

Title: Marine Protected Areas Byelaw 2018	Impact Assessment (IA)
IA No: DRAFT_EIFCA006	Date: 30/10/2018
Lead department or agency: Eastern Inshore Fisheries and Conservation Authority	Stage: Development/Options
Other departments or agencies:	Source of intervention: Domestic
	Type of measure: Other
	Contact for enquiries: Julian Gregory (CEO) Eastern IFCA, 6 North Lynn Business Village, Bergen Way, King's Lynn, Norfolk, PE30 2JG; tel:01553 775321, email: mail@eastern-ifca.gov.uk
Summary: Intervention and Options	RPC Opinion: Not Applicable

Cost of Preferred (or more likely) Option				
Total Net Present Value	Business Net Present Value	Net cost to business per year (EANDCB in 2014 prices)	One-In, Three-Out	Business Impact Target Status
£-637,985	£-576,215	£60,012.	Not applicable	To be determined
What is the problem under consideration? Why is government intervention necessary?				
Shrimp fishing within the Wash and North Norfolk Coast Special Area of Conservation (SAC) has been assessed and adverse impacts on site integrity cannot be ruled out. Spatial closures are proposed through the Marine Protected Areas Byelaw 2018 which mitigate the risk to the most sensitive sub-features (sub-tidal mixed sediment and subtidal mud).				
Why is government intervention necessary? The risk to Marine Protected Areas (MPAs) dictates that a regulatory approach is required in relation to the protection of designated habitats.				
What are the policy objectives and the intended effects?				
Objectives: To manage long-term, sustainable shrimp fisheries within the Eastern IFC District which do not adversely impact the conservation objectives of marine protected areas by prohibiting the use of any bottom towed gear (including in relation to fishing for species other than shrimp) over habitats which have been assessed as being vulnerable to this fishery. Intended effects: Prevent degradation and /or improve the condition of habitats vulnerable to bottom towed gear within the Wash and North Norfolk Coast SAC.				

What policy options have been considered, including any alternatives to regulation? Please justify preferred option (further details in Evidence Base)				
Option 0. Do nothing.				
Option 1. Discrete spatial closures through the Marine Protected Areas Byelaw 2018				
Option 2. Total closure				
The preferred option is option 1 – The proposed byelaw will ensure that fishing activity will not impact negatively on the conservation objectives of the Wash and North Norfolk Coast SAC.				
Will the policy be reviewed? It will be reviewed. If applicable, set review date: 07/2024				
Does implementation go beyond minimum EU requirements?			No	
Are any of these organisations in scope?			Micro Yes	Small Yes
			Medium Yes	Large Yes
What is the CO ₂ equivalent change in greenhouse gas emissions? (Million tonnes CO ₂ equivalent)			Traded: N/A	
			Non-traded: N/A	

I have read the Impact Assessment and I am satisfied that, given the available evidence, it represents a reasonable view of the likely costs, benefits and impact of the leading options.

Signed by the responsible Chief Executive:

Date:

Summary: Analysis & Evidence

Policy Option 1

Description:

FULL ECONOMIC ASSESSMENT

Price Base Year 2018	PV Base Year 2016	Time Period Years: 10	Net Benefit (Present Value (PV)) (£)		
			Low: £-207,299	High: £-4,406,447	Best Estimate: £-637,985

COSTS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Cost (Present Value)
Low	0.0	£24,083	£207,299
High	0.0	£511,920	£4,406,447
Best Estimate	0.0	£74,118	£637,985

Description and scale of key monetised costs by 'main affected groups'

Key monetised costs relate to the loss of fishing grounds to shrimp fishers as a result of spatial closures. The scale of the impact based on the best estimate is likely to be low to moderate in relation to the brown shrimp fishery. The actual scale of impact is likely to vary annually given the spatial variability of the shrimp fishery within the site and the potential for important fishing grounds to co-occur with proposed spatial closures. The best estimate is likely to be an over-estimate given that fishers can make up losses by fishing in different areas.

Other key non-monetised costs by 'main affected groups'

The closures are thought to effectively rule out any future pink shrimp fishery. There is only a limited pink shrimp fishery at present (as reflected in the monetised costs) although it had historically been worth significantly more. No data is available to accurately monetise this impact.

BENEFITS (£m)	Total Transition (Constant Price) Years	Average Annual (excl. Transition) (Constant Price)	Total Benefit (Present Value)
Low	Unknown	Unknown	Unknown
High	Unknown	Unknown	Unknown
Best Estimate	n/a	n/a	n/a

Description and scale of key monetised benefits by 'main affected groups'

none identified

Other key non-monetised benefits by 'main affected groups'

Protection of the habitats identified as being at risk from shrimp fishing activity will have a positive effect on the overall ecological functioning of the MPA and potentially improve fishery productivity, including in relation to species other than shrimps.

Key assumptions/sensitivities/risks	Discount rate	3.5%
Assumptions: Fishing grounds identified through Eastern IFCA catch returns data are accurate. Sensitivities / risks: Spatial closures cause displacement into other less sensitive areas with the effect of impacting site integrity (unlikely), shrimp population dynamics result in future important shrimp fisheries occur within closed areas with an increased economic impact on the industry.		

BUSINESS ASSESSMENT (Option 1)

Direct impact on business (Equivalent Annual Costs): £60,012	Benefits: 0.0	Net: -£60,012	Score for Business Impact Target (qualifying provisions only) £m:
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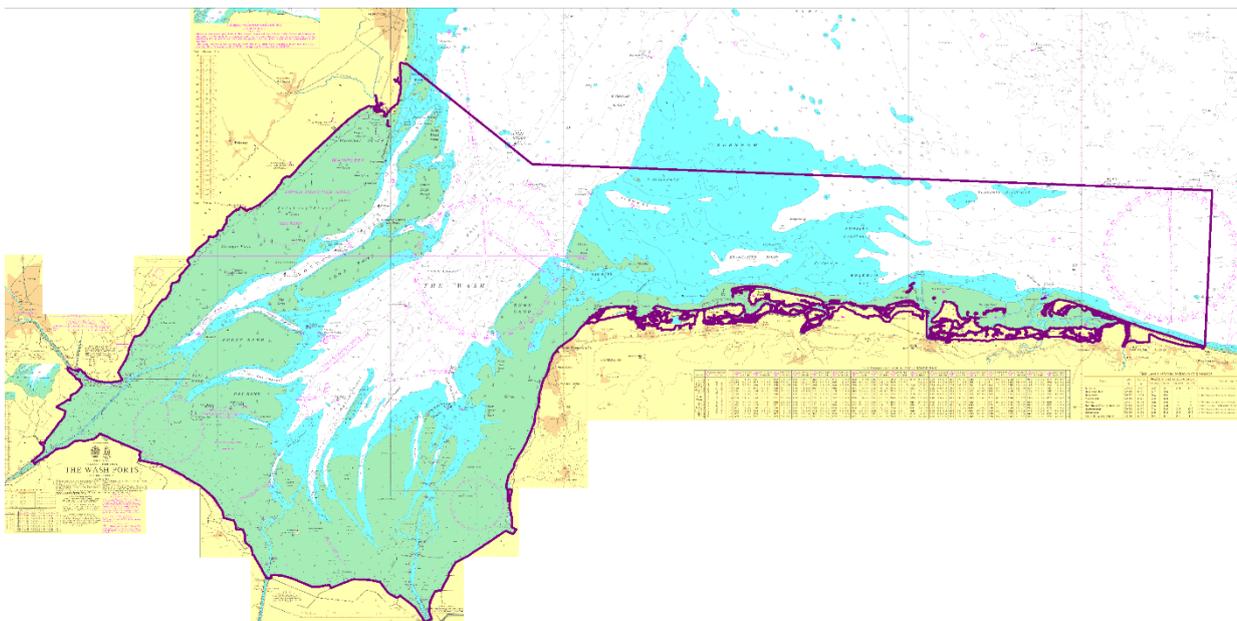
Evidence Base

Problem under consideration

Defra’s revised approach to managing fishing activity in European Marine Sites requires Eastern IFCA to ensure that fishing activity does not have an adverse effect on site integrity in marine protected areas (MPA) which occur within the IFC District. This requirement derives from Article 6 of the Habitats directive and the Conservation of Habitats and Species Regulations (as amended) 2017 (SI 2017/1012). Furthermore, Eastern Inshore Fisheries and Conservation Authority (IFCA) is required under the Marine and Coastal Access Act 2009 to further the conservation objectives of any marine conservation zones within the Eastern IFC District.

