Kent and Essex Inshore Fisheries Conservation Authority

Fisheries in EMS Habitats Regulations Assessment for the 2022-2024 Thames Estuary Cockle Fishery Order Area Fishery

European Marine Sites:

Essex Estuaries SAC
Margate and Long Sands SAC
Benfleet and Southend Marshes SPA
Foulness (Mid Essex Coast Phase 5) SPA
Thames Estuary and Marshes SPA
Outer Thames Estuary SPA
Foulness (Mid Essex Coast Phase 5) Ramsar
Benfleet and Southend Marshes Ramsar

Features:

Mudflats and Sandflats not covered by seawater at low tide (Intertidal mudflats and sandflats),
Sandbanks slightly covered by seawater at all times,
Intertidal gravel and sand,
Seagrass
Red throated diver
Common Tern
Little Tern

Generic sub-feature(s): Mud communities, Muddy Sand Communities, Sand and Gravel communities, Eelgrass bed communities, supporting habitats of red throated divers, foraging areas for common tern and little tern

Site specific sub-feature(s):

Fishing activities assessed: Cockle suction dredging in the Thames Estuary Cockle Fishery Order area (TECFO)

i. Contents

ii. Revision history

Version	Date	Author	Reason	Status
1	31/03/2021	P Haupt	Initial draft	Draft
2	12/04/2022	P Haupt	NE, Alex Baker comments addressed	Draft
3	12/04/2022	P Haupt	NE signed off	FINAL

1. Introduction

1.1 Need for an HRA assessment

Kent and Essex Sea Fisheries Committee (K&ESFC) was granted the Thames Estuary Cockle Fishery Order (TECFO) in 1994 under which management of the exploitation of the commercial cockle fishery takes place within the area of the Order (Figure 1). K&ESFC has now been replaced by Kent and Essex Inshore Fisheries and Conservation Authority (KEIFCA).

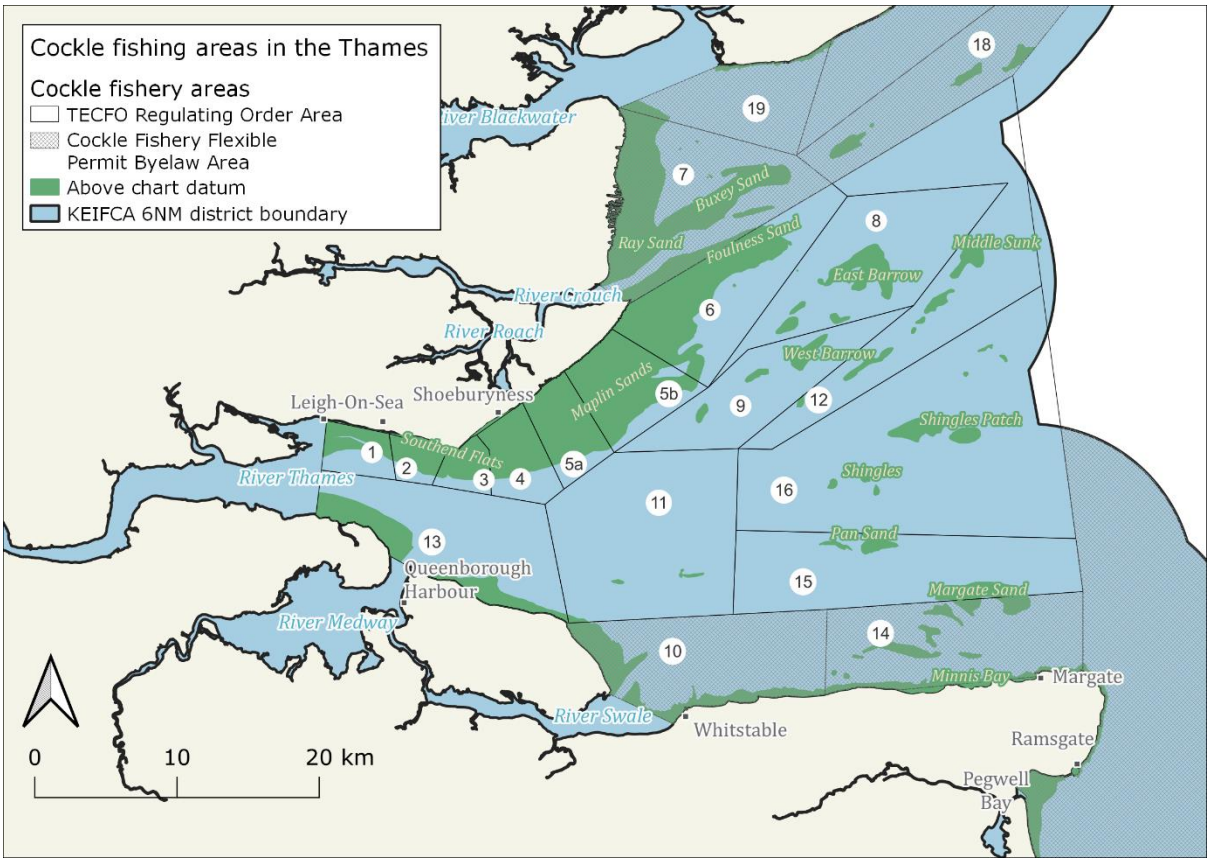


Figure 1. Cockle fishery management areas of the 1994-2024 Thames Estuary Cockle Fishery Order (TECFO) in Kent and Essex, shaded according to cockle fishery. See Table 1 for area names.

Table 1. Chart area key, relating are codes to their names.

Thames Estuary Cockle Fishery Order (TECFO) areas	Cockle Fishery Flexible Permit Byelaw (CFFPB) areas
Marsh End & Chapman Sands (1)	Inner Estuary (1a)
East of pier (2)	Buxey Ray, Dengie Sands & Ray Sands (7)
West of Shoebury boom (3)	Leysdown & Ham (10)
East of Shoebury boom (4)	South Margate Sands (14)
South Maplin (5a)	South Kent Coast to Dungeness (17)
Mid Maplin (5b)	Gunfleet Sand (18)
North Maplin & Foulness Sands (6)	Blackwater Estuary (19)
East Barrow & Maplin Spit (8)	Wallet & North Essex Coast (20)
West Barrow (9)	
East Cant, Middle & Red Sand (11)	
Sunk Sand (12)	
West Cant & Scrapsgate (13)	
North Margate Sand & Pan Sand (15)	

Shingles & Long Sand (16)	

The area of the Order includes sections of the Essex Estuaries SAC, Margate and Long Sands SAC, Mid-Essex Coast (Foulness) SPA, Benfleet and Southend Marshes SPA, the Thames Estuary and Marshes SPA and the Outer Thames SPA. These MPAs can be seen in Figure 2and Figure 3 below.

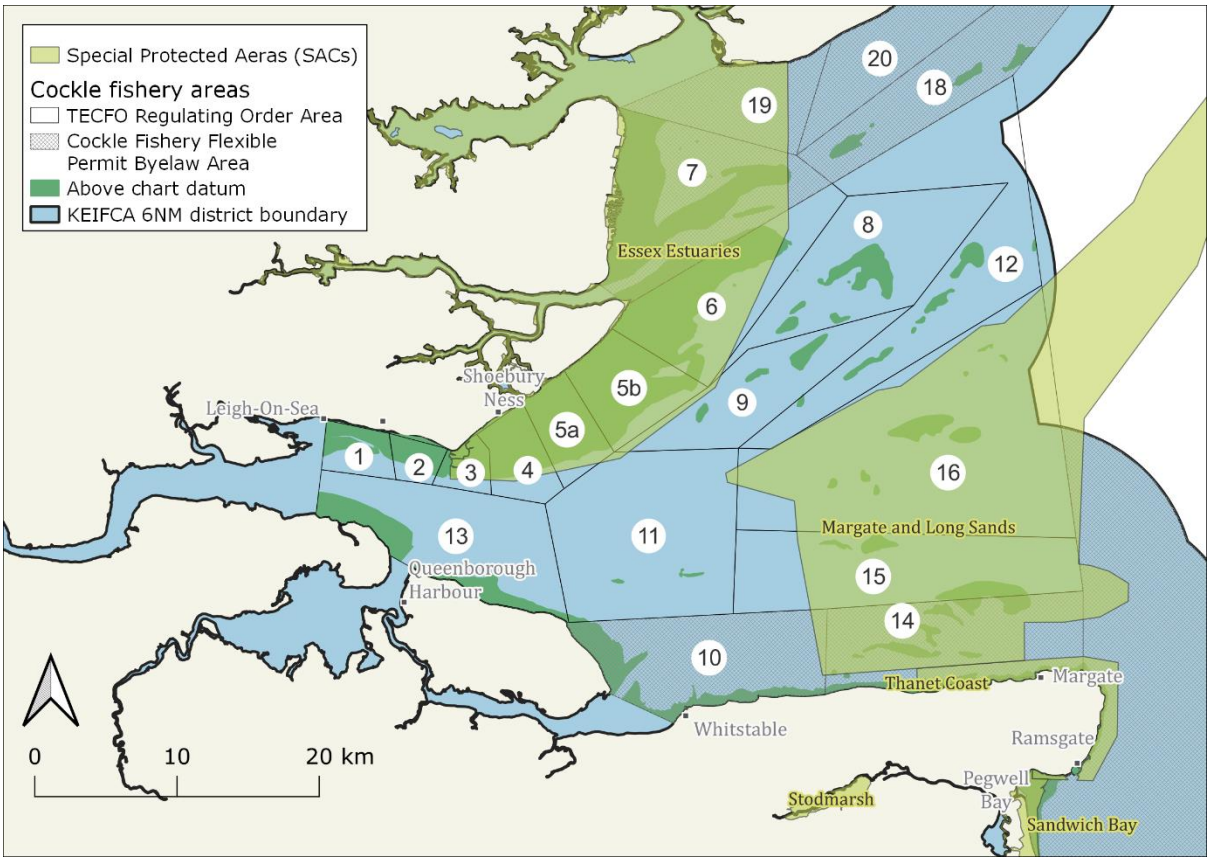


Figure 2. Map of all SACs in and around the Thames cockle fishing areas.

