.

4. Gear/feature interaction in the MCZ categorised as 'red' risk and overview of management measure

None – this site has no gear-feature interactions categorised as "red" risk. The Devon and Severn IFCA Mobile Fishing Permit Byelaw which came into place on 1st January 2014, vessels using mobile fishing gear are prohibited from the Tamar Estuary MCZ, to protect the reef feature of Plymouth Sound and Estuaries SAC.

5. Activities under consideration

- Bait collection: Digging with forks

Within the part of the MCZ that falls within D&S IFCA's District, bait digging is only known to occur on the mudflats at Ernesettle (Stephenson, 2019) and just north of the Tamar bridge (Langmead et al., 2017).A full description of D&S IFCA's current understanding of the levels and distribution within the Tamar Estuary Sites MCZ can be found in Stephenson (2019).

[1] MCZ Factsheet http://publications.naturalengland.org.uk/category/1721481

See Davies (2016) for more information regarding fishing activities occurring in Torbay MCZ.

6. Is there a risk that activities are hindering the conservation objectives of the MCZ?

Yes,
Evidence:
To determine whether each pressure is capable of affecting (other than insignificantly) the site's feature(s), the sensitivity assessments and risk profiling of pressures from the advice on operations section of the Natural England conservation advice package were used (Natural England, 2015). Table shows the fishing activities and pressures included for assessment. The justifications for the pressures chosen for inclusion in this assessment can be seen in **Error! Reference source not found.**.

Table 2 - Fishing activities and pressures included in this assessment.

Activity	Pressures
Shore-based activities (Bait digging)	Abrasion/disturbance of the substrate on the surface of the seabed
	Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion
	Removal of non-target species
	Removal of target species

The relevant targets for favourable condition were identified within Natural England's conservation advice supplementary advice tables (Natural England, 2015). Table shows which targets were identified as relevant to the activity assessed. The impacts of pressures on features were assessed against these targets to determine whether the activities causing the pressures are compatible with the site's conservation objectives.

Table 3 - Relevant favourable condition targets for identified pressures.

Feature	Attribute	Target
Intertidal biogenic reef	Extent and distribution	Maintain the total extent and spatial distribution of mussel beds
	Structure: population density	Maintain the density of mussels
	Structure: species composition of component communities	Maintain the species composition of the mussel bed community
Intertidal coarse sediment	Distribution: presence and spatial distribution of intertidal coarse sediment communities	Maintain the presence and spatial distribution of intertidal coarse sediment communities
	Structure: sediment composition and distribution	Maintain the distribution of sediment composition types across the feature
	Structure: sediment total organic content	Maintain total organic content (TOC) in the sediment at existing levels
	Structure: species composition of component communities	Maintain the species composition of component communities
Blue mussel (*Mytilus edulis*) beds	Extent of subtidal biogenic reef	When mussel beds develops within the site, their extent and persistence should not be compromised by human activities, accepting that, due to the naturally dynamic nature of the feature its extent will fluctuate over time.
	Supporting processes: areas with conditions suitable for reef formation	Maintain the environmental conditions in those locations that are known, or which become known, to be important for mussel bed formation.
Native oyster	Presence and spatial distribution of the species	Recover the presence and spatial distribution of the species.

(*Ostrea edulis*)	Population: population size	Recover the population size within the site.
	Population: recruitment and reproductive capability	Maintain the reproductive and recruitment capability of the species.
	Supporting habitats: extent and distribution	Maintain the extent and spatial distribution of the following supporting habitats: [subtidal rock; subtidal sediment].

Section 8 provides detail on the activity and a literature review to support this assessment.

7. Can D&S IFCA exercise its functions to further the conservation objectives of the site?

Yes,
Evidence: Monitoring and Control Arrangements

- Monitoring of activity levels through regular patrols
- Through the IFCA's Byelaw Review process, D&S IFCA will be reviewing all byelaws relating to hand working (including bait digging). Options for management will include, no action, voluntary measures and 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.