Eastern IFCA also has a duty to take action to ensure the sustainable exploitation of fisheries within its district as per section 153 of the Marine and Coastal Access Act 2009. In carrying out its duties Eastern IFCA is obliged to ensure good environmental status of fish and shellfish stocks as per the Marine Strategy Framework Directive (2008/56/EC) namely; sustainable fisheries with high long-term yields, stocks functioning at full reproductive capacity, and to maintain or increase the proportion of older and larger individuals.

The prolific shrimp fishery within the Eastern IFC District co-occurs primarily with the Wash and North Norfolk Coast Special Area of Conservation (SAC) – see fig 1. The fishery was assessed in accordance with s.63 of the Habitats and Species Regulations (as amended) 2017 and it was concluded that management measures are required to prevent an adverse effect on site



Eastern IFCA/MMO Shrimp Workshop – 10 July 2015

Legend

The Wash and North Norfolk Coast Special Area of Conservation (SAC)

Image ref: T:\S_Image_library\L_Maps_[finished]2015_07_02_W&NCC_SAC.Workspace ref: T:\S_GIS_Library\2015_07_02_W&NCC_SAC

Drawn by: SC
Date drawn: 02/07/15
Boundary data source: JNCC

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Not to be used for Navigation

Figure 1. Chart showing the boundary of the Wash and North Norfolk Coast Special Area of Conservation.

integrity.

The Wash and North Norfolk brown shrimp fishery is the most important in the UK, accounting for approximately 90% of UK landings (ICES, 2010). The annual first sale value of this fishery has ranged from £538,234 to £2,668,685 with an average value of £1,662,408 (Marine Management Organisation landings data release 23/08/2018). Between 29 and 54 different vessels have operated in the fishery annually from 2010 to 2017 with a total of 82 different vessels having operated over the same time period.

This is a year-round fishery but effort and landings typically peak from September to November (Innes et al., 2007; ICES, 2015). In the past, the fishery has been a significant employer in the ports of Boston and King's Lynn (Innes et al., 2007). Beam trawling for shrimp is one of the main fishing activities occurring within The Wash and North Norfolk Coast SAC. Aviat et al. (2011) reported that approximately 500 vessels and 1,000 fishers are involved in the North Sea brown shrimp fishery (i.e. across the whole of the North Sea brown shrimp fishing area, of which The Wash is a small part). Currently, approximately 37,000 tonnes of shrimp are fished per annum by Dutch (53%), German (33%), Danish (8%), UK (2%), Belgian (2%) and French (1%), including the Eastern English Channel vessels (Seafish, 2017). Reflecting on these percentages, The Wash and North Norfolk Coast brown shrimp fishery is of huge importance on a local level, however, it is not nearly as extensive or intensive as the continental fishery.

Traditionally, two species were targeted in The Wash and North Norfolk Coast area by this activity; brown shrimp (*Crangon* spp.) and pink shrimp (*Pandalus montagui*), with the pink shrimp fishery being the more important fishery for more than 150 years (MES, 2012). Currently there is no fishing for pink shrimp due to market conditions, competing potting activity and restrictions on towed demersal gear in the available grounds. The pink shrimp fishery used to operate in deeper waters of The Wash and its approaches, and is often associated with biogenic reef created by *Sabellaria spinulosa* colonies.

Other species are also thought to be caught from this area using bottom-towed gear although activity is thought to be small compared to the brown shrimp fishery. Notable species include sole, cod and whiting.

Towed demersal fishing activities on features: subtidal biogenic reef: *Sabellaria* spp., subtidal stony reef and intertidal seagrass beds within the MPA are classified as red-risk interactions and required management measures to prevent fishing activities from having harmful effects on the environment. To address this, the Eastern Inshore Fisheries and Conservation Authority (Eastern IFCA) created the Protected Area Byelaw (now the Marine Protected Areas Byelaw 2016), to prohibit certain fishing activities across ten areas to prevent the above red-risk activity-feature interactions occurring in the district.

An additional 'red-risk' feature interaction has been identified in the form of use of bottom-towed-gear over mussel beds. Mussel beds are considered a 'biogenic reef' (as is the case for *Sabellaria* reef) and therefore require protective closures.

Towed demersal fishing activities on all other (none-red risk) features within the Wash and North Norfolk SAC were assessed as amber and green risk activity-feature interactions in the shrimp fishery Habitats Regulations Assessment for the Wash and North Norfolk Coast SAC¹. This identified a requirement to introduce management measures (mitigation) to reduce the impacts of this fishery on sub-tidal mud and mixed sediments. Mitigation is required because the assessment concluded that "adverse effect on site integrity" could not be ruled out. This was a precautionary conclusion based on the lack of direct evidence that impacts were not occurring – although many

¹ Full HRA can be found here: <http://www.eastern-ifca.gov.uk/habitats-regulations-assessment-impacts-shrimp-fishery-wash-north-norfolk-coast-special-area-conservation/>

parts of the assessment suggested that impacts were unlikely to occur, particularly on the less sensitive features of the site. The precautionary stance is required by the Habitats Regulations.

Eastern IFCA has identified that two types of subtidal mixed sediments occur within the site, one being more vulnerable than the other, based on the type of sediment and associated species present. This is evidenced in grab sample and video survey data gathered by Eastern IFCA in 2016 and 2017 (Hornbrey 2018). Closures will be focused on the more vulnerable type of subtidal mixed sediment.

Vulnerable mixed sediment is defined as angular gravel with sand and mud, supporting various epifauna and occurring in water deeper than ten metres below chart datum. The other common type of mixed sediment within The Wash is mud or sandy mud with gravel rounded by constant movement, sometimes including a layer of broken shell on the surface and supporting very little if any epifauna.

It is judged that the spatial closures provide sufficient mitigation to ensure no adverse effect on site integrity from shrimp beam trawl fishery interactions, and those related to the wider use of bottom-towed-gear, with subtidal mixed sediment and subtidal mud. Furthermore, the closures will provide protection to key sensitive species highlighted in the assessment where they occur within these two sub-feature habitats.

It is judged that spatial closures are not required for the remaining features, nor the remaining parts of the subtidal mixed sediment and subtidal mud sub-features of the site, but that technical restrictions and overall effort limitations are required to limit impacts in the remainder of the site and ensure adverse effects on site integrity can be ruled out. A summary of the outputs of the HRA are set out in Table 1 (below).

Table 1: Summary of mitigation for Wash & North Norfolk Coast, its sub-features or sensitive species where impacts could not be ruled out.

Sub-feature	Mitigation	Mechanism
Harbour seal	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
A2.1 Intertidal coarse sediment	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
A2.2 Intertidal sand	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
A2.3 Intertidal mud	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
A5.1 Subtidal coarse sediment	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
A5.2 Subtidal sand	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
A5.3 Subtidal mud	Spatial closures (part) Gear restriction; effort limitation	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
A5.4 Subtidal mixed sediment	Spatial closures (part) Gear restriction; effort limitation	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw

Sub-feature	Mitigation	Mechanism
A5.6 Subtidal biogenic reef	Spatial closures (update of 2014 closures)	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
W&NNC SAC	Spatial closures (part); Gear restriction; effort limitation	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
<i>Abra alba</i> (App 8c)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
	Spatial closures (part)	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
<i>Bathyporeia elegans</i> (App 8d)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
<i>Flustra foliacea</i> (App 8e)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
<i>Hydrallmania falcata</i> (App 8f)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
<i>Lanice conchilega</i> (App 8g)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
	Spatial closures (part)	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
<i>Mediomastus fragilis</i> (App 8h)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
	Spatial closures (part)	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
<i>Mytilidea</i> (App 8i)	Spatial closures (part)	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw
<i>Ophiuroidea</i> (App 8j)	Gear restriction; effort limitation	EIFCA Shrimp permitting byelaw
	Spatial closures (part)	EIFCA Marine Protected Areas byelaw EIFCA Shrimp permitting byelaw

Rationale for intervention

IFCAs have a duty to ensure that fish stocks are exploited in a sustainable manner, and that any impacts from that exploitation on designated features in the marine environment are reduced or suitably mitigated, by implementing appropriate management measures. Implementing this byelaw will enable Eastern IFCA to ensure that fishing activities are conducted in a sustainable manner and that the marine environment is suitably protected.