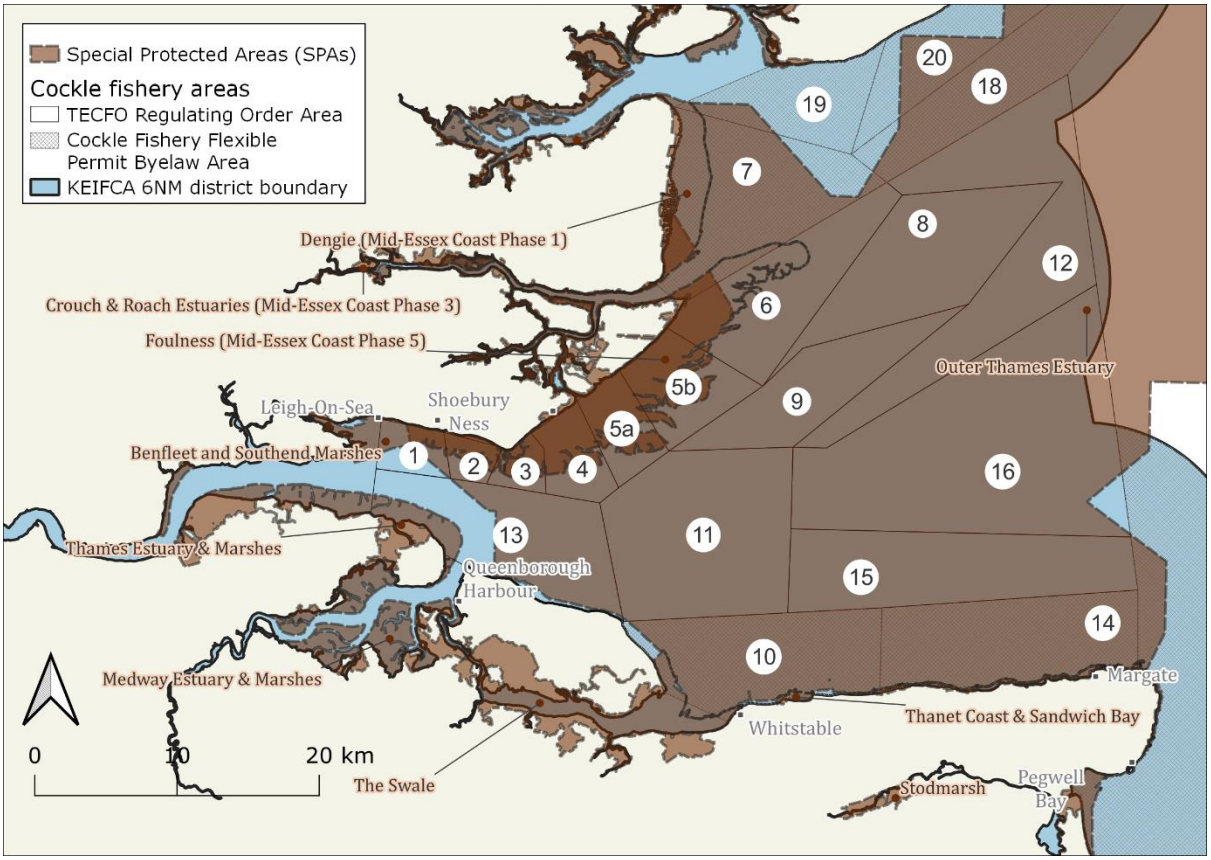


Figure 3. All the SPAs and RAMSAR sites in the Thames Estuary and their overlap with cockle management areas. Dark (brighter) brown aeras show overlap of SPAs.

Licences for cockle harvesting inside the TECFO area are issued by KEIFCA each year under strict management regulations. The issuing of these licences is subject to provisions of Article 6(3) of the Habitats and Birds Directives.

The purpose of this site specific assessment document is to assess whether or not in the view of Kent and Essex IFCA the fishing activities of cockle suction dredging have a likely significant effect on features of EMS (Essex Estuaries SAC, Margate and Long Sands SAC, Benfleet and Southend Marshes SPA, Foulness SPA, Thames Estuary and Marshes SPA and Outer Thames Estuary SPA) and, on the basis of this assessment, whether or not it can be concluded that cockle suction dredging will not have an adverse effect on the integrity of these EMS. This document is to be used in conjunction with tests of Likely Significant Effect already completed and approved by Natural England.

1.2 Documents reviewed to inform this assessment

- Natural England's risk assessment Matrix of fishing activities and European habitat features and protected species[1]
- Natural England's consultation advice (Annex 2)
- Site map(s)
- Fishing activity data
- KEIFCA cockle report 2021 (Annex 3)

[1] See Fisheries in EMS matrix: http://www.marinemanagement.org.uk/protecting/conservation/documents/ems_fisheries/populated_matrix3.xls

2. Conservation objectives

Ensure that the integrity of the site is maintained or restored as appropriate, and ensure that the site contributes to achieving the Favourable Conservation Status of its Qualifying Features, by maintaining or restoring:

- The extent and distribution of qualifying natural habitats
- The structure and function (including typical species) of qualifying natural habitats, and
- The supporting processes on which qualifying natural habitats rely

Natural England have provided draft Supplementary Advice Tables (SATs) for Essex Estuaries SAC. These indicate that the condition of the features or sub-features is yet to be assessed, and therefore they cannot be assumed to be in favourable condition.

3. Interest features of the EMS categorised as 'Red' risk and overview of management measures

Red risk interaction:

- **Feature:** Estuaries; Seagrass; eelgrass bed communities, red throated divers, common tern, little tern
- **Gear type:** Towed (demersal); towed (demersal/pelagic); dredges (towed); dredges (other)

Source: EMS matrix[2]

In December 2013 KEIFCA issued a byelaw prohibiting the use of all bottom towed fishing gear within specified areas of the Essex Estuaries SAC to protect seagrass (*Zostera* spp) and therefore prevent damage to or deterioration of the sites (please refer to www.kentandessex-ifca.gov.uk for the full byelaw conditions) and see Figure 4.

[2] See Fisheries in EMS matrix:
http://www.marinemanagement.org.uk/protecting/conservation/documents/ems_fisheries/populated_matrix3.xls

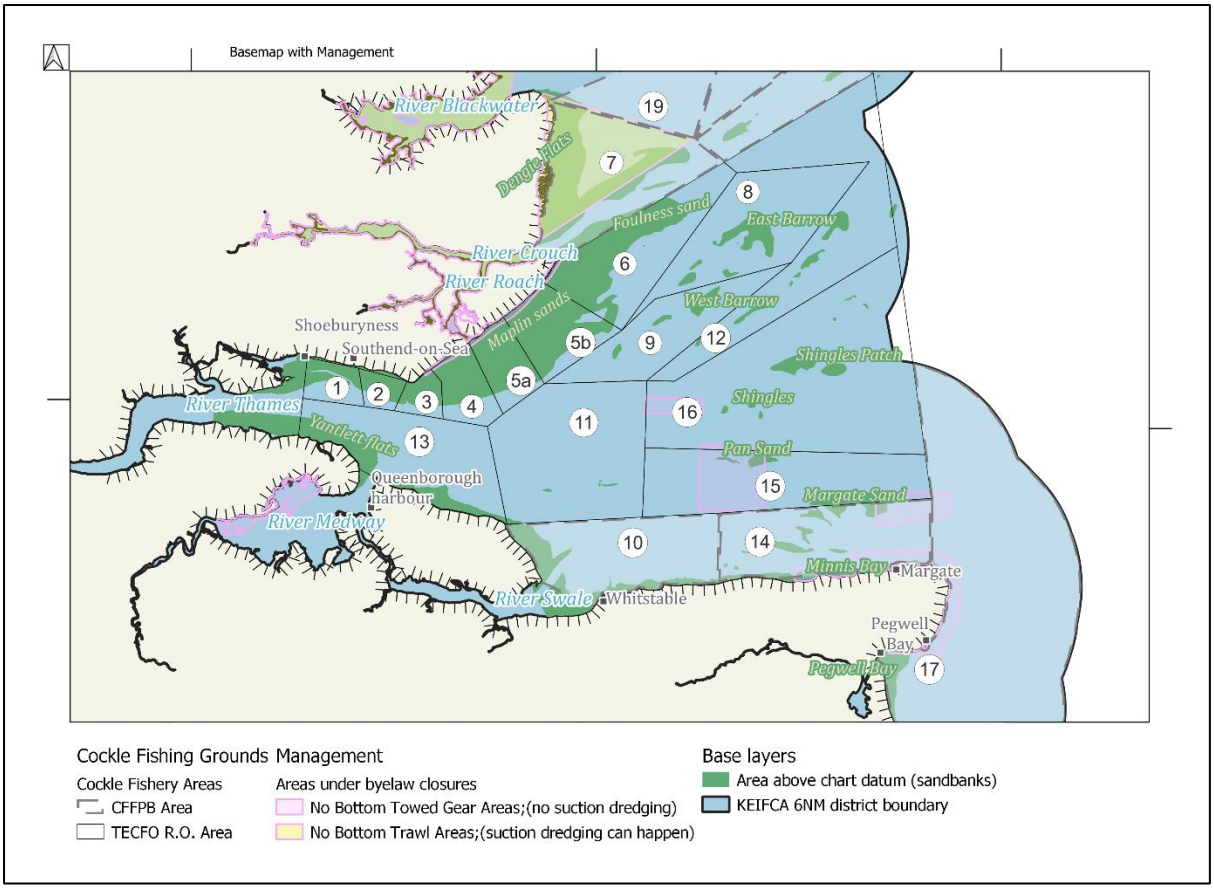


Figure 4. No bottom towed gear byelaws in greater Thames Estuary. (No dredge areas prohibit any bottom towed gear including suction dredges commonly used to harvest cockles.)

4. Overview of fishing activities within the site

The site is large and a variety of fishing methods are undertaken across the site. The site contains one of Essex's main commercial fishing ports, West Mersea, which is home port to 28 vessels, all of which are under 10 m (MMO registered fishing vessel list, February 2019). In addition, there are 10 smaller fishing ports within the SAC boundaries, with a total of 16 registered fishing vessels working out of them, only 1 of which is over 10 m. The ports of Clacton-on-Sea, Leigh-on-Sea and Southend-on-Sea are outside the SAC boundaries, but vessels from these ports are known to work within the boundaries of the SAC on occasion. There are an additional 36 vessels registered at these three ports, with 14 over 10 m. Fishing in Essex Estuaries SAC is primarily conducted by a non-nomadic fleet.

The TECFO cockle fleet is comprised of 14 vessels, all larger than 12 m and fitted with Vessel Monitoring System (VMS) loggers, and are set to report GPS location and speed data every 10 minutes during the period when the fishery is active. This real time data set is monitored during the fishery for enforcement purposes and analysed to improve the management and survey strategy on an annual basis.