8. Referenced supporting information to inform assessment

Bait digging has been found to have a range of impacts on both the sediment it occurs on, and the communities within it:

Impacts on sediment

Bait digging usually occurs to depths of 30cm, unearthing a deeper sediment that would usually remain undisturbed (Jackson and James, 1979). Changes can therefore occur in sediment characteristics as a result of bait digging. In unexploited sediments, a 10cm layer of well-mixed sand is created by bioturbation (primarily by lugworms), overlying a layer of sands and shell (Anderson and Meyer, 1986). Undug sediment was found to have a higher organic content which is generally not site specific. The process of turning over the sediment and erosion of sediment mounds by tides and wave action leads to a loss of finer fractions and associated organic material. In contrast, the basins may collect organic matter and fine sediments (Anderson and Meyer, 1986). This could have implications for local sediment load and turbidity levels (Watson et al., 2017). Transport of fine sediment and previously buried contaminants takes place at the sediment surface.

If the mounds of sediments are subsequently returned through the process of back or in-filling, then the effect of the disturbance is reduced and recovery can occur within three weeks (Fowler, 1999). Recovery rates are therefore influenced by the energy of the site, and behaviour of the bait diggers. Coarse sand beaches with considerable wave action will recover more quickly than sheltered sites. Experimentally dug plots in a very sheltered location in the Menai Strait were still visible after a year, although this is thought to be due to the presence of boulder clay (Johnson, 1984). Other, less sheltered, sites have reported a timeframe of 25 days for holes to disappear (Johnson, 1984).

Impacts on target species

Both blow lugworm (*Arenicola marina*) and king ragworm (*Alitta virens*) are targeted by bait diggers throughout the D&S IFCA's District.

Contrasting evidence exists as to the *direct* environmental effects of bait digging for lugworm. Relative to other exploited intertidal invertebrates, blow lugworms are relatively resilient to exploitation and disturbance because of their relative fecundity and widespread distribution

(Fowler, 1999). In addition, *A. marina* exhibit a marked annual cycle in the numbers and condition of individuals, so that any changes in population structure correlated to bait digging, would have to control for these factors (Olive, 1993). Removal rates of 50-70% of worms in the area dug have been reported in the literature (Heilgenberg 1987, Blake, 1979) but D&S IFCA observations suggest this may be much lower in some areas, especially where large areas of lugworm exist and holes are relatively well spread out.

A wide range of responses by *A. marina* to exploitation or experimental simulations of exploitation have been found, relating to local environmental conditions and the intensity and distribution of bait digging activity. Olive (1993) describes the scenario which led to complete removal of all lugworms from a large area of a National Nature Reserve in Northumberland in 1984, with densities falling from >40m^{-2} to <1m^{-2}. When the site was closed to bait digging it repopulated within a matter of months, thanks to the presence of extensive non-exploited populations nearby. Similarly, lugworm populations in the Dutch Wadden Sea appear to be unaffected by large scale commercial exploitation, with an estimated 2 x 10^7 individuals take annually. However, Cryer et al. (1987) found no recovery in worm densities after 6 months following experimental removal, although natural densities at the test site in South Wales were low (9-16 m^{-2}) and the survey ran through the less productive winter months. The capacity of a population to withstand bait digging activities therefore relies on a number of factors including the size of the exploited area relative to the total lugworm bed, the presence of other lugworm beds nearby, the presence of nursery areas, the relative exploitation of adult and juvenile lugworms, and the intensity and seasonality of bait digging. However, on the whole they are thought to be resilient to bait digging.

A.virens is a keystone intertidal species as prey for fish, birds and crustaceans, is a predator of other invertebrates and has an important role in bioturbation of the sediment (Watson et al. 2017a). King ragworm are generally found in more sheltered sediment areas but they can also be found in more mixed sediments (E West, Pers. Obs.). Differing reports exist of the life-history and population characteristics of *A.virens.* Whilst early studies of North American populations suggested a mean age at breeding of >3 years with the population dominated by 0-group individuals, a population from the Menai Straight, Wales was thought to mature later, and to have very few 0-group individual present. The latter population was therefore seen as being vulnerable to exploitation. On the North East coast of England, a study found similar densities (~15m^2 during the summer, ~3m^2 during the winter) of *A. virens* in both exploited and unexploited populations Blake (1979), suggesting that at least some populations are unaffected by bait digging. In other cases the change in macrofaunal community has been thought to benefit *A.virens*, due to its opportunistic nature (Evans et al. 2015).