Fishing activities can potentially cause negative outcomes as a result of 'market failures'. These failures can be described as:

1. Public goods and services – a number of goods and services provided by the marine environment such as biological diversity are 'public goods' (no-one can be excluded from benefiting from them, but use of the goods does not diminish the goods being available to others). The characteristics of public goods, being available to all but belonging to no-one, mean that individuals do not necessarily have an incentive to voluntarily ensure the continued

existence of these goods which can lead to under-protection/provision.

2. Negative externalities – negative externalities occur when the cost of damage to the marine environment is not fully borne by the users causing the damage. In many cases no monetary value is attached to the goods and services provided by the marine environment and this can lead to more damage occurring than would occur if the users had to pay the price of damage. Even for those marine harvestable goods that are traded (such as wild fish), market prices often do not reflect the full economic cost of the exploitation or of any damage caused to the environment by that exploitation.
3. Common goods - a number of goods and services provided by the marine environment such as populations of wild fish are 'common goods' (no-one can be excluded from benefiting from those goods however consumption of the goods does diminish that available to others). The characteristics of common goods (being available but belonging to no-one, and of a diminishing quantity), mean that individuals do not necessarily have an individual economic incentive to ensure the long-term existence of these goods which can lead, in fisheries terms, to potential overfishing. Furthermore, it is in the interest of each individual to catch as much as possible as quickly as possible so that competitors do not take all the benefits. This can lead to an inefficient amount of effort and unsustainable exploitation.

IFCA byelaws aim to redress these sources of market failure in the marine environment through the following ways:

- Management measures to conserve designated features of MPAs will ensure negative externalities are reduced or suitably mitigated.
- Management measures will support continued existence of public goods in the marine environment by conserving the range of biodiversity in the sea of the Eastern IFC District.
- Management measures will also support continued existence of common goods in the marine environment by ensuring the long-term sustainability of shrimp stocks in the Eastern IFC District.

Policy objective

The policy objective is to ensure that the shrimp fishery within the Wash and North Norfolk Coast SAC does not have a negative impact upon site integrity whilst minimising the economic impact on the fishing industry.

The intended effect of the measures is to prohibit the use bottom towed gear in areas which contain habitats which are likely to be damaged by their use and with the effect of adversely affecting site integrity of the Wash and North Norfolk Coast SAC.

Description of options considered (including status quo);

Option 0 (do nothing) – status quo

Eastern IFCA has assessed the impacts of shrimp fishing on the Wash and North Norfolk Coast SAC. This assessment has concluded that adverse impacts on site integrity cannot be ruled out in relation to some sub-features where any level of fishing activity using bottom towed gear is considered likely to have a significant adverse effect.

The 'do nothing' option would have the least economic impact on stakeholders however, is not

considered to adequately reduce the risk of impacts from shrimp fishing within Wash and North Norfolk Coast SAC and is therefore not considered a viable option.

Option 1 (preferred option) – Marine Protected Areas Byelaw 2018

The Marine Protected Areas Byelaw 2018 will introduce spatial closures in addition to those in effect from the Marine protected Areas Byelaw 2016 (including those in the Humber Estuary) to prohibit the use of bottom towed gear primarily in relation to the following:

- sub-tidal mixed sediment;
- sub-tidal mud (sub-features of the site);
- Biogenic reef (mussel beds and extensions to *Sabellaria spinulosa* closures in place under Marine protected Areas Byelaw 2016)

These have been assessed as being sensitive to bottom-towed-gear fishing. Spatial closures are set out in Appendices 2, 3 and 4. So as to be effective, closures are proposed which are as simple a shape as possible and do not necessarily follow the convoluted extent of sub-features identified above. As such, closures will also encompass some habitats and features which are not considered at risk of damage. The proposed byelaw includes provision for limited bottom towed gear fisheries to co-occur with mussel beds. An exemption is proposed to allow fisheries which are consented through the Wash Fishery Order 1992. No significant adverse effect on site integrity will occur as a result of such fisheries as these are assessed using a Habitats Regulation Assessment prior to commencement.

The byelaw will also require fishers to 'lash and stow' bottom towed gear such that it cannot readily be used when transiting closed areas. There is an exemption to this requirement to the effect that shrimp beams need only be lifted clear of the water if a vessel has been fishing up to the closed area or will be fishing immediately after leaving a closed area.

Option 2 – Closure of Wash and North Norfolk Coast to shrimp fishing

Closure of the site would meet the conservation objectives of the site but have disproportionate impacts on the industry and effectively end the UK's contribution to the markets in relation to brown shrimp, with circa 90% of the UK's catch coming from the Wash and North Norfolk Coast SAC. Therefore this option was not considered viable.

Monetised and non-monetised costs and benefits

Option 0 – Do nothing option

There are no monetised costs associated with the 'do nothing' option.

The key non-monetised costs relate to the impacts on ecosystem functioning resultant of continued fishing activity in the areas proposed to be closed. Impacts on ecosystem function is likely to lead to impacts on the sustainability of the fishery and its productivity.

In addition, the 'do nothing' option is not in keeping with the requirements of the Habitats Directive and as such may lead to infraction proceedings being taken against the UK.

Option 1 – Shrimp Permit Byelaw 2018

The key monetised costs associated with the proposed closures are the loss of fishing grounds.

Impacts on Shrimp Fishery

Eastern IFCA requires fishers to submit returns forms for each shrimp fishing trip within the Wash and North Norfolk Coast SAC under Byelaw 11 (Development of shellfish fisheries) of Eastern IFCA's Byelaws. This data has been used to estimate the level of fishing activity within each of the proposed closed areas. Marine Management Organisation (MMO) landings data has been used to determine the monetary impact of the closures.

Fishers provide information regarding the location of each tow during shrimp fishing activity. These are compared against the location of proposed closures. This provides a 'proportion' of total catch likely to be affected by each closures. MMO landings data for brown shrimp is then used to determine a monetised value associated with each closures (i.e. as a proportion of the total value). MMO landings data is not available at the same resolution as Eastern IFCA data. Landings data for International Council for the Exploration of the Sea (ICES) statistical rectangles 34F0 and 35F0 were used to estimate monetary values which will have the effect of overestimating impacts as these areas account for a much larger areas including the Lincolnshire coast.

The resolution of the Eastern IFAC data does not allow for an exact estimate as the grids do not correspond with the shape or size of closed areas (with some closed areas being smaller than a single grid box). Eastern IFCA data for 1st January to 31st December of 2016 and 2017 is used. MMO landings data from 2010 to 2016 is used to estimate economic impacts.

The low estimate considers fishing effort within closed areas except those associated with the proposed mussel bed closures (Appendix 2 – Chart 1). Shrimp fishing activity is not thought to occur over mussel beds (except perhaps inadvertently) however, a significant amount of fishing activity occurs within the grid boxes in which mussel beds are found (which accounts for 2.89% of the fishery). The low estimate also takes into account the lowest annual landed value of brown and pink shrimps between 2010 and 2016 (which is £584,525). The low estimate is £16,907.

The low cost estimate is likely to be an overestimate given that the landed value of catch takes into account fishing activity outside of the Wash and North Norfolk Coast SAC but the resolution of the landings data does not allow for excluding other areas from the assessment. Shrimp fishing grounds are known to vary annually as shrimps move to different areas (within the site). As such, it is conceivable that the impact of these closures in some years will be zero.