Table 2. Number of fishing vessels registered at each port within, or close to, Essex Estuaries SAC. Taken from UK Fleet Register for March 2021.

Port	Nº under 10 m	Nº over 10 m vessels	Total nº vessels
Bradwell	4	-	**4**
Brightlingsea	4	-	**4**
Burnham-on-Crouch	3	-	**3**
Clacton-on-Sea	5	-	**5**
Colchester	2	-	**2**
Great Wakering	0	-	**0**
Leigh-on-Sea	8	13	**21**
Maldon	5	-	**5**
Paglesham	0	-	**0**
Rochford	0	-	**0**
Southend-on-Sea	4	-	**4**
Tollesbury	0	-	**0**
West Mersea	30	1	**31**
Wivenhoe	5	0	**5**
Total	**70**	**14**	**84**

Commercial fishing occurs within the site using a variety of gears;

- **Potting:** Common year-round, primarily for whelks, lobsters and edible crabs.
- **Static and drift netting:** Common year-round in the SAC, targeting bass during the summer and cod or mullet in the winter. Drift netters also target sole.
- **Trawling:** Otter trawls and multi-rig trawls are common year-round, with one pair of vessels regularly engaged in pair trawling in the area. Sole, cod, bass and thornback ray are the target species.
- **Mussel dredging:** Occurs very occasionally for seed mussel, but is done under KEIFCA permit and is closely monitored.
- **Cockle suction dredging:** Annual cockle fishery which has been managed under the Thames Estuary Cockle Fishery Order (TECFO) since 1994. This is a seasonal fishery from June to September/October. Outside of the TECFO, cockle fishing is managed by KEIFCA cockle byelaw which requires vessels to have a permit to cockle suction dredge. Permits were issued and a limited fishery occurred in 2017 and 2018.
- **Oyster dredging:** Public native oyster (*Ostrea edulis*) beds are closed under the new Blackwater, Crouch, Roach and Colne Estuaries Marine Conservation Zone Native Oyster Permit Fishery Byelaw, and will remain closed until such time as the native oyster stocks are deemed to have recovered to sufficient levels to allow sustainable harvesting. Dredging for Pacific oysters (*Crassostrea gigas*) on public grounds is still permitted, and Natural England are providing advice on this fishery as it removes this non-native species from the estuary.
- **Mariculture (bivalve molluscs):** Common within the site for oysters (both native and Pacific) and mussels. There is low level commercial clam dredging in the river Crouch.
- **Bait digging/hand gathering:** Harvesting of bait and shellfish occurs on the shores both commercially and recreationally. There is one known area of commercial crab tiling within the SAC.

Additionally, there is a thriving recreational angling industry in the area, as well as a few small hobby shrimp fishermen.

5. Test of Likely Significant Effect (LSE)

The Habitats Regulations assessment (HRA) is a step-wise process and is subject to a coarse test of whether a plan or project will cause a likely significant effect on a European marine site[3].

5.1 Completed and approved tests for LSE

As part of the Defra revised approach to managing fisheries in EMS, tests of LSE were completed by KEIFCA for impacts of cockle suction dredging on features of the SPAs and SAC. Table 3 summarises the tests completed and approved by Natural England (NE). These tests of LSE have been reviewed by KEIFCA in April 2016 and are still valid. Features that have already been assessed and found to not be significantly impacted by cockle suction dredging will not be assessed further in this document. From the initial tests of LSE, any interactions of cockle suction dredging with features where no LSE could not be concluded will be assessed further (Table 4).

Table 3. Summary of completed and approved tests of LSE for the impact of cockle suction dredging on EMS features and sub-features. A result of 'NO' concludes there is no likely significant impact of cockle suction dredging on that feature, conversely a result of 'YES' concludes that a result of no LSE could not be proved and a full appropriate assessment is required to determine the impacts, if any, on the EMS features.

EMS and feature/sub-feature	Document reference	Result of test of LSE	Date approved by NE	Date last reviewed by KEIFCA
Essex Estuaries SAC				
Sandbanks which are slightly covered by sea water all the time	KEIFCA/EE/23	NO	22/09/2015	13/04/2016
Salicornia and other annuals colonizing mud and sand	KEIFCA/EE/24	NO	22/09/2015	13/04/2016
Spartina swards (Spartinion maritimae)	KEIFCA/EE/24	NO	22/09/2015	13/04/2016
Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	KEIFCA/EE/24	NO	22/09/2015	13/04/2016
Mediterranean and thermo-Atlantic halophilous scrubs (Sarcocornetea fruticose)	KEIFCA/EE/24	NO	22/09/2015	13/04/2016
Mudflats and sandflats not covered by seawater at low tide	KEIFCA/EE/25	YES	22/09/2015	13/04/2016
Estuaries	KEIFCA/EE/26	NO	22/09/2015	13/04/2016
Benfleet and Southend Marshes				
***SPA** - Estuarine Birds (Ringed Plover, Dark Bellied Brent Goose, Grey Plover, Knot, and Waterbird Assemblage)*	KEIFCA/BS/14	NO	22/09/2015	13/04/2016
***Ramsar** - Intertidal mud and sand*	KEIFCA/BS/14	YES	22/09/2015	13/04/2016
***Ramsar** - Intertidal mixed sediments*	KEIFCA/BS/14	YES	22/09/2015	13/04/2016
***Ramsar** - Saltmarsh*	KEIFCA/BS/20	NO	22/09/2015	13/04/2016
***Ramsar** - Seagrass*	KEIFCA/BS/22	YES	22/09/2015	13/04/2016
Foulness (Mid Essex Coast Phase 5)				
***SPA** - Estuarine birds (Avocet, Common Tern, Little Tern, Sandwich Tern, Bar Tailed Godwit, Golden Plover, Hen Harrier, Redshank, Dark Bellied Brent Goose, Grey Plover, Knot, Oystercatcher and Waterbird Assemblage)*	KEIFCA/MEC/88	NO	22/09/2015	13/04/2016
***Ramsar** - Intertidal gravel and sand*	KEIFCA/MEC/85	YES	22/09/2015	13/04/2016
***Ramsar** - Intertidal mud and sand*	KEIFCA/MEC/86	YES	22/09/2015	13/04/2016
***Ramsar** - Saltmarsh*	KEIFCA/MEC/87	NO	22/09/2015	13/04/2016
***Ramsar** - Seagrass*	KEIFCA/MEC/21	NO	22/09/2015	13/04/2016
Thames Estuary and Marshes				
***SPA** - Estuarine birds (Avocet, Hen Harrier, Ringed Plover and Waterbird Assemblage)*	KEIFCA/TEM/10	NO	22/09/2015	13/04/2016
***Ramsar** - Intertidal mud and mixed*	KEIFCA/TEM/11	NO	22/09/2015	13/04/2016

[3] Managing Natura 2000 sites: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm

sediments				
***Ramsar** - Saltmarsh*	KEIFCA/TEM/12	NO	22/09/2015	13/04/2016
Outer Thames SPA - *Red Throated Diver, Common Tern, Little Tern*	Feature/fishing gear interaction assessed by MMO and concluded to have no LSE			

5.2 Assessment of LSE

Table 4. Test of Likely Significant effect of cockle suction dredging on:

- intertidal mud and sand (Essex Estuaries SAC)
- intertidal mud and sand, intertidal mixed sediments, seagrass (Benfleet and Southend Marshes Ramsar)
- intertidal gravel and sand, intertidal mud and sand (Foulness (Mid Essex Coast Phase 5) Ramsar)

1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?	No
2. What potential pressures such as abrasion/physical loss by gear type(s) are likely to affect the interest features? *(reference to conservation objectives)*	1. Abrasion/disturbance of the surface of the seabed 2. Genetic modification & translocation of indigenous species 3. Introduction of microbial pathogens 4. Introduction or spread of non-native species 5. Organic enrichment 6. Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion 7. Physical change (to another seabed type) 8. Removal of non-target species 9. Siltation rate changes (high & low), including smothering
3. Are the qualifying features potentially exposed to the pressure(s)?	1. Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure 2. No - Fishing mortality/trait selectivity would have to be at very high levels to lead to genetic modification; considered unlikely for this activity 3. No – Insufficient activity levels to pose risk at level of concern 4. No – Fleet operates in local area so risk considered to be extremely low and biosecurity checks are carried out prior to the start of the fishery. 5. No – Insufficient activity levels to pose risk at level of concern 6. Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure 7. Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure 8. Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure 9. Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure

4. Potential scale of pressures and mechanism of effect/ impact (if known)	The Essex Coast is home to two highly managed cockle fisheries; one within the Thames Estuary Cockle Fishery Order (TECFO) and one outside (managed by the KEIFCA cockle permit byelaw). The Thames Estuary Cockle Fishery Order (TECFO) was established in 1994 and manages an area that includes sections of the Essex Estuaries SAC, Foulness, Benfleet and Southend Marshes and the Thames Estuary and Marshes Ramsar and SPAs. The TECFO enables KEIFCA to limit the number of licences issued to persons wishing to exploit the commercial fishery within these areas, which is reviewed every year. This has been restricted to 14 vessels for a number of years, which has restricted effort on the grounds within the TECFO. Activity is also restricted temporally. The TECFO allows the restriction of vessels fishing time on the grounds by control of landings and fishing days. Fishing is opened for a limited season by KEIFCA, based on stock surveys and fishery monitoring. During this time, vessels are restricted in the number of trips they can take. These factors limit the potential impacts of suction dredge fishing on benthic features of Essex Estuaries SAC. Outside of the TECFO, cockle fishing is managed by KEIFCA cockle byelaws. This applies to Dengie, St. Peters Flats and Buxey Sand areas of Essex Estuaries SAC. The byelaw restricts fishing activity by requiring that fishers are in possession of a permit to fish in these areas. When these areas have been opened to fishing, an average of 20 to 40 vessels have taken part in fishing during the 1 to 4 week open period. This restricts effort on the grounds. This fishery outside the TECFO will be assessed separately and not included in this test of LSE. Primary impact of dredge fisheries on benthic habitats is reduction in diversity and abundance of biota. This includes benthic infauna such as burrowing shrimps as well as surface dwelling erect epifauna and flora (Kaiser et al., 2006). Clarke and Tully (2014) concluded that in addition to the expected reduction in bivalve abundances, cockle suction dredging also impacted on the wider ecosystem, although these effects were mainly seasonal and spatial. Eastern IFCA (Sebastian, 2012) examined the impacts of cockle suction dredging on particle size and benthic epifauna and recovery over time. No significant difference was found in sediment composition between control sites and sites that had been dredged, either directly after dredging had occurred or after three months. The study also suggested that cockle dredging had little or no immediate impact on associated biota and that recovery occurs within one month. Alteration of the physical structure of the seabed can lead to degradation of overall communities supporting an ecosystem within an area. Abrasion and dispersal of material from benthic