Impacts on non-target species

Bait digging can have adverse effects on a wide variety of species as a result of physical damage, burial, smothering and/or exposure to desiccation or predation to non-target invertebrates. Recovery of small short-lived invertebrates will usually occur within a year, but populations of larger, long-lived invertebrates may take much longer (Fowler, 1999). In some extreme cases local diversity may be reduced, which may be especially true in physically fragile environments such as eelgrass or mussel beds (Fowler, 1999). Similarly, Beukema (1995) found that within a 1km^2 area of the Dutch Wadden Sea, the local lugworm stock declined by more than double over a four-year mechanical digging period. As a result of this decline, total zoobenthic biomass also declined, with short lived species showing a marked reduction during the digging period. Recovery of the benthos took several years, especially by the slower establishing species. However, if disturbance by digging is short term, benthic communities can recover within six months (Beukema, 1995).

Moshabi et al. (2015) also explored the impacts of bait digging on the macrofauna of intertidal mudflats. The fauna of their study area (the tidal mudflats of Kneiss Islands, Tunisia) was mainly composed of polychaetes, the more abundant families being the *Nereididae*, *Arenicolidae* (fishing target species) and the *Cirratulidae*. They found the number of taxa and abundance of individuals were affected by bait digging; the abundances estimated at the control stations were significantly higher than those estimated at the three stations before and after bait collection, with some polychaete species disappearing after one month of bait digging. This indicates that the intertidal macrozoobenthic biodiversity at the impacted stations is affected by the bait digging activity, or possibly by trampling.

Jackson and James (1979) investigated the effects of bait digging on cockle populations. They found that increased digging in an area caused higher cockle mortality, particular on smaller individuals. The cause of mortality was due to burial/smothering as individuals that were buried at a depth of 10cm rarely survived.

Rossi et al. (2007) investigated the effects of trampling on mudflats, such as that associated with recreational activities like bait digging. They found that trampling clearly modified the abundance and population dynamics of the clam *Macoma balthica* and the cockle *Cerastoderma edule.* There was a negative impact on adults of both species, probably because footsteps directly killed or buried the animals, provoking asphyxia. However, trampling indirectly enhanced the recruitment rate of *M. balthica*. Small-sized *C. edule* showed no reaction to trampling. It is likely that small animals could recover more quickly because trampling occurred during the growing season and there was a continuous supply of larvae and juveniles. Trampling may also have weakened negative adult-juvenile interactions between adult cockles and juvenile *M. balthica*, thus facilitating the recruitment. Rossi et al. (2007) concluded that human trampling is a relevant source of disturbance for the conservation and management of mudflats. During the growing season recovery can be fast, but in the long-term it might lead towards the dominance of *M. balthica* to the cost of *C. edule*, thereby affecting ecosystem functioning.

Wynberg & Branch (1997) assessed the impacts of trampling associated with the use of suction pumps for the collection of prawns as bait, by comparing areas that had been sucked over with a prawn pump, to areas that had been trampled only. Prawn densities were depressed six weeks following both sucking and trampling but recovered by 32 weeks. Macrofaunal numbers declined in most treatment areas and macrofaunal community composition in the most-disturbed areas was distinct from that in other areas. They determined that the trampling itself has almost the same effect as sucking for prawns, on both the prawns and on the associated biota.

It is important to note that the effects on macrofaunal communities can differ substantially between estuaries. For example, the mud content of an estuary can affect the resilience of the communities to bait digging. Although Dernie et al. (2003) found that it was not possible to predict the recovery rates of assemblages based on percentage of silt and clay in the sediment, there was a good relationship between recovery rate and infilling rate, which is linked to the physical characteristics of the sediment. Clean sand habitats were the quickest to recover both in terms of physical and biological characteristics. Other studies have also found extended recovery times for estuaries with high mud content (Carvalho et al., 2013).

The site-specific nature of the impacts of bait digging was also demonstrated by Watson et al. (2017). They found that responses were both site and disturbance type specific. Their data also showed that responses were not consistent between species (e.g. *C. volutator* and *P. ulvae*) or even between those within the same trophic group. They, therefore, concluded that bait collection alters the macrofaunal community and the associated sediment characteristics across large spatial scales, but with the caveat that the strength (and type) of the response is site specific.