The high estimate considers closures over mussel beds in addition to other areas (which equates to 17.45% of the fishery in the Wash North Norfolk Coast SAC) and the highest annual value of landed catch (£2,668,788). The high cost estimate is therefore £465,734 per year. This is likely to be an overestimate because fishers are not thought to fish over mussel beds and because it includes landed value associated with shrimp fishing outside of the site whereas the fishing activity data only relates to fishing within the site. As above, shrimp grounds are thought to move during and between years. As such, the potential cost of the measures could be more if shrimps were to relocate into a closed area.

The best estimate takes into account the average (during 2016 and 2017) fishing effort within closed areas except over closures associated with mussel beds. It also takes into account the average annual landed value of shrimps (between 2010 and 2016 inclusive). The best estimate is therefore £66,069 per year.

Impacts on 'other' fisheries

Use of bottom towed gear within the Wash and North Norfolk Coast SAC is thought to be very limited except in relation to shrimp fishing.

MMO landings data shows that between 2010 and 2016, 42 different species were caught within ICES rectangles 34F0, 34F1, 35F0 and 35F1. Excluding scallops and mussel (which are regulated through the Wash Fishery order within the MPA) and whelks (which are not caught with bottom towed gear and their inclusion in the MMO data is assumed to be a mistake), the average annual landed value is £21,341. The site is within these ICES rectangles although the site makes up only a small proportion of the site. The vast majority of this activity is associate with ICES Rectangle 35F0 which is likely to be a reflection of activity along the Lincolnshire coast and outside of the site. This is consistent with anecdotal reports of fishing activity.

As such, the high estimate annual cost is £39,010 which corresponds with the highest recorded annual landed value of 'other species' within associated ICES rectangles for the period 2010 to 2016 inclusive.

The low cost is zero which reflects that it is unlikely that the MPA represents important fishing grounds for these species and that the majority are thought to be caught on the Lincolnshire coast.

It is most likely that landings of 'other' species from within the MPA are actually only by-catch of the shrimp fishery. This cannot be distinguished from that which is caught intentionally however using the MMO landings data. As such the best estimate takes into account the average annual landed value (£21,341) for these ICES rectangles and applies the same fishing activity assessment as for the shrimp fishing impacts above (i.e. the average percentage of fishing activity effected, the average of which is 4.1%) with an estimated cost of £874 annually.

Costs to Eastern IFCA

Additional compliance activities will be required in addition to education and engagement. The cost of these are estimated to be £7,176 based on six additional sea patrols and 4 additional shore patrols. This is likely to be an underestimate with regards to the initial implementation of the measures during which time the risk of non-compliance is higher. In addition, the number of patrols will increase if risk associated with the fishery increases as directed through the Tactical Coordinating Group.

Non-monetised costs

Pink shrimp fishery

Table 2. showing the breakdown of costs associated with additional compliance needs resultant of introducing a new byelaw.

Costs associated with 1 sea patrol

	employment	cost	working days	cost per std 7.4 hour day
Crew:-				
Skipper	1	33,760.00	225	150.04
Crew:-	3	29,410.00	227	388.68
Total cost				538.72
"on costs"				
Pension			21.50%	115.83
E'ers NI		12,156.97	226	53.79
				708.34
	annual cost		days at sea	
<u>Operation cost of vessel</u>			70	
Maintenance/refit	15,000.00			214.29
Insurance	3,000.00			42.86
				257.14
Total operation cost per day/trip				965.48
6 additional sea patrols				5792.898

Costs associated with 1 shore patrol

	employment	cost	working days	cost per std 7.4 hour day
Crew:-				
Skipper	0	33,760.00	0	0.00
Crew:-	2	29,410.00	227	259.12
Total cost				259.12
"on costs"				
Pension			21.50%	55.71
E'ers NI		6,978.94	226	30.88
				345.71
Total operational cost of shore patrol				345.71
4 additional shore patrols				1382.839

total additional compliance costs 7175.74

Pink shrimp fisheries are anecdotally thought to have been worth as much as brown shrimp fisheries previously. At present, there is only a limited market and pink shrimp are landed as bycatch of the brown shrimp fishery and have limited value.

Fishers have indicated that the proposed closures effectively rule out any targeted pink shrimp fishery in the future as the proposed closures coincide with what were historically important pink shrimp fishing grounds. This cannot be monetised as data for this historic fishery is not available although it is anecdotally thought to have been worth as much as the current brown shrimp fishery.

Changes in fishing behaviors

Displacement from the proposed closed areas may have the effect of intensifying effort on other shrimp grounds with an impact on the ecological functioning and sustainability of the shrimp fishery and associated habitats. Given that the level of fishing activity over the proposed closures is considered to be relatively low (circa 4%), displacement is likely to be limited..

Costs to Eastern IFCA

Eastern IFCA intends to undertake monitoring to support the conclusions of the Habitat Regulation Assessment and ensure that adverse effects are not occurring within the site open to fishing. The associated cost cannot be monetised as ultimately the level of monitoring is likely to change annually.

Option 2 – Total closure of Wash and North Norfolk Coast MPA to bottom towed gear

The pink and brown shrimp fisheries in the Eastern IFCA district are worth between £584,525 and £2,668,788 per annum. The vast majority of these fisheries are thought to occur within the Wash and North Norfolk Coast SAC although other notable areas are off the Lincolnshire coast and north of the MPA.

Eastern IFCA has undertaken an assessment of the impacts of shrimp fishing within the MPA and found that some habitats are very sensitive to shrimp fishing activity and require closure (to all bottom towed gear). Other habitats are found to be less sensitive although it is thought that fishing activity could impact these habitats if activity increased.

The potential impact of this option is likely to be underestimated by the landed value of catch. The factories which process the shrimp caught (both of which are based in King's Lynn) rely to a large degree on the shrimp market. The market price for the processed shrimp is likely to be much higher than the landed value and which includes a significant amount of export to foreign markets (primarily Netherlands). There are a significant number of tertiary jobs associated with this fishery and these processing factories (i.e. engineers, factory workers, delivery drivers).

Only a minor increase in fishing effort is anticipated as a result of displacement from the closed areas and fishing at the current levels is assessed to be in keeping with the conservation objectives of the site. Closure of the whole site would meet the conservation objectives however, it is likely to cause a large impact on stakeholders with little or no additional benefit to site integrity. As such, it is considered disproportionate to close the entire site to shrimp fishing activity as the associated risks to site integrity can be adequately mitigated through effort limitations as required.

Rationale and evidence that justify the level of analysis used in the IA (proportionality approach)

This assessment has used the following information:

- MMO landings data (2010 to 2017 inclusive)
- Eastern IFCA shrimp fishing database (based on returns data)
- Anecdotal information provided by fishers (during informal engagement)

The analysis has considered the best available evidence to estimate monetised costs where the data will allow such. This has included extensive consultation with stakeholders who are likely to be impacted.

Concerns have been raised by the shrimp fishing industry in relation to the closures and in particular, the closures associated with the north Norfolk coast and central part of the Wash as these include some important shrimp fishing grounds. The shape and size of closures have taken the informal consultation into account where possible whilst ensuring that the mandated protective effect of the measures are not diminished. A summary of how these concerns have been taken into account is set out in the 'how we listened document' which is found on the Eastern IFCA website².

Risks and assumptions

There are limitations in relation to the data used in the above analysis. Eastern IFCA requires shrimp fishers to provide certain fisheries data for each fishing trip however there is known to be a level of non-compliance with this requirement. This is mitigated to a degree given that the assessment only uses this information to estimate relative importance of certain areas as shrimp fishing ground (i.e. number of tows as a proportion of the total) rather than relying on the data to estimate the actual fishing effort in an area.

A combination of Eastern IFCA shrimp fishing data and MMO landings data is used to estimate cost. The resolution of both of these is less than that of the closures. As a result the costs potentially over-estimate the impacts of the measures.

In addition, as set out above, shrimp fishing grounds are known to move within and between years. As such, the importance of the areas closed to fishing are likely to change over time. The data available to determine the importance of fishing grounds only relates to two years (2016 and 2017) and has its own limitations (as set out above) and as such the actual cost to the industry may change.