	habitats can occur at various levels through the use of dredge fisheries. Burial and smothering can occur through suspension of material in the course of dredging and settlement. Hiddink (2003) suggested that disturbance of benthic habitats through dredge activity could reduce density of non-target fauna through redistribution of fauna and sediment.
5. Potential effects in-combination with other plans and projects	Essex Estuaries SAC covers a large area, and as such there are numerous fishing activities which occur in it. Drift netting occurs within the site (see HRA document ref. KEIFCA/EE/50). Trawling (KEIFCA/EE/07), clam dredging (KEIFCA/EE/18), potting (KEIFCA/EE/38) and static netting (KEIFCA/EE/47) also occur in the subtidal region and full appropriate assessments have been carried out for these activities. Additional licenced activities include; • *Maintenance dredging:* Occurs at harbours within the site including Burnham Harbour (MMO ref. MLA/2015/00165). This is likely to affect this subtidal feature and as such should be mitigated for as part of the HRA process for this activity. • *Shipping channel:* Beyond the site are several major shipping channels leading to the Thames Estuary. This should not affect this subtidal feature. • *Wallasea Island Wild Coast Project*: MMO ref. 34763/100304/2. An RSBP project to breach sea walls and create new intertidal habitats. This is may affect this subtidal feature through changes in sediment loading. • *Private fisheries:* There are numerous private fisheries within the SAC, primarily for shellfish with two areas with private fin fisheries. The licence holders will be required to complete HRAs for private fishing activities, which take into consideration their effects in combination with other public fisheries activities. • *Gunfleet Sands wind farm:* In the vicinity of the site is a large windfarm which is regularly accessed by service vessels from Brightlingsea. There is a licence for cable repairs to be undertaken when necessary, but these emergency works will likely occur on a small spatial and temporal scale. In all nearshore areas there is regularly ongoing maintenance work on coastal infrastructure, including repairs to piers and jetties and capital dredging. These projects are generally on a small spatial scale and are one-off or very occasional (annual or bi-annual) occurrences. All future projects will be required to consider their effect in combination with licenced fishing activities in the region. There are no national infrastructure projects planned in or near the Essex Estuaries SAC site (National Infrastructure Planning Portal, 2019).

6. Is the potential scale or magnitude of any effect likely to be significant?[4]	**Alone; YES** Comments: It is possible that if cockle suction dredging activities have a negative impact on intertidal mud and sand (Essex Estuaries SAC, Benfleet and Southend Marshes Ramsar and Foulness (Mid-Essex Coast Phase 5) Ramsar), intertidal mixed sediment (Benfleet and Southend Marshes Ramsar), intertidal gravel and sand (Foulness (Mid-Essex Coast Phase 5) Ramsar) and seagrass (Benfleet and Southend Marshes Ramsar) in general, these activities may have a significant effect on the site integrity. **In-combination;** N/A Comments: In-combination effects are unlikely to occur as a result of the location of fishing activity not overlapping with dredging, shipping channels, or wind farm locations. If, in future, any project applications within the TECFO area are submitted, the in combination effects will be reviewed.
7. Have NE been consulted on LSE? If yes, what was NE's advice?	

Table 5. Test for Likely Significant Effect (TSLE) for cockle suction dredging on protected features for Margate and Long Sands SAC

1. Is the activity/activities directly connected with or necessary to the management of the site for nature conservation?	No
2. What potential pressures such as abrasion/physical loss by gear type(s) are likely to affect the interest features? (reference to conservation objectives)	Abrasion/disturbance of the surface of the seabed (D6) Changes in suspended solids (water clarity) (D3) Penetration and/or disturbance of the substratum below the surface of the seabed, including abrasion (D2) Removal of non-target species (B6) Removal of target species (B5) Smothering and siltation rate changes (light) (D5) Visual disturbance (B1)

[4] Yes or uncertain: completion of AA required. If no: LSE required only.

3. Are the qualifying features potentially exposed to the pressure(s)?	Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure. Yes - Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure. Yes - Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure. Yes - Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure. Yes - Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure. Yes – Need to consider spatial scale/intensity of activity to determine likely magnitude of pressure. No – None of the qualifying features are considered sensitive to this pressure.
4. Potential scale of pressures and mechanism of effect/ impact (if known)	Primary impact of dredge fisheries on benthic habitats is reduction in diversity and abundance of biota. This includes benthic infauna such as burrowing shrimps as well as surface dwelling erect epifauna and flora (Kaiser et al., 2006). Clarke and Tully (2014) concluded that in addition to the expected reduction in bivalve abundances, cockle suction dredging also impacted on the wider ecosystem, although these effects were mainly seasonal and spatial. Burial and smothering can occur through suspension of material in the course of dredging and settlement. Hiddink (2003) suggested that disturbance of benthic habitats through dredge activity could reduce density of non-target fauna through redistribution of fauna and sediment. Alteration of the physical structure of the seabed can lead to degradation of overall communities supporting an ecosystem within an area. Abrasion and dispersal of material from benthic habitats can occur at various levels through the use of dredge fisheries.

5. Potential effects in-combination with other plans and projects	The Margate and Long Sands SAC covers a very large area, and as such there are numerous fishing activities which occur in it (See Thanet Coast Table 2 and Margate and Long Sands Fisheries activity section for details). Drift netting occurs within the site (KEIFCA vessel sightings database). Trawling (KEIFCA/ML/09) and potting (KEIFCA/ML/10) also occur in the subtidal region and full appropriate assessments have been carried out for these activities. Additional licenced activities include; Shipping channel: Beyond the site are several major shipping channels leading to the Thames Estuary. This should not affect this subtidal feature. Thanet Offshore wind farm: Close to the site is a large windfarm which is regularly access by service vessels. There is a licence for cable repairs to be undertaken when necessary, but these emergency works will likely occur on a small spatial and temporal scale. London Array Offshore wind farm cable repair (MMO ref. MLA/2020/00579): Within the SAC is a large windfarm which is regularly access by service vessels. There is currently a consultation underway for a new licence regarding cable repairs. These emergency works will occur on a small spatial and temporal scale contained within the windfarm. Gridlink Interconnector cable (MMO ref. MLA/2020/00262): The interconnector cable is proposed for installation this year and will pass through the Margate and Long Sands SAC site. Part of the cable route (KP42.1 to KP47.7) passes through the northern part of the Pan Sand box which is part of the larger Margate and Longsand SAC. NeuConnect Interconnector cable (MMO ref. MLA/2019/00488): The interconnector cable is proposed for installation this year and will pass the full length of the northern edge of the Margate and Long Sands SAC. South East Link (SEAlink) cable is a National Grid project in which a high voltage undersea electricity link between Suffolk and Kent is planned. The cable will come from the Sizewell Area in Suffolk and move offshore, away from the northern tip of the Margate and Long Sands SAC and make landfall in the Pegwell Bay area. These projects are required to consider their effect in combination with licenced fishing activities in the region, and therefore, will have submitted and approved respective HRA's.

6. Is the potential scale or magnitude of any effect likely to be significant?5	**Alone; YES** Comments: It is possible for cockle suction dredging activities have a negative impact on sand communities, however the fishery impacts a very small and specific area, for a limited time, and is closely monitored through VMS. We address this further in the appropriate assessment. **In-combination; N/A** Comments: In-combination effects will be considered in full in the appropriate assessment.
7. Have NE been consulted on LSE? If yes, what was NE's advice?	Not yet

6. Appropriate Assessment

6.1 Location and scale of cockle suction dredging

Since 2010 Kent and Essex IFCA have implemented a documentation procedure for recording all fishing vessel sightings whilst at sea on patrol vessels. Enforcement patrols on land and from sea are targeted to monitor the cockle fishery operating under the TECFO and in the permitted fishery.

6.1.1 Additional cockle suction dredging monitoring under the TECFO

A requirement of the TECFO cockle licence is that licence holders phone a dedicated phone line, 'the TECFO cockle line' at least 2 hours before landing into port every time they are fishing for cockles and leave a message stating the date, estimated time of landing into port, port of landing and the area fished. This data is entered daily into a database to track the number of fishing trips made by each vessel and the fishing effort over defined areas inside the TECFO area. A list of vessels fishing each day/night is given to enforcement officers and used in their targeted patrols from vessels or on shore. Each port is visited at least once every week during the fishing season to coincide with the landing times of cockle dredging vessels reported by the skippers. The volume of cockles landed by each vessel is checked by enforcement officers to ensure that the limit of 13.6 m^3 of cockles per trip (see section 7 for details of the TECFO requirements) is not exceeded. At least one sea patrol per week during the cockle season is also carried out to monitor fishing activity and evaluate compliance with the reporting requirements of the cockle licence. Failure of licence holders to adhere to the reporting requirements or to the maximum catch per trip results in action taken by KEIFCA officers (e.g. written warnings, financial administrative penalties or further legal proceedings).

At the start of the cockle season all vessels are required to undergo tests of the suction dredge by KEIFCA officers to ensure that no more than 10% of the cockles passing through the riddle and returning to the sea are damaged. This is carried out at sea during normal fishing operations when KEIFCA officers board vessels and collect samples of cockles passing through the riddle to assess the extent of damage caused to undersized cockles by the suction dredge and riddle. In the event that vessels fail these tests, they have the opportunity to modify their fishing gear to reduce damage and can be re-tested by KEIFCA officers. A certificate of compliance issued by KEIFCA officers with the limit of no more than 10% damage of undersize cockles is required for vessels to continue fishing.

6.1.2 VMS monitoring under the TECFO

The MMO employs a vessel monitoring system (VMS) using GPS technology to monitor the movements of licenced fishing vessels over a certain length. Prior to 2015, only vessels 15 m or greater in length were required to use VMS however all licenced vessels of length 12 m and above have been required to have VMS since 2015. All licenced vessels in the TECFO are between 12 and 15 m in length and therefore have been required to use VMS since 2015. The requirements for VMS are that they transmit locational and vessel speed data every 2 hours. This temporal resolution is not sufficient to examine the location and time spent fishing over the SAC features, therefore the frequency of data transmission was increased at the request of KEIFCA. The increased cost associated with this increased frequency of data transmission was funded by an increase in the cost of cockle licences. Analysis of this data has shown a good correlation between the VMS track data, the information submitted by the fishermen on the TECFO cockle line, sightings of fishing vessels by the KEIFCA patrol vessel at sea and inspections made by KEIFCA officers at ports.