9. In-combination assessment

Table 4 - Relevant activities occurring in or close to the site

Plans and Projects		
Activity	**Description**	**Potential Pressure(s)**
MBA research vessel trawling to fish for scientific purposes within the Tamar	Dispensation for annual Marine Biological Association (MBA) scientific survey work on research vessel Sepia within the EMS to fish for scientific purposes. Activity involving 4m beam trawl in West Mud (Tamar) and Yealm Mouth, demersal otter trawl in Bigbury bay, and rectangle dredge in New Ground (Plymouth Sound), Mewstone and Stoke Point.	Removal of target species Removal of non-target species Abrasion, disturbance and penetration of the substrate
MBA and EA trawling for smelt within the Tamar	Dispensation for the MBA and Environment Agency (EA) for shad and smelt monitoring on behalf of Natural England within the EMS. Adult density of shad and smelt will be sampled by a light 4m beam trawl or a small (6ftm) 4 panel demersal trawl between West Mud and Morwellham Island by MBA Sepia. They intend to carry out this sampling monthly (on high water springs) between July 2015 and August 2016.	Removal of target species Removal of non-target species Abrasion, disturbance and penetration of the substrate
Outside of the MCZ	Maintenance dredging at HMNB Devonport	Abrasion, disturbance and penetration of the substrate Resuspension of sediment (smothering)
Outside of the MCZ	Thanckes Oil Jetty demolition and construction of Yonderberry Jetty, Torpoint	Abrasion, disturbance and penetration of the substrate Resuspension of sediment (smothering)
No other plans or projects known to be occurring within Tamar Estuary MCZ	The impact of future plans or projects will require assessment in their own right, including accounting for any in-combination effects, alongside existing activities.	N/A
Other activities being considered		
Fishing Activity	**Description**	**Potential Pressure(s)**
Crab tiling		Abrasion, disturbance and penetration of the substrate Removal of target and non-target species

It is believed there is no likelihood of significant adverse effect on the interest features from in-combination effects with other plans or projects.

10. NE consultation response

N/A Natural England has not been consulted at this stage.

11. Conclusion

The literature detailed in section 8 found that bait digging could have an effect on the sediment characteristics, the populations of the target species, and the macrofaunal communities.

Within the part of the MCZ that falls within D&S IFCA's District, bait digging is only known to occur on the mudflats at Ernesettle (Stephenson, 2019) and just north of the Tamar bridge (Langmead et al., 2017). Bait digging in the Tamar Estuary MCZ occurs mostly on A2.2 littoral sand and muddy sand and occasionally on A2.3 littoral mud (Figures 1 & 2, Annex 1) (bait digging has undergone HRAs for these sediments in the Plymouth Sound & Estuaries SAC and the Tamar Estuary Complex SPA, which are co-located with the MCZ). Currently bait digging is not believed to occur on the intertidal coarse sediment (located in upper Tavy). Intertidal biogenic reefs can be found on the Tamar, a mussel bed north of the mouth of the Tavy and a large mussel bed located near to the Royal Naval Armaments Depot Ernesettle (Natural England, 2015). The mussel beds are located at the lower shore away from where bait digging activity occurs.

In conclusion, there is not believed to be any overlap between the activity and the features assessed. Therefore, no change in management is recommended. However, D&S IFCA should continue to monitor the levels and locations of bait digging with the Tamar MCZ.

12. Summary table

Feature or habitat of Conservation interest	**Conservation objectives / Target attributes** (Natural England, 2015)	**Potential pressures from activity and sensitivity of habitats to pressures.** (Natural England, 2015)	**Potential exposure to pressures and mechanism of impact significance**	**Is there a risk that the activity could hinder the achievement of conservation objectives of the site?**	**Can D&S IFCA exercise its functions to further the conservation objectives of the site? If Yes, list management options**
Intertidal biogenic reefs	Maintain the extent and distribution Maintain extent of supporting habitat	• Abrasion/disturbance of the substrate on the surface of the seabed • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion • Removal of target species • Removal of non-target species	Within the part of the MCZ that falls within D&S IFCA's District, bait digging is only known to occur on the mudflats at Ernesettle (Stephenson, 2019) and just north of the Tamar bridge (Langmead et al., 2017).	Currently bait digging does not occur in the vicinity of the features assessed.	Yes, Management measures could include: 1. Monitor activity levels through future bait digging surveys 2. Monitoring and review of byelaw 3. Enforcement of byelaw
Intertidal coarse sediment	Maintain the extent and distribution Maintain the presence and spatial distribution Maintain the distribution of sediment composition Maintain species composition of component communities	• Abrasion/disturbance of the substrate on the surface of the seabed • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion • Removal of target species • Removal of non-target species	See above.	Currently bait digging does not occur in the vicinity of the features assessed.	See above.