Summary and preferred option with description of implementation plan

The preferred option is Option 1 – Marine Protected Areas Byelaw 2018. This would close certain areas to use of bottom towed gear and require this gear to be lashed and stowed when transiting restricted areas with an exception in certain circumstances. This option would permit a mussel fishery in the Wash using dredges under the Wash Fishery Order 1992 (which would be subject to a Habitat Regulation Assessment and as such would not have an impact on site integrity).

These closures are in addition to the closures already implemented in the Marine Protected areas Byelaw 2016.

The proposed measures will have the effect of protecting the Wash and North Norfolk Coast SAC from the effects of shrimp fishing activity but minimise the impact on industry by closing only those areas

² http://www.eastern-ifca.gov.uk/wp-content/uploads/2018/07/2018_07_23_how_we_listened.pdf

which will be impacted. Fishing within the rest of the site will be managed through the use of a separate proposed byelaw (Shrimp permit Byelaw 2018) which will ensure there are no impacts on site integrity in relation to habitats and species outside of the restricted areas.

To implement these measures, fishers will be made aware of the additional closures through updates to the Eastern IFCA website and targeted dialogue with shrimp fishers. Officers will engage with the industry to educate and engage as per Eastern IFCA's Enforcement Policy and Regulation Strategy³.

³ <http://www.eastern-ifca.gov.uk/wp-content/uploads/2016/03/RC-Strategy.pdf>

Annex A: Policy and Planning

Which marine plan area is the MPA and management measure in?

East Inshore Marine Plan

Have you assessed whether the decision on this MPA management measure is in accordance with the Marine Policy Statement and any relevant marine plan?

- Yes

If so, please give details of the assessments completed:

Marine Plan Policy	Policy Text	Policy screened in or out from assessment	Assessment of plan policy
Policy AGG1	Proposals in areas where a licence for extraction of aggregates has been granted or formally applied for should not be authorised unless there are exceptional circumstances.	×	Does not apply.
Policy AGG2	Proposals within an area subject to an Exploration and Option Agreement with The Crown Estate should not be supported unless it is demonstrated that the other development or activity is compatible with aggregate extraction or there are exceptional circumstances.	×	Does not apply.
Policy AGG3	Within defined areas of high potential aggregate resource, proposals should demonstrate in order of preference: a) that they will not, prevent aggregate extraction b) how, if there are adverse impacts on aggregate extraction, they will minimise these c) how, if the adverse impacts cannot be minimised, they will be mitigated d) the case for proceeding with the application if it is not possible to minimise or mitigate the adverse impacts	×	Does not apply.

<p>Policy AQ1</p>	<p>Within sustainable aquaculture development sites (identified through research), proposals should demonstrate in order of preference:</p> <p>a) that they will avoid adverse impacts on future aquaculture development by altering the sea bed or water column in ways which would cause adverse impacts to aquaculture productivity or potential</p> <p>b) how, if there are adverse impacts on aquaculture development, they can be minimised</p> <p>c) how, if the adverse impacts cannot be minimised they will be mitigated</p> <p>d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts</p>	<p>×</p>	
<p>Policy BIO1</p>	<p>Appropriate weight should be attached to biodiversity, reflecting the need to protect biodiversity as a whole, taking account of the best available evidence including on habitats and species that are protected or of conservation concern in the East marine plans and adjacent areas (marine, terrestrial).</p>	<p>✓</p>	<p>Eastern IFCA undertook a Habitats Regulations Assessment with regards to the potential impacts of shrimp fishing on site integrity within the Wash and North Norfolk Coast SAC. The assessment concluded that shrimp fishing is likely to have an adverse effect on the site in relation to sub-tidal mud and sub-tidal mixed sediment sub-features. In addition, intertidal mussel beds have been identified as a 'red-risk' interaction which requires closure under Defra's revised approach to fisheries management in MPA. The proposed byelaw restricts fishing activity in the MPA to the extent that the site is impacted.</p>
<p>Policy BIO2</p>	<p>Where appropriate, proposals for development should incorporate features that enhance biodiversity and geological interests.</p>	<p>×</p>	

<p>Policy CAB1</p>	<p>Preference should be given to proposals for cable installation where the method of installation is burial. Where burial is not achievable, decisions should take account of protection measures for the cable that may be proposed by the applicant.</p>	<p>×</p>	<p>Does not apply.</p>
<p>Policy CC1</p>	<p>Proposals should take account of:</p> <ul style="list-style-type: none"> • how they may be impacted upon by, and respond to, climate change over their lifetime and • how they may impact upon any climate change adaptation measures elsewhere during their lifetime <p>Where detrimental impacts on climate change adaptation measures are identified, evidence should be provided as to how the proposal will reduce such impacts.</p>	<p>✓</p>	<p>Protecting site integrity of the Wash and north Norfolk Coast SAC will increase the resilience of the site and its features such that it can better withstand natural phenomenon and events related to climate change.</p>
<p>Policy CC2</p>	<p>Proposals for development should minimise emissions of greenhouse gases as far as is appropriate. Mitigation measures will also be encouraged where emissions remain following minimising steps. Consideration should also be given to emissions from other activities or users affected by the proposal.</p>	<p>✓</p>	<p>The byelaw will potentially increase emissions as fishers have to travel further (including potentially outside of the Wash and North Norfolk Coast SAC) to fish for shrimp. However, the degree to which this will occur is likely to be limited (displacement estimated as 4%) as parts of the MPA remain open to fishing (although subject to effort management through the Shrimp Permit Byelaw 2018).</p>
<p>Policy CCS1</p>	<p>Within defined areas of potential carbon dioxide storage,(mapped in figure 17)proposals should demonstrate in order of preference:</p> <ol style="list-style-type: none"> a) that they will not prevent carbon dioxide storage b) how, if there are adverse impacts on carbon dioxide storage, they will minimise them c) how, if the adverse impacts cannot be minimised, they will be mitigated d) the case for proceeding with the proposal if it is not possible 	<p>×</p>	<p>Does not apply.</p>

	to minimise or mitigate the adverse impacts		
Policy CCS2	Carbon Capture and Storage proposals should demonstrate that consideration has been given to the re-use of existing oil and gas infrastructure rather than the installation of new infrastructure (either in depleted fields or in active fields via enhanced hydrocarbon recovery).	×	Does not apply.
Policy DD1	Proposals within or adjacent to licensed dredging and disposal areas should demonstrate, in order of preference a) that they will not adversely impact dredging and disposal activities b) how, if there are adverse impacts on dredging and disposal, they will minimise these c) how, if the adverse impacts cannot be minimised they will be mitigated d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts	×	Does not apply
Policy DEF1	Proposals in or affecting Ministry of Defence Danger and Exercise Areas should not be authorised without agreement from the Ministry of Defence.	×	Does not apply
Policy EC1	Proposals that provide economic productivity benefits which are additional to Gross Value Added currently generated by existing activities should be supported.	✓	The shrimp fishery within the East Inshore Marine Plan Area are of national importance representing circa 90% of UK shrimp landings. The introduction of discrete spatial closures in relation to the fishery will allow for a longer-term, sustainable fishery to be continued without adverse impacts on the MPA.

Policy EC2	Proposals that provide additional employment benefits should be supported, particularly where these benefits have the potential to meet employment needs in localities close to the marine plan areas.	✓	At least two processor plants (which process shellfish) are known to process shrimp catches from across the district and further – enabling a productive shrimp fishery will support jobs in addition to fishing activity (e.g. factory cleaners, admin etc.).
Policy EC3	Proposals that will help the East marine plan areas to contribute to offshore wind energy generation should be supported.	×	Does not apply.
Policy ECO1	Cumulative impacts affecting the ecosystem of the East marine plans and adjacent areas (marine, terrestrial) should be addressed in decision-making and plan implementation.	✓	The proposed closures will support a healthy marine habitat which in turn, should have a benefit on the biodiversity of the wider ecosystem.
Policy ECO2	The risk of release of hazardous substances as a secondary effect due to any increased collision risk should be taken account of in proposals that require an authorisation.	✓	No additional collision risk identified as a result of the proposed byelaw.
Policy FISH1	Within areas of fishing activity, proposals should demonstrate in order of preference: a) that they will not prevent fishing activities on, or access to, fishing grounds b) how, if there are adverse impacts on the ability to undertake fishing activities or access to fishing grounds, they will minimise them c) how, if the adverse impacts cannot be minimised, they will be mitigated d) the case for proceeding with their proposal if it is not possible to minimise or mitigate the adverse impacts	✓	The purpose of the byelaw is to prohibit shrimp fishing from discrete spatial areas within the Wash and North Norfolk Coast SAC for the purpose of meeting requirements of the Habitats Directive. Closures are limited to the most sensitive sub-features where adverse effect from the fishing activity could not be ruled out. For the purpose of creating effective closures, proposed shapes of these areas are as simple as possible and as such do encompass some sub-features which are not considered at risk of damage to the effect of having an impact on site integrity.

Policy FISH2	Proposals should demonstrate, in order of preference: a) that they will not have an adverse impact upon spawning and nursery areas and any associated habitat b) how, if there are adverse impacts upon the spawning and nursery areas and any associated habitat, they will minimise them c) how, if the adverse impacts cannot be minimised they will be mitigated d) the case for proceeding with their proposals if it is not possible to minimise or mitigate the adverse impacts	✓	Spatial closures will have the effect of protecting habitats determined as potentially being impacted by bottom-towed-gear fishing activity. Some displacement may occur (estimated as 4% of total effort) however it is unknown as to whether this will be displaced onto spawning or nursery areas.
Policy GOV1	Appropriate provision should be made for infrastructure on land which supports activities in the marine area and vice versa.	×	Does not apply.
Policy GOV2	Opportunities for co-existence should be maximised wherever possible.	×	Does not apply.
Policy GOV3	Proposals should demonstrate in order of preference: a) that they will avoid displacement of other existing or authorised (but yet to be implemented) activities b) how, if there are adverse impacts resulting in displacement by the proposal, they will minimise them c) how, if the adverse impacts resulting in displacement by the proposal, cannot be minimised, they will be mitigated against or d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts of displacement	✓	Proposed spatial closures are estimated to displace 4% of shrimp fishing activity which currently takes place within The Wash and North Norfolk Coast SAC.
Policy MPA1	Any impacts on the overall Marine Protected Area network must be taken account of in strategic level measures and assessments, with due regard given to any current agreed advice on an ecologically coherent network.	✓	The byelaw will implement spatial closures with the effect of mitigating impacts on site integrity on the Wash and North Norfolk Coast SAC.
Policy OG1	Proposals within areas with existing oil and gas production should not be authorised except where compatibility with oil and gas production and infrastructure can be	×	Does not apply.

	satisfactorily demonstrated.		
Policy OG2	Proposals for new oil and gas activity should be supported over proposals for other development.	×	Does not apply.
Policy PS1	Proposals that require static sea surface infrastructure or that significantly reduce under-keel clearance should not be authorised in International Maritime Organization designated routes.	×	Does not apply.
Policy PS2	Proposals that require static sea surface infrastructure that encroaches upon important navigation routes (see figure 18) should not be authorised unless there are exceptional circumstances. Proposals should: a) be compatible with the need to maintain space for safe navigation, avoiding adverse economic impact b) anticipate and provide for future safe navigational requirements where evidence and/or stakeholder input allows and c) account for impacts upon navigation in-combination with other existing and proposed activities	×	Does not apply.

Policy PS3	Proposals should demonstrate, in order of preference: a) that they will not interfere with current activity and future opportunity for expansion of ports and harbours b) how, if the proposal may interfere with current activity and future opportunities for expansion, they will minimise this c) how, if the interference cannot be minimised, it will be mitigated d) the case for proceeding if it is not possible to minimise or mitigate the interference	X	Does not apply.
Policy SOC1	Proposals that provide health and social well-being benefits including through maintaining, or enhancing, access to the coast and marine area should be supported.	X	Does not apply.
Policy SOC2	Proposals that may affect heritage assets should demonstrate, in order of preference: a) that they will not compromise or harm elements which contribute to the significance of the heritage asset b) how, if there is compromise or harm to a heritage asset, this will be minimised c) how, where compromise or harm to a heritage asset cannot be minimised it will be mitigated against or d) the public benefits for proceeding with the proposal if it is not possible to minimise or mitigate compromise or harm to the heritage asset	X	Does not apply.
Policy SOC3	Proposals that may affect the terrestrial and marine character of an area should demonstrate, in order of preference: a) that they will not adversely impact the terrestrial and marine character of an area b) how, if there are adverse impacts on the terrestrial and marine character of an area, they will minimise them c) how, where these adverse impacts on the terrestrial and marine character of an area cannot be minimised they will	X	Does not apply.

	<p>be mitigated against</p> <p>d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts</p>		
Policy TIDE1	<p>In defined areas of identified tidal stream resource (see figure 16), proposals should demonstrate, in order of preference:</p> <p>a) that they will not compromise potential future development of a tidal stream project</p> <p>b) how, if there are any adverse impacts on potential tidal stream deployment, they will minimise them</p> <p>c) how, if the adverse impacts cannot be minimised, they will be mitigated</p> <p>d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts</p>	×	Does not apply.
Policy TR1	<p>Proposals for development should demonstrate that during construction and operation, in order of preference:</p> <p>a) they will not adversely impact tourism and recreation activities</p> <p>b) how, if there are adverse impacts on tourism and recreation activities, they will minimise them</p> <p>c) how, if the adverse impacts cannot be minimised, they will be mitigated</p> <p>d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts</p>	×	

Policy TR2	Proposals that require static objects in the East marine plan areas, should demonstrate, in order of preference: a) that they will not adversely impact on recreational boating routes b) how, if there are adverse impacts on recreational boating routes, they will minimise them c) how, if the adverse impacts cannot be minimised, they will be mitigated d) the case for proceeding with the proposal if it is not possible to minimise or mitigate the adverse impacts	X	
Policy TR3	Proposals that deliver tourism and/or recreation related benefits in communities adjacent to the East marine plan areas should be supported.	X	Does not apply.
Policy WIND1	Developments requiring authorisation, that are in or could affect sites held under a lease or an agreement for lease that has been granted by The Crown Estate for development of an Offshore Wind Farm, should not be authorised unless a) they can clearly demonstrate that they will not compromise the construction, operation, maintenance, or decommissioning of the Offshore Wind Farm b) the lease/agreement for lease has been surrendered back to The Crown Estate and not been re-tendered c) the lease/agreement for lease has been terminated by the Secretary of State d) in other exceptional circumstances	X	Does not apply.
Policy WIND2	Proposals for Offshore Wind Farms inside Round 3 zones, including relevant supporting projects and infrastructure, should be supported.	X	Does not apply.