6.1.3 Cockle suction dredging footprint on the seabed

A fishing footprint can be calculated from VMS data for the TECFO cockle fishery. VMS points can filtered so as to range between 2 and 6 knots because this is the known fishing speed range. These points can then be converted tracks and buffered by the width of the dredge blade (76 cm – 38 cm either side of track) which is in contact with the seabed (maximum of 76 cm wide as specified in the TECFO gear regulations)[6]. High cockle densities and biomass leads to increased catch rates because fishing trips are shorter and more efficient and consequently have lower levels of impact on the seabed (Table 6).

Table 6. Impacts of cockle fleet by TECFO fishing area, 2017-2021

Year	Surface area (km^2) on seabed	Yearly biomass (tonnes)	Landed (tonnes)	Efficiency: Landings per area (tonnes/km^2)
2017	2.98	25428	3555	1193
2018	1.86	37129	6453	3469
2019	3.82	46567	7826	2049
2020	2.69	34042	7016	2608
2021	2.11	33591	6024	2855

The surface area directly impacted by the cockle dredge ranged between 1.86 to 3.82 km^2 over the last five years, which are representative a range of conditions, from poor adult cockle stock years (2017) to high adult stocks 2018-2019. VMS data is a useful measure of fishing effort, in terms of the surface seabed over which the fishery operated. The use of VMS data puts KEIFCA in the position to evaluate the spatial extent, of seabed, and specific habitats impacted by the fishery over time. VMS tracks has shown that the fishery operates over sand that is covered by seawater most of the time, for over 99.5% of the fishery's footprint. Sand dominated habitats, along with coarse sediments, are less sensitive to the pressures from cockle suction dredging compared to mixed sediment, mud, reef and biogenic reefs found in the MPAs in the district. The VMS data provides evidence that the fishery operates over the less sensitive benthic habitats and provides option to put further management measures in place to avoid impacting highly sensitive habitats should it become necessary. VMS is also an effective means to monitor fishing activity to ensure that fishers only fish in allocated areas.

6.1.5 Total Allowable Catch (TAC)

KEIFCA conducts bi-annual stock assessments of cockle populations in the main cockle harvesting areas of the TECFO (management areas 2, 3, 4, 5a, 5b and 6) in spring and autumn. Annual cockle stock assessments are conducted on other cockle beds in the TECFO in spring. The abundance, age and biomass of size fractionated cockles is determined and the data from the spring survey are used to set a total allowable catch (TAC) for the summer cockle fishery. This TAC is set at no more than 33 % of the total adult biomass and is based on previously used stock models (Cefas) that

[6] *See https://github.com/philiphaupt/fishing_impact-vms_to_footprint/ for methods used to calculate fishery footprints.

allocated a third of the stock for the fishery, a third as food supply for birds and other animals and a third to remain to restock the population. The age structure of the cockle population is also analysed to determine the health and sustainability of the stock. Autumn surveys on the main cockle harvesting beds provide information on annual recruitment into the fishery and allow measurements of winter losses due to natural causes or predation to be assessed. This method has been applied to set a TAC to the TECFO fishery for over 20 years and has resulted in a sustained population of cockles. An annual report of the cockle stock assessments is provided to all cockle licence holders, Natural England and published on the KEIFCA website in May each year (2021 cockle report, Annex 3). TACs for previous years, along with season opening dates can be seen in Table 7.

Table 7. Dates and TAC with corresponding number of permitted fishing trips for the TECFO cockle fishery from 2012 to 2021.

Year	Date of Cockle Season	Length of Fishing season (weeks)	TAC (tonnes)	Number of trips per vessel
2021	20/06/2021 – 08/10/2021	16	6160	40
2020	29/06/2020 – 02/10/2020	14	7452	48
2019	16/06/2019 – 04/10/2019	16	8088	52
2018	17/06/2018 – 28/09/2018	15	6468	42
2017	26/06/2017 – 13/10/2017	15* (13 weeks fished)	4312	28
2016	26/06/2016 – 7/10/2016	15	6160	40
2015	14/06/2015 – 16/10/2015	18* (16 weeks fished)	6622	43
2014	22/06/2014 – 26/09/2014	14	6160	40
2013	23/06/2013 – 04/10/2013	15	6160	40
2012	24/06/2012 – 05/10/2012	15	6379	42

**Fishing was stopped for 2 weeks due to low cockle biomass, cockles were left to grow before further harvesting.*

6.1.6 Fishing effort

Cockle suction dredging in the Thames Estuary is highly regulated and intensively managed with KEIFCA conducting bi-annual stock assessment surveys and setting TAC's for each year. Each vessel is permitted to land a maximum of 13.6 m^3 cockles (equivalent to approximately 11 tonnes of cockles) per fishing trip, ensuring that enforcement and monitoring of the catch levels is achievable. The volume of cockles landed by each vessel is checked several times throughout the fishing season by KEIFCA officers. Cockles are landed either in tonne bags (maximum of 12 per trip) or are loaded as loose cockles directly from the vessel's hold into lorries on the quayside. All cockle tonne bags are labelled and measured by KEIFCA officers and a 'load line' is drawn at the appropriate height on the bag which corresponds to a volume of 1.13 m^3. Similarly, KEIFCA officers also measure the dimensions of the holds on cockle boats using loose loading and draw load lines on the hold up to which the volume is 13.6 m^3. These load lines on the bags or in the holds are checked by KEIFCA officers during port inspections when cockle boats are landing to ensure that catch limits are not exceeded.

The TAC for the year is divided up equally between the number of licence holders (currently 14) and then divided by 11 tonnes (equivalent to 13.6 m^3 cockles, the total permitted catch per trip) to gain a total number of fishing trips that each vessel can make in the season. The start and end dates of the season are set by KEIFCA and in addition the distribution of fishing effort across the season is further defined by KEIFCA. This is achieved by allocating a certain number of fishing trips per week to each vessel, this is typically 2 to 4 trips per week but the pattern changes throughout the season to reduce excess pressure at the start of the season and distribute fishing effort more evenly throughout the season. Fishing is also only permitted every week throughout the season from 21:00 on Sunday evening until 12:00 on Friday. However, almost always, fishermen have completed their

allocated fishing trips by Tuesday or Wednesday every week, thus the cockle beds are usually not fished by any vessel for 4 to 5 days every week of the fishing season. Table 7 summarises the permitted TAC, number of trips and season for fishing inside the TECFO from 2012.

Fishermen are required to submit monthly catch returns to KEIFCA which detail the amount caught and from which areas for each fishing trip. These data show the distribution of fishing effort across the cockle management areas and correspond with the VMS data collected (Table 6).

6.2 Co-location of cockle suction dredging and SAC features

Cockles inhabit clean sand, muddy sand, mud and muddy gravel in the intertidal range, most commonly found from the middle to lower intertidal range (Tyler-Walters, 2007). They burrow into the sediment up to 5 cm deep. The majority of cockles in the KEIFCA district are located on the Maplin and Foulness sands in the Essex Estuaries SAC and the outer (offshore) edge of the Foulness SPA (annual KEIFCA cockle reports). The majority of cockle harvesting in the TECFO area is therefore concentrated in these areas, which correspond to the KEIFCA cockle management areas 4, 5a, 5b and 6 (Figure 1).

Benthic habitat maps provided by Natural England show the location of sub features of the SAC (Fig. 2) and show that the majority of cockle harvesting is over intertidal sand. There are also areas of intertidal mixed sediment. These areas of intertidal mixed sediment correspond with high densities of cockles and expert officer knowledge describes these areas as sand with shell (mostly dead cockle shell) and cockles.

From conducting point surveys across the entire Maplin and Foulness sands multiple times a year for several years, KEIFCA officers are extremely familiar with the intertidal benthic habitat in this area and their expert officer knowledge has observed a low number of associated species on both the near shore and the outer intertidal area. There is also no observable difference in the range, abundance or diversity of species, with the exception of cockle abundances, across the inshore, unfished area and the outer intertidal, fished area, however, full invertebrate analyses have not been conducted.

There were no sightings or VMS data from cockle suction dredgers over intertidal seagrass beds in Benfleet and Southend Marshes SPA. This habitat does not support cockles in sufficient numbers for harvesting, if any, and as such cockle dredging has never been recorded over this habitat by KEIFCA officers. Due to the lack of cockles and the shallow location of this feature it is extremely unlikely that cockle suction dredging would occur over this habitat and this will be monitored by VMS, officer sightings, fishermen reports and landings data.