Blue mussel (*Mytilus edulis*) beds	Extent of subtidal biogenic reef Maintain the environmental conditions important for mussel bed formation.	• Abrasion/disturbance of the substrate on the surface of the seabed • Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion • Removal of target species • Removal of non-target species	See above.	Currently bait digging does not occur in the vicinity of the features assessed.	See above.
Native oyster (*Ostrea edulis*)	Recover the presence and spatial distribution Recover the population size Maintain the reproductive and recruitment capability Maintain the extent and distribution of supporting habitats	• Removal of target species	See above.	Currently bait digging does not occur in the vicinity of the features assessed.	See above.

13. References

Anderson F.E. & Meyer L.M (1986) The interaction of tidal currents on a disturbed intertidal bottom with a resulting change in particulate matter quantity, texture and food quality, Estuarine, Coastal and Shelf Science, 22: 19-29.

Beukema JJ. (1995). Long-term effects of mechanical harvesting of lugworms *Arenicola marina* on the zoobenthic community of a tidal flat in the wadden sea. Netherlands Journal of Sea Research. 33: 2019-227

Blake R.W. (1979) Exploitation of a natural population of *Arenicola marina* (L.) from the north east coast of England. Journal of Applied Ecology 16: 663-670.

Carvalho S, Constantino R, Cerqueria M, Pereira F, Subida M, Drake P, Gaspar M (2013). Short term impact of bait digging on intertidal microbenthic assemblages of two south Iberian Atlantic systems. Estuarine, Coastal and Shelf Science. 132 pp65-75.

Cryer, M., Whittle, G.N. & Williams, R. (1987) The impact of bait collection by anglers on marine intertidal invertebrates. Biological Conservation. 42: 83-93.

Davies, S. (2016) Tamar Estuary MCZ Fishing Activity Report. Devon and Severn IFCA Report.

Evans, S., Moon, J., Bunker, A.R. and Green. M. 2015. Impacts of Bait Digging on the Gann: An Evidence Review. NRW Evidence Report No: 81 34pp, NRW, Bangor.

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

Heiligenberg, T. van den. 1987. Effects of mechanical and manual harvesting of lugworms Arenicola marina L. on the benthic fauna of tidal flats in the Dutch Wadden Sea. Biological Conservation, 39, 165-177.

Jackson J and James R. (1979). The influence of bait digging on cockle, *Cerastoderma edule,* populations in North Norfolk. Journal of Applied Ecology. 16: 671-679.

Johnson G. (1984) Bait collection in a proposed marine nature reserve, MSc Report, Ecology and Conservation Unit, University College London in http://www.ukmarinesac.org.uk/activities/bait-collection/, accessed February 2019.

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.

Moshabi, N., Pezy, J-P., Dauvin, J-C. & Neifar, L. (2015) Short-term impact of bait digging on intertidal macrofauna of tidal mudflats around the Kneiss Islands (Gulf of Gabés, Tunisia). Aquatic Living Resources 28: 111-118

Natural England (2015) Draft Conservation Advice for Tamar Estuary Marine Conservation Zone (MCZ)

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

Rossi, F., Forster, R.M., Montserrat, F., Ponti, M., Terlizzi, A., Ysebaert, T. & Middelburg, J.J. (2007) Human trampling as short-term disturbance on intertidal mudflats: effects on macrofauna biodiversity and population dynamics of bivalves. Marine Biology 151: 2077-2090.

Stephenson (2019) Devon & Severn IFCA Report: Bait Digging in the Plymouth Sound & Estuaries European Marine Site and Tamar Estuary Sites Marine Conservation Zone. Data Analysis Report.

Watson, G.J., Murray, J.M., Schaefer, M., Bonner, A. and Gillingham, M. (2017) Assessing the impacts of bait collection on inter-tidal sediment and the associated macrofaunal and bird communities: The importance of spatial scales, Marine Environmental Research 130: 122-133

Wynberg, R.P. & Branch, G.M. (1997) Trampling associated with bait-collection for sandprawns *Callianassa kraussi* Stebbing: effcts on the biota of an intertidal sandflat. Environmental Conservation 24(2): 139-148