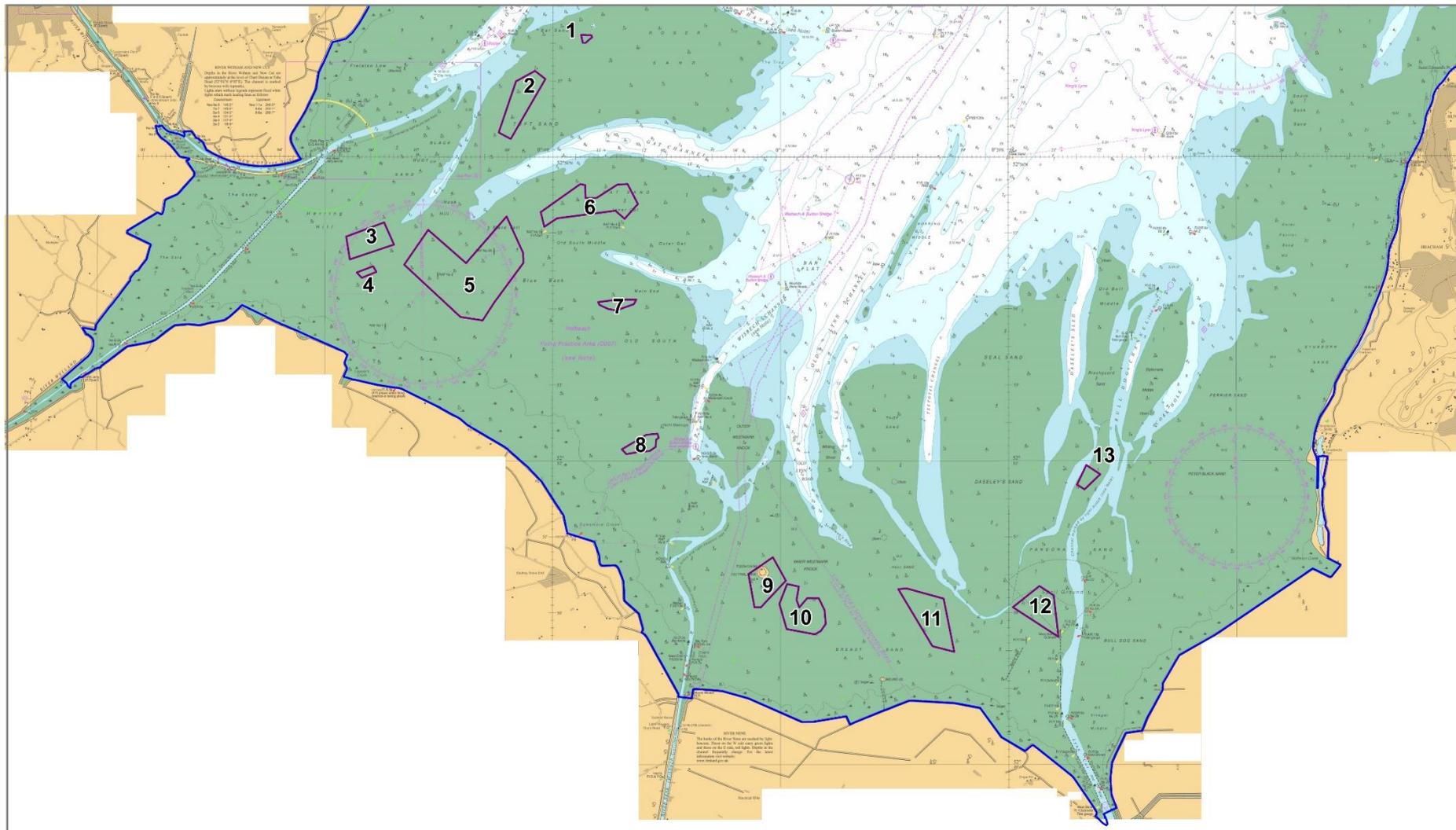


Chart 1: The Wash Mussel Beds - Proposed Closures to Bottom Towed Gear

- Proposed Marine Protected Area closures
- The Wash and North Norfolk Coast SAC boundary

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Date:04/07/18
 Drawn by:SC
 Projection: Lat Long WSG84
 EMS boundary:JNCC download -
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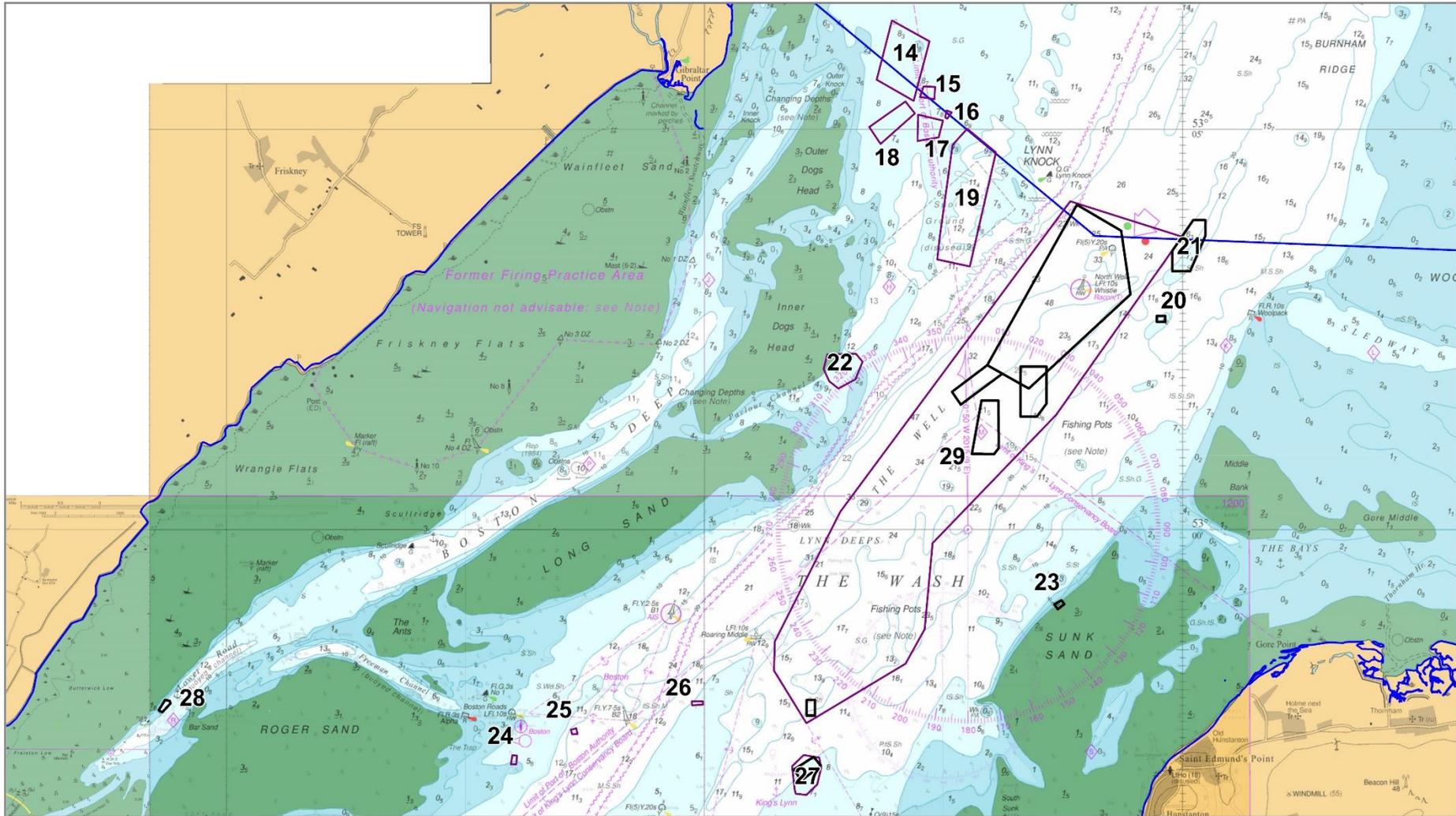
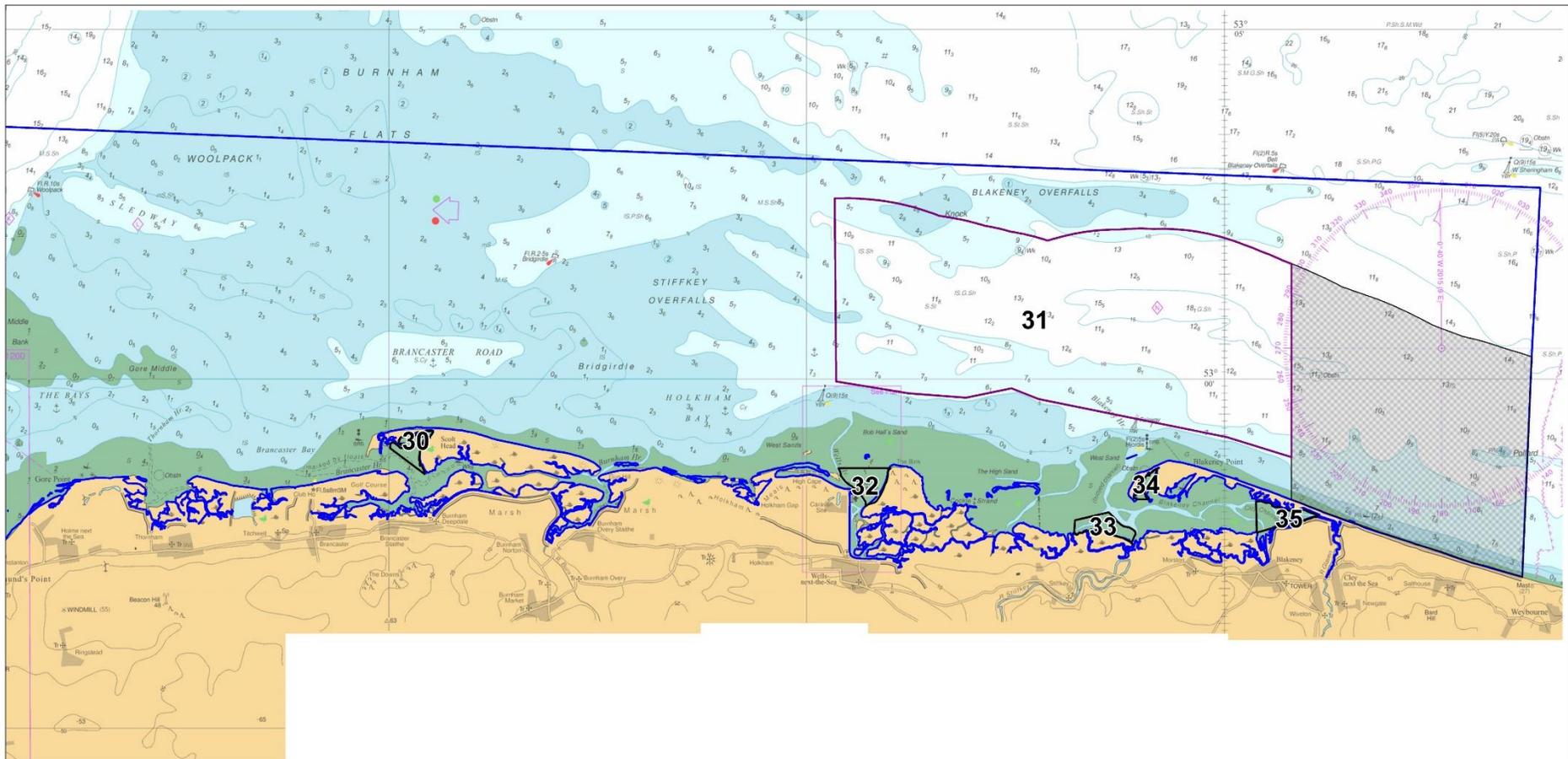


Chart 2: The Wash Central & Northern - Proposed Closures to Bottom Towed Gear

- Proposed Marine Protected Area closures
- The Wash and North Norfolk Coast SAC boundary
- Existing Marine Protected Area closures

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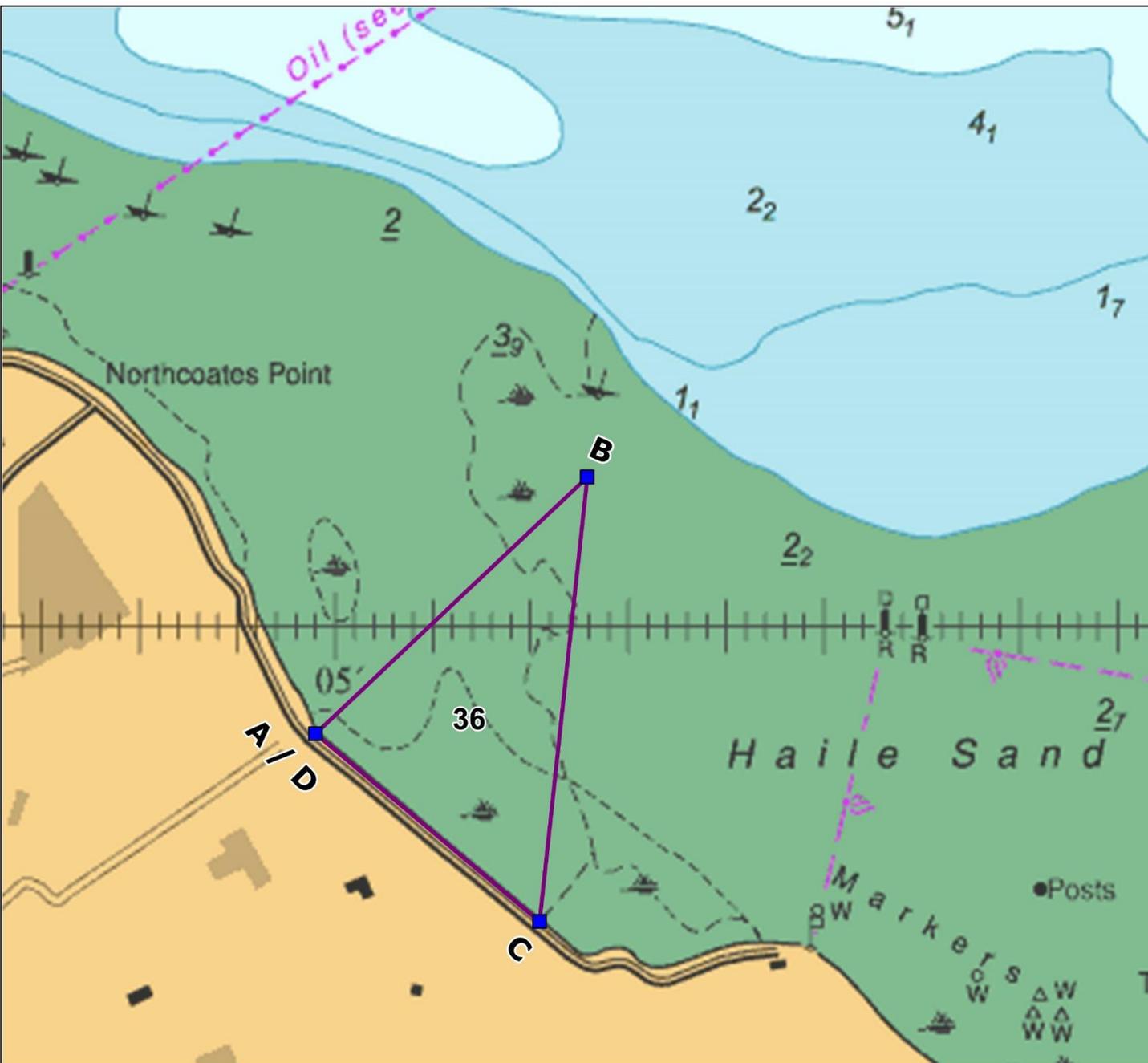


Chart 3: North Norfolk Coast Proposed Closures to Bottom Towed Gear

- Proposed Marine Protected Area closures
- Existing Marine Protected Area closures
- Existing Byelaw 12 Trawling Restricted Area
- The Wash and North Norfolk Coast Coast SAC boundary

Date:26/10/18
 Drawn by:SC
 Projection: Lat Long WSG84
 EMS boundary:JNCC download -
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2018_10_Post_Con_Adm_NNC_Layout.WOR



Marine Protected Areas Byelaw 2018

Chart 4: *Zostera* (eelgrass) -

Fishing restrictions within the restricted area a person must not:

- a) fish with bottom towed gear;
- b) fish by handwork;
- c) fish by crab tiling.

- Restricted area
- Location points

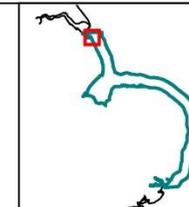
Decimal Degrees

Point	Latitude	Longitude
A	53.494415°	0.081682°
B	53.507329°	0.104793°
C	53.484969°	0.100740°
D	53.494415°	0.081682°

Degrees and Decimal Minutes

Point	Latitude	Longitude
A	53° 29.67' N	00° 04.90' E
B	53° 30.44' N	00° 06.29' E
C	53° 29.10' N	00° 06.04' E
D	53° 29.67' N	00° 04.90' E

Area = 170.8 hectares



Date: 30/10/18 Drawn by: SC
 Projection: Lat Long WSG84
 Data sources: EIFCA
 Ref: MPA_Byelaw_2018_Chart_4.wor

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