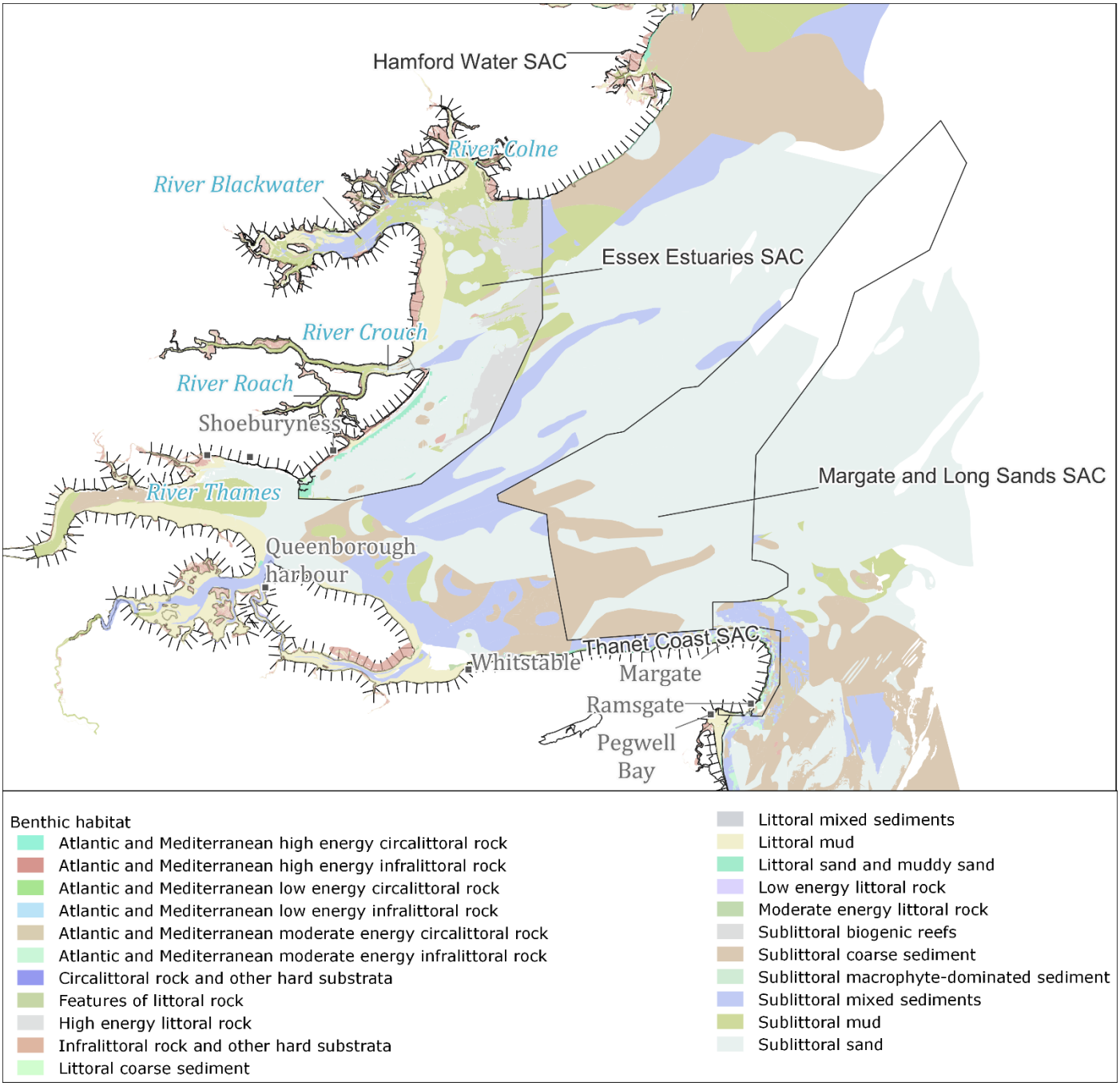


Figure 5. Benthic habitats in Essex Estuaries and Margate Long Sands SACs.

6.2.1 Feature data limitations

The feature map for Essex Estuaries SAC was updated by Natural England in January 2021 and represents the best available evidence. The map is based on benthic surveys and SAC features have then been modelled. This map provides a better degree of certainty regarding the features of the SAC than the previous data used.

6.3 Types of fishing gear – cockle suction dredges

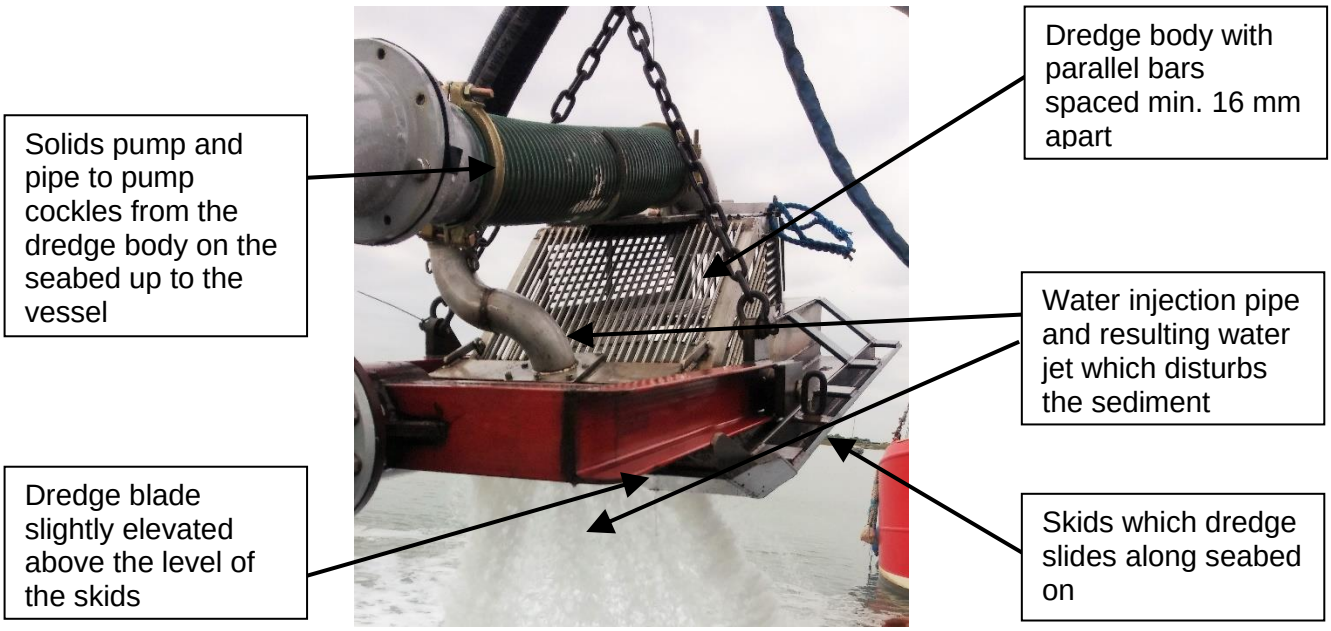
All 14 licenced cockle fishing vessels within the TECFO operate suction dredges only for the harvesting of cockles. There are restrictions on vessel length of 14m and beam of 5m.

Cockle suction dredges use a hydraulic jet to fluidise sediment immediately in front of a blade which funnels the softened sediment and contents into the dredge body. The dredge body consists of parallel metal bars that are required under the TECFO to be spaced no less than 16 mm apart for fishing on all areas inside the TECFO area, and for fishing on areas 1, 2, 3, 4 and 5a the spacing between the bars can be no greater than 16.5 mm (Figure 6a). The width of the blade which funnels the softened sediment into the dredge body must be no greater than 760 mm. During normal operation, the only part of the dredge in contact with the seabed are the skids used to slide the dredge along the ground and the dredge blade which interacts only with the fluidised sediment and is set at a higher level than the skids upon which the dredge sits to prevent it digging into the seabed (Figure 6a).

A solids pump is used to suction solids from inside the dredge body up via a pipe to a rotating mechanical riddle operating over the side of the vessel. The cockle harvesting equipment must incorporate a riddle which is at least 1750 millimetres in length and which is be designed and operated so that the retained cockles are in contact with the riddle for its full length (Figure 6b). The spacing between the riddle bars is the same requirement as for the dredge body, i.e. no less than 16 mm and no greater than 16.5 mm in areas 1, 2, 3, 4 and 5a. This reduces the catch of undersized cockles and maximises the return of sediment and any other species that would pass through the 16 mm bars to the sea.

All fishing gear used for the removal of cockles from within the TECFO area must receive a certificate of approval from KEIFCA which is valid until 31st December that year. KEIFCA officers inspect all fishing gear every year to ensure compliance with the gear regulations defined within the TECFO and described above, including testing the operation of the dredges and riddles to limit the damage to cockles returned to the sea which must be less than 10% of the retained catch.

a.



b.

Figure 6. Cockle suction dredge (a) and sorting riddle (b)

6.4 Potential impacts of cockle suction dredging

6.4.1 Physical effects

- Abrasion/disturbance of the surface of the seabed
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion
- Physical change (to another seabed type)
- Siltation

The impact of a hydraulic suction dredge on the seabed will be determined by its weight, structure (Grieve et al., 2014) and force and size of hydraulic jet contacting the seabed.

Intertidal sand, mud and mixed sediments generally feature widespread, small scale, low relief topographic features such as ripples (Kaiser et al., 2002; Grieve et al., 2014). Habitat complexity is further enhanced through bioturbation creating mounds, burrows and polychaete tubes (Nilsson and

Rosenberg, 2003; Grieve et al., 2014). Demersal towed gear has been shown to create greater topographic relief than is normally present in these habitats in the form of furrows, whilst the sediment disturbance caused both by gear penetration and turbulence resulting from its passing flattens out small-scale topography, reducing the habitat complexity (Kaiser et al., 2002; Nilsson and Rosenberg, 2003; Grieve et al., 2014). These studies have been conducted on trawls and dredges and are not specific to cockle suction dredges.

The impact of cockle suction dredges that are used in the Thames Estuary on sediment and macrofauna has been studied in the Wash, Norfolk (Sebastian 2012) on similar intertidal muddy sand habitats as targeted in Essex. Experimental sites were dredged by one of the TECFO licenced cockle vessels (FV Mary Amelia), using a cockle suction dredge of dimensions and specifications in line with the TECFO licence requirements. Sediment composition was analysed by particle size analysis (PSA) and the abundance and diversity of macrofauna was assessed immediately after (day 0), 2 weeks, 1 month and 3 months following dredging in dredged and undredged, control sites. Sediment composition, biota abundance and diversity were all more variable between replicates within dredged and undredged areas than between dredged and undredged areas and there was no significant difference in sediment composition between dredged and undredged areas.

In addition to changing the topography of the soft sediment habitat, the impact of suction dredges may cause sediment to be re-suspended and redeposited elsewhere. However, as cockle suction dredging in Essex Estuaries SAC occurs at high tide in intertidal areas, soft sediments would naturally be re-suspended by wave and tidal action during every tidal cycle and the re-suspending effects of suction dredges on top of this natural variation would probably be minimal.

6.4.2 Biological effects

- Abrasion/disturbance of the surface of the seabed
- Penetration and/or disturbance of the substrate below the surface of the seabed, including abrasion
- Siltation
- Removal of non-target species

Disturbance of the seabed by the water injection jet of the dredge can mobilise surface and upper sediment dwelling species other than cockles. These can be moved into the body of the dredge and if they don't pass through the 16 mm wide gaps in the bars, they may get pumped up to the vessel via the solids pump along with any cockles. In addition to the opportunity to reduce the by-catch of other species by having 16 mm bar spacing on the dredge body, the catch is passed immediately through the sorting riddle which allows any undersize cockles and associated species to pass through the bars and be returned to the sea in approximately the same location as they were taken from. Any associated species that are larger than 16 mm will be retained in the catch unless removed by hand by the fishermen.

Infauna such as Baltic tellins (*Macoma baltica*) and white furrow shells (*Abra alba*) are considered to be relatively resistant to certain fishing activities as their environmental position confers protection (Roberts et al., 2010; Tilin et al., 2010). However, emergent organisms, especially those with erect body forms are more likely to be susceptible to damage or removal through contact with towed demersal gear, such as a cockle suction dredge (Roberts et al., 2010; Tilin et al., 2010). Cockle suction dredging on soft intertidal substrates is likely to have several effects on benthic organisms, including direct impact/removal, uprooting and smothering by re-suspended sediment. Previous research has shown an increase in mortality of infauna due to cockle suction dredging with up to a 30% decrease in species numbers and a 50% decrease in abundance compared to undredged areas (Hall and Harding, 1998). In the Wadden Sea, cockle suction dredging had a negative impact

on the abundance of 4 non-target species; shrimp (*Crangon crangon*), polychaetes (*Heteromastus filiformis*), blue mussel (*Mytilus edulis*) and razor clam (*Ensis americanus*). All other 16 non-target species were not significantly impacted by cockle suction dredging apart from the bivalve *Tellina tenuis* which increased in abundance in response to cockle suction dredging (Kraan et al, 2007). Another study in Ireland showed that the only significant impact of hydraulic cockle suction dredging on non-target fauna was a short-lived impact on the tellin bivalve *Angulus tenuis* (Clarke and Tully, 2014).

An impact study of cockle suction dredges on muddy sediments and biodiversity of infauna in the Wash, Norfolk (Sebastian 2012) showed a significantly lower species diversity in dredged areas compared to undredged areas after 2 weeks, however this was an isolated result and was not found immediately following the dredging on day 0 or in subsequent sampling points. As was found for the sediment composition, the variance between replicates in each area was greater than any difference between the dredged and undredged areas. Given the inconsistency in these results and the lack of a clear difference between dredged and undredged areas immediately following dredging, it can be concluded that cockle suction dredging did not have a significant impact on the sediment composition or associated macrofauna and that natural variability and the patchy distribution of organisms was responsible for the differences observed at the 2-week time point.

6.4.3 Resistance/Tolerance

Soft sediments, especially muddy sands have been found to be particularly intolerant to fishing impacts from towed demersal fishing gear such as trawling or dredging (Kaiser et al., 2006). The primary impact of cockle suction dredges is via the water injection jet and the skids sliding on the seabed, this is in contrast to trawling or dredging using a box dredge where physical parts of the fishing gear, e.g. otter trawl doors, nets, tickler chains or dredge blades cause abrasion to the surface or penetrate the seabed. Although there will be some abrasion from the action of the skids sliding over the seabed, the penetration of the water jet into the surface of the seabed is likely to be less damaging to the sediment composition or biota than traditional dredge blades or trawling gear and the impact has been assumed to be small (Bell and Walker, 2005).

6.4.4 Resilience/Recovery

The ability of the biota to regenerate or recolonize after damage by static fishing gear is dependent on the organism's life cycles, regenerative abilities and mobility. Long lived species will recover more slowly, as will sessile species which may rely on spawning events to recolonize areas which have been impacted (Roberts et al., 2010). The ability of colonial organisms such as sponges to regenerate means they are likely to recover from damage more quickly (Roberts and Cairns, 2014).

Decreases in the abundance and species number of associated fauna in cockle beds have been shown to persist for less than 2 months with research showing recovery to undredged levels within 56 days (Hall and Harding, 1998).

6.4.5 Sensitivity

Tilin et al. (2010) created a matrix of the sensitivity of different habitats to pressures that can be linked to human activities in the marine environment. For cockle suction dredging the most applicable impacts are from abrasion or penetration of the seabed, removal of non-target species and siltation. The dredge skids and water injection jet are the main parts of the dredge that are in contact with the seabed. The dredge skids could cause abrasion to the seabed surface but are unlikely to penetrate. The water injection jet disturbs the seabed and will penetrate into the surface

of the seabed but it is unlikely to penetrate more than 25 cm and previous reports have stated a 5 cm penetration depth for cockle suction dredges (Bell and Walker, 2005). Tilin et al (2010) reported a low sensitivity of intertidal sand and muddy sediments to surface damage and penetration of the seabed up to 25 cm (Table 7). The sensitivity of intertidal mixed sediment to penetration of the seabed is medium to high but with low confidence. The small areas of intertidal mixed sediment on the Maplin and Foulness sands as shown on the modelled feature maps provided by NE are sand and muddy sand dominated by cockles and dead shell in the surface 5 cm (KEIFCA unpublished data).

There is a high sensitivity of intertidal sand and muddy sand to physical change of the seabed and a medium sensitivity of intertidal mixed sediment however, as any sediment disturbed by the water jet of the cockle suction dredge is returned to the same location by passing through the dredge body or sorting riddle, it is unlikely that the seabed type would be altered.

There is low confidence in the sensitivity estimations for both features to the removal of non-target species, ranging from not sensitive to medium sensitivity. Previous research in the Wadden Sea (Kraan et al, 2007) and Ireland (Clarke and Tully, 2014) have revealed that the majority of cockle bed associated infauna species are not affected by cockle suction dredging.

Table 8. Sensitivity of Essex Estuary SAC features to pressures as identified by Tilin et al. (2010). Confidence in sensitivity assessments is included in brackets.

	Sensitivity of feature to						
Feature	**Penetration/ damage of the seabed >25 mm**	**Penetration/ surface abrasion of the seabed ≤25 mm**	**Damage of seabed surface features**	**Physical change to another seabed type**	**Removal of non-target species**	**Siltation rate changes (low). 5 cm of fine material added to the seabed in a single event**	**Siltation rate changes (high). 30 cm of fine material added to the seabed in a single event**
Intertidal sand and muddy sand	Medium (Low)	Low (High)	Low (High)	High (Low)	Not Sensitive - Medium (Low)	High (Low)	High (Low)
Intertidal mixed sediment	Medium - High (Low)	Medium - High (Low)	Medium (Low)	Medium (Low)	Medium (Low)	Medium (Low)	High (Low)

Table 9. Sensitivity of Margate Long Sands SAC features to pressures as identified by MarESA (2020). Confidence in sensitivity assessments is included in brackets.

	Sensitivity of feature to						
Feature	**Penetration/ damage of the seabed >25 mm**	**Penetration/ surface abrasion of the seabed ≤25 mm**	**Damage of seabed surface features**	**Physical change to another seabed type**	**Removal of non-target species**	**Siltation rate changes (low). 5 cm of fine material added to the seabed in a single event**	**Siltation rate changes (high). 30 cm of fine material added to the seabed in a single event**

Subtidal coarse sediment	Not sensitive (High)	Not sensitive (High)	Low (High)	High (Low)	Not Sensitive (Low)	Not sensitive (High)	High (Low)
Sublittoral sand	Low (High)	Medium (Low)	High (High)	High (High)	Low (High)	Low (High)	Medium (High)

7. Mitigation - Existing management measures

The TECFO (annex 4) defines spatial, temporal and effort restrictions on cockle harvesting in the Thames Estuary along with gear restrictions and vessel size limitations to reduce the impact to EMS features. A summary of the regulations in place and enforcement and monitoring practices followed by KEIFCA to mitigate any negative impacts of cockle suction dredging on EMS feature is shown below.

- Vessel size limit of 14 m in length and 5 m width (beam)
- Limit of 14 vessels in the fishery – licences issued annually
- A total allowable catch (TAC) set at no more than 33 % of the total biomass over 16 mm as determined by bi-annual stock assessment surveys
- Limit of 13.6 m^3 of cockles to be landed per fishing trip which can be reduced by KEIFCA to 6 m^3
- Restriction on fishing season length and number of fishing trips per week to reduce intensity, dependent on TAC set but no more than 4 fishing trips per week, average of 2-3 trips per vessel per week
- Cockle harvesting areas are not fished for at least 7 months every year
- No cockle fishing is permitted from 12:00 on Friday to 09:00 on Monday every week during the cockle harvesting season
- Minimum of 16 mm bar spacing in the dredge body and sorting riddle
- Maximum width of dredge blade of 76 cm
- Minimum length of sorting riddle of 1.75 m
- Requirement that not more than 10 % of undersize cockles returned to the sea are damaged – checked by KEIFCA officers at the start of every cockle harvesting season
- All fishing gear checked at the start of each cockle harvesting season by KEIFCA officers and a compliance certificate issued by KEIFCA is required
- Minimum harvesting rate of 1 tonne cockles per hour. If the harvesting rate falls below this, the cockle management area will be closed due to low density
- Requirement of fishermen to give 2 hours' notice prior to landing following every cockle harvesting trip
- Enhanced monitoring using VMS
- Targeted shore and sea patrols to check for compliance
- Detailed catch return logs required to be submitted by all licence holders

8. Conclusion[7]

A total allowable catch set at no more than 33 % of the adult biomass, a minimum landing size of 16 mm width and monitoring to ensure that less than 10% of undersized cockles returned to the sea are damaged, ensures sufficient numbers of adult cockles and all smaller cockles remain and are

[7] If conclusion of adverse affect alone an in-combination assessment is not required.

available as a food supply for birds and other animals. A limit to the length of the cockle harvesting season and its occurrence around high tides in the summer months also limits disturbance to wintering bird populations and feeding birds that use the area at low tide as detailed in the tests of LSE for the SPAs. Cockle suction dredging has been shown not to occur over seagrass habitats in Benfleet and Southend Marshes SPA. Intertidal sand, muddy sands, mixed sediment and gravel habitats in Essex Estuaries SAC and Mid-Essex Coast SPA are exposed to the pressure of cockle suction dredging but effort limitation (TAC, temporal restrictions and minimum size), gear restrictions (dredge width, riddle and dredge bar spacing and riddle length), along with extensive monitoring (VMS, targeted sea and shore patrols, cockle line reporting and catch return forms) and enforcement (targeted patrols and analysis of monitoring data) reduce, control and actively monitor the pressure exerted by cockle suction dredging on EMS features.

It can be concluded that cockle suction dredging, alone or in combination, could have a significant effect on the intertidal sand, mud, muddy sand or mixed sediment features of Essex Estuaries SAC and bird features of Benfleet and Southend Marshes SPA, Thames Estuary and Marshes SPA, Foulness SPA and Outer Thames SPA if it was not managed. However, the extensive management, monitoring and enforcement of the Thames Estuary cockle fishery under the TECFO, as described here, mitigate potential significant effects to the features of the SAC and SPAs ensuring that no adverse effect to EMS features occurs from the TECFO cockle fishery and this fishery will not affect site or feature integrity. This conclusion has been drawn using expert knowledge and best available evidence.

This HRA is to stand for 3 years, covering the remaining period while the TECFO regulation Order is still valid, from May 2022 to Dec 2024. Natural England will be consulted annually and the opening of the TECFO cockle fishery prior to the start of the cockle harvesting season and any changes to the fishery from what is covered in the HRA will be discussed, and a new HRA prepared should it be necessary.

10. Integrity test

The mean surface area impacted by the cockle dredge blades of all 14 vessels is 3 km^2 per year in the TECFO area which covers approximately 1144 km^2. This represents significantly less than 1% of the total TECFO area (based on VMS data from the whole fleet over the course of the season).

Areas 3, 4, 5a, 5b and 6 fall within the Essex Estuaries SAC. This area covers 195 km^2 and is predominantly intertidal mudflats and sandflats. VMS data from these areas indicates an impact of 2 km^2., i.e. less 1% of the SAC. The VMS data shows that the impact is largely on sublittoral sand as opposed to intertidal mud. Fishing activity in the Margate in Long Sands SAC will be restricted to less than 0.5% of the SAC around a specific sandbank, for very limited number of fishing trips, if the area has sufficient stocks. As this habitat has sufficient time to recover in the 7 months annually that the cockle fishery is closed, there is likely to be no long-term adverse effect to the EMS features and no negative impact on site integrity.

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Annex 2: Natural England Conservation Advice

Essex Estuaries European marine site. English Nature's advice given under Regulation 33(2) of the Conservation (Natural Habitats &c.) Regulations 1994, 2000. Accessed from; http://publications.naturalengland.org.uk/publication/3030183?category=3212324

European Site Conservation Objectives for Essex Estuaries SAC (UK0013690), 2014. Accessed from; http://publications.naturalengland.org.uk/publication/4781199427895296

See Natural England's conservation advice packages on the NE Designated Site System https://designatedsites.naturalengland.org.uk/

Annex 3: KEIFCA Thames Estuary Cockle Survey Report 2021

Appended as a PDF document

Annex 4: Thames Estuary Cockle Fishery Order

KENT AND ESSEX INSHORE FISHERIES AND CONSERVATION AUTHORITY

THE THAMES ESTUARY COCKLE FISHERY ORDER 1994 REGULATIONS

MAY 2012

The local fisheries Authority for the Kent and Essex Inshore Fisheries and Conservation District in exercise of the powers conferred on them by Article 3 of the Thames Estuary Cockle Fishery Order 1994 under the Sea Fisheries (Shellfish) Act 1967, as amended, hereby makes the following regulations:-

REGULATION No. 1 - CONSTRUCTION OF INSTRUMENTS AND FISHING GEAR

No person shall, without the written consent of the Authority, operate any instrument or fishing gear for the purpose of taking, riddling, sorting or grading cockles unless all surfaces acting to retain the catch be constructed of parallel bars with an average space between bars of no less than 16 millimetres.

This requirement shall not apply to pipes used to convey water or catch between the seabed and any fishing vessel.

The Authority may give written consent for the use of instruments or fishing gear, otherwise prohibited by this Regulation, to all licence holders for a specified area and for a specified period of time for specific purposes including the thinning of overpopulated stock, removal and thinning of cockles which have not shown good growth or for the purposes of relaying. Consent will only be given where the Authority is satisfied that the quality of a bed would be enhanced by the removal of cockles.

When operating within Harvesting Areas 1, 2, 3, 4 & 5a *described in Part I of the Schedule and shown for illustrative purposes only on the map in Part II of the Schedule,* no person shall operate equipment used for the purpose of riddling, sorting or grading cockles unless all surfaces acting to retain the catch be constructed of parallel bars with an average space between bars of no less than 16 millimetres and no more than 16.5 millimetres.

REGULATION No. 2 - PROHIBITION ON THE REMOVAL OF SMALL COCKLES

No person shall, without the written consent of the Authority, remove from the regulated fishery cockles of which more than 10% by weight, of a representative sample, will pass through a space 16 millimetres in width. A representative sample will consist of no less than 200 kilograms of cockles. Small cockles rejected as a result of the requirements of this Regulation shall be returned immediately to the sea.

The Authority will give written consent for a specified area and specified period of time to all licence holders to permit the removal of cockles otherwise prohibited by this regulation, when

written consent has been given by the Authority under the regulation relating to the Construction of Instruments and Fishing Gear.

REGULATION No. 3 - LIMITATION ON THE MAXIMUM QUANTITY OF COCKLES THAT MAY BE REMOVED FROM THE FISHERY

Except as permitted by the written authority of the Kent and Essex Inshore Fisheries and Conservation Authority no licence holder shall, within any fishing trip carry on board or land more than 13.6 cubic metres of cockles taken from the area of the Thames Estuary Cockle Fishery Order.

Any such written authority shall permit all licence holders to take specified quantities of cockles greater than 13.6 cubic metres during specified periods, subject to annual Total Allowable Catch limits. Such written authority shall be granted only where cockle stocks are sufficiently plentiful to permit increased quantities of cockles to be taken during the periods so specified.

For the purpose of this regulation:

(a) 13.6 cubic metres of cockles is deemed equivalent to 500 baskets, at 6 gallons of cockles per basket.

(b) When calculating the quantity of cockles removed no allowance shall be made in respect of the quantity of any dead shell, sand, other species or debris mixed with the catch

REGULATION No. 4 - REGULATON OF FISHING OPERATIONS

Persons taking cockles from within the area of the Thames Estuary Cockle Fishery Order 1994 must land their catch before commencing fishing during another specified fishing period.

No cockles shall be carried on board a fishing vessel at the time of commencement of fishing for cockles within the area of the Thames Estuary Cockle Fishery Order 1994.

Except as permitted by the written authority of the Kent and Essex Inshore Fisheries and Conservation Authority when a vessel is engaged in, or has during a specified fishing period been engaged in, dredging, fishing or taking cockles within the area of the Thames Estuary Cockle Fishery Order 1994 all cockles carried on board or landed shall be considered to have been taken from within the area of the Thames Estuary Cockle Fishery Order 1994.

Such written authority shall only be given if :-

(a) A licence holder has applied in writing for such authority, specifying where and when they shall be fishing during the specified fishing period to which the application relates; and
(b) the Kent and Essex Inshore Fisheries and Conservation Authority is satisfied that the total quantities of cockles to be taken from the Regulated Fishery, by that licence holder, during the relevant specified fishing period will not exceed the quantities permitted for that licence holder for that period.

For the purpose of this regulation a "specified fishing period" is one of the permitted fishing periods specified in license conditions made under Section 4 (6) of the Thames Estuary Cockle Fishery Order 1994.

REGULATION No. 5 - REPORTING OF COCKLE LANDINGS

Persons landing cockles taken from within the area of the Thames Estuary Cockle Fishery Order 1994 must give at least 2 hours notice of landing.

Notice of landing shall be given either directly to an appointed officer of the Kent and Essex Inshore Fisheries and Conservation Authority or by leaving a message on an appointed telephone line.

Details of the appointed officer, or officers, of the Kent and Essex Inshore Fisheries and Conservation Authority and telephone line on which messages should be left will be given to each licence holder.

REGULATION No. 6 - CARRIAGE OF COCKLES

No person shall carry on board or remove cockles from the Thames Estuary Cockle Fishery Order 1994 unless they are loaded into bags or containers that have a capacity of 1.13 cubic metres.

All such bags or containers shall be clearly marked with a load line if capacity is not level with the top of the side surfaces.

The capacity of all such bags or containers shall have been checked by an officer of the Authority and shall be marked to show that this check has taken place.

As an alternative to the above requirements it shall be permitted for a licence holder to carry cockles loose in the hold of their vessel provided that a hold load line has been calculated by a Maritime and Coastguard Agency authorised organisation appointed vessel surveyor to show the level to which the hold may be filled to contain 13.6 cubic metres of cockles or other quantity that may be specified under Regulation No. 3. Documentation of these calculations shall be submitted to the Authority and a clear mark shall be placed on all four sides of the hold showing this calculated load line.

In addition the hold capacity at the load line must be cross-checked by means of transferring a loaded catch of cockles into a straight-sided container in the presence of an officer of the Authority who will measure the volume of the container. The volume of cockles loaded into the container will be calculated by the Authority officer and any error in the position of the load line marking on the vessel hold will be adjusted to arrive at an approved loadline. As the cockles loaded into the straight-sided container will not have settled as they would have done in the hold of the vessel an additional allowance of 0.4 cubic metres will be added. Making a total container volume of 14.00 cubic metres. Once the position of the hold load line has been approved it shall be permanently marked by fixing a straight shelf or ledge along two parallel sides of the hold by means of welding or other permanent means. In addition a straight edged rod of a length equal to the distance between the two parallel sides of the hold shall be kept on each vessel for the purpose of laying from one ledge to the other to ensure that the catch is loaded level and not above the permitted load line.

In addition, the full permitted catch of vessels loading into approved bags shall be cross-checked in a similar manner.

In normal circumstances these cross checks will be carried out no more than once per year or when hold/bag dimensions are changed.

To enable checks for compliance with these Regulations cockles carried loose in a vessel hold shall be stowed level.

For the purpose of Regulations made under this Order the quantity of cockles taken from the fishery shall be that quantity of cockles contained within a volume as specified under Regulation No. 3.

REGULATION No. 7 - LIMITATION ON THE MAXIMUM NUMBER OF LANDINGS PER SPECIFIED FISHING PERIOD

No person shall make more than a specified number of landings of cockles removed from the Thames Estuary Cockle Fishery Order 1994, during any one specified fishing period.

A list specifying the maximum number of landings that licence holders may make per specified fishing period will be provided to each licence holder.

For the purpose of this regulation a "specified fishing period" is one of the permitted fishing periods specified in license conditions made under Section 4 (6) of the Thames Estuary Cockle Fishery Order 1994.

REGULATION No. 8 - APPROVAL OF FISHING GEAR

No person shall operate any instrument or fishing gear for the purpose of taking cockles from within the area of the Thames Estuary Cockle Fishery Order 1994 unless a certificate of approval for the instrument or fishing gear has been issued by the Authority. A certificate of approval shall be available to all applicants who fulfil the conditions set out below.

A certificate of approval will not be granted if the instrument or fishing gear, when operating at its normal speed over the ground, results in more than 10% of cockles, measured by weight, being visibly damaged. Damage rate will be assessed by taking a representative sample of cockles taken by the dredging operation. This will include cockles that are being retained and also cockles rejected by the riddle.
For the purpose of this regulation cockles will be considered to be visibly damaged when on examination it is seen that there are visible cracks, chips or there is other damage to the shell.

All rakes used by hand to take cockles are exempt from this regulation.

The certificate of approval will be valid until the following 31st December.

Approval will take account of the performance and assessment during inspections of the instrument of fishing gear whilst in operation, during the preceding 12 months.

New instruments or fishing gear may be given a provisional certificate of approval for a period of one month in order to permit assessment.