Annex 1: Site Maps

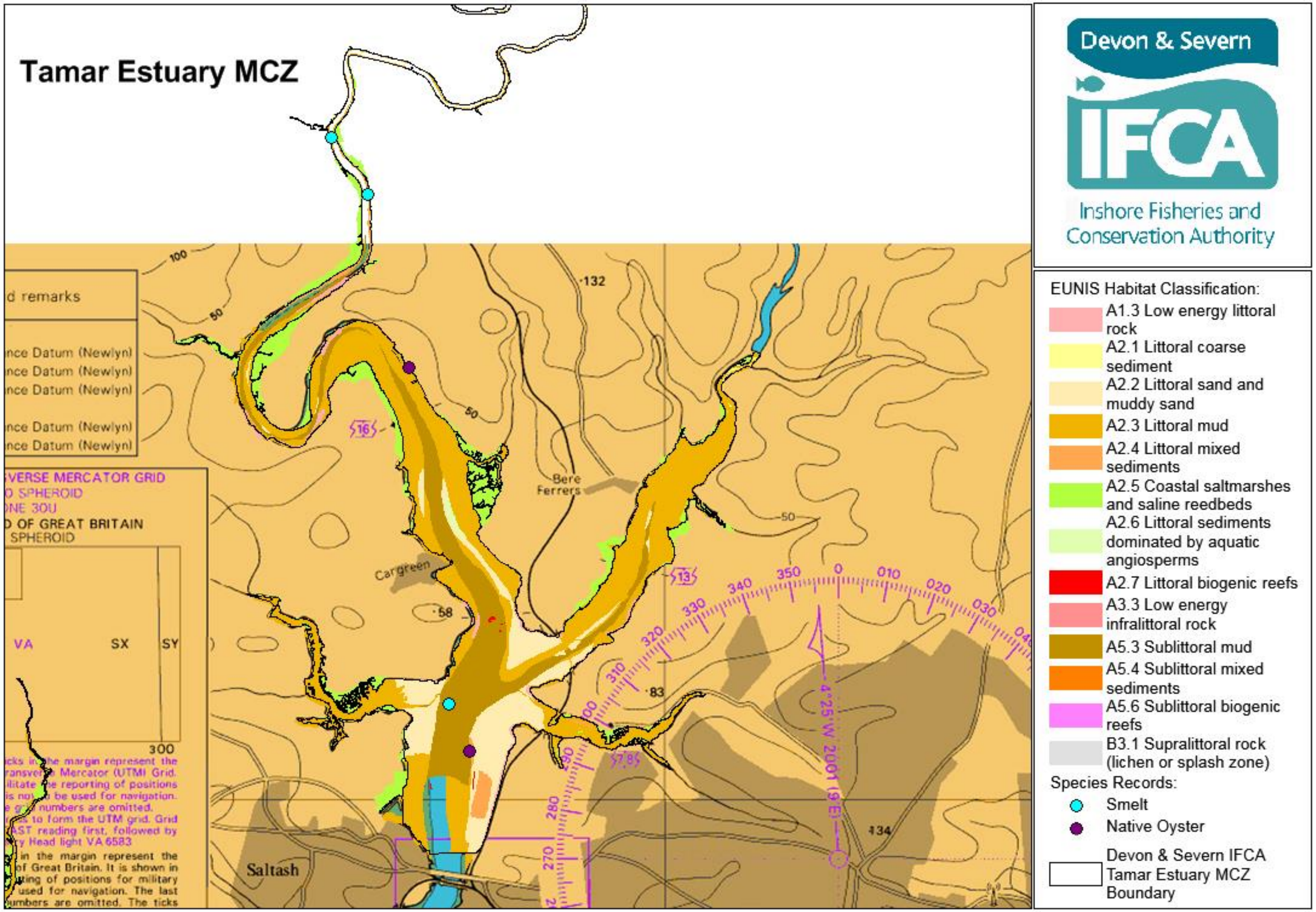

Figure 1 – Tamar Estuary MCZ showing habitat types and species records

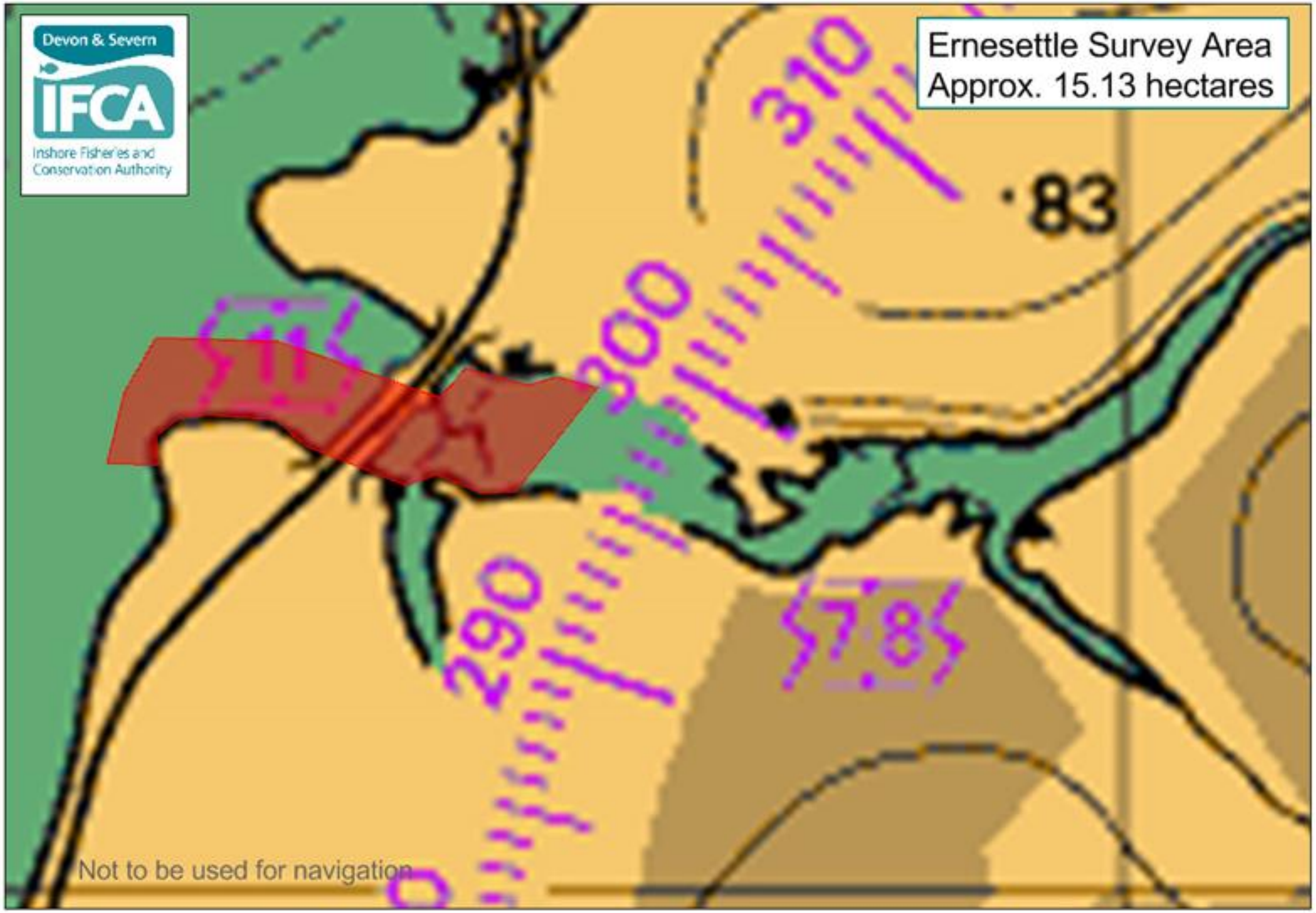

Figure 2 - Area where bait digging is known to occur, from D&S IFCA surveys (Stephenson, 2019)

Annex 2: Pressures Audit Trail

Fishing Activity Pressures: Shore-based activities	**Intertidal biogenic reefs**	**Intertidal coarse sediment**	**Blue mussel (*Mytilus edulis*) beds**	**Native oyster (*Ostrea edulis*)**	**Screening Justification**
Abrasion/disturbance of the substrate on the surface of the seabed	S	NS			**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Deoxygenation	NS	NS			**OUT** – Insufficient activity levels to pose risk at level of concern
Genetic modification & translocation of indigenous species	IE				**OUT** - the fleet operates in local area only so risk considered extremely low
Hydrocarbon & PAH contamination. Includes those priority substances listed in Annex II of Directive 2008/105/EC.	NS	NS			**OUT** - Insufficient activity levels to pose risk of large scale pollution event
Introduction or spread of non-indigenous species	S	IE			**OUT** - the fleet operates in local area only so risk considered extremely low
Litter	IE	IE			**OUT** – Insufficient activity levels to pose risk at level of concern
Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion	S	NS			**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Physical change (to another seabed type)	S	S			**OUT** – Insufficient activity levels to pose risk at level of concern
Removal of non-target species	S				**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure
Removal of target species	S				**IN** – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure