Screening Assessment

in relation to

Fisheries Natura Plan for Seed Mussel (2023-2027)

in the Irish Sea

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Table of Contents

1. Preface

In Ireland, the implementation of Article 6 of the Habitats Directive in relation to aquaculture and fishing projects and plans that occur within designated sites is achieved through sub-article 6(3) of the Directive. Fisheries not coming under the scope of Article 6.3, that is, those fisheries not subject to secondary licencing, are subject to risk assessment (RA). Identified risks to designated features can then be mitigated and deterioration of such features can be avoided as envisaged by sub-article 6.2.

Fisheries, other than oyster fisheries, and aquaculture activities are licenced by the Department of Agriculture, Food and Marine (DAFM). Oyster fisheries are licenced by the Department of Environment Climate and Communications (DECC). The Habitats Directive is transposed in Ireland in the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). Habitats and Birds (Habitats Directive and Birds Directive) regulations for sea fisheries are laid out in European Union (Birds and Natural habitats) (Sea-fisheries) Regulations S.I. 290 of 2013. Appropriate assessments and risk assessments are carried out against the conservation objectives (COs), and more specifically on the version of the COs that are available at the time of the Assessment, for designated ecological features, within the site, as defined by the National Parks and Wildlife Service (NPWS). NPWS are the competent authority for the management of Natura 2000 sites in Ireland. Obviously, aquaculture and fishing operations existed in coastal areas prior to the designation of such areas under the Directives. Ireland is thereby assessing both existing and proposed aquaculture and fishing activities in such sites. This is an incremental process, as agreed with the EU Commission in 2009, and will eventually cover all fishing and aquaculture activities in all Natura 2000 sites.

The process of identifying existing and proposed activities and submitting these for assessment is, in the case of fisheries projects and plans, outlined in S.I. No. 290 of 2013. Here, the industry may bring forward fishing proposals or plans which become subject to assessment. These Fisheries Natura Plans (FNPs) may simply be descriptions of the sea-fishing activity to which the plan relates or may also include modifications to activities that mitigate, prior to the assessment, perceived effects to the ecology of a designated feature in the site. In the case of other fisheries, that are not projects or plans, data on activity are collated and subject to a risk assessment against the COs. In the case of aquaculture, DAFM receives applications to undertake such activity and submits a set of applications, at a defined

point in time, for assessment. The FNPs and aquaculture applications are then subject to a screening process which concludes whether appropriate assessment (AA) is required or not. If the AA or the RA process finds that the possibility of significant effects cannot be discounted or that there is a likelihood of negative consequence for designated features, then such activities will need to be mitigated further if they are to continue. The present report is a screening for appropriate assessment for the Fisheries Natura Plan for seed mussels in the Irish Sea (2023-2027).

2. Executive Summary

This report is a screening for appropriate assessment of a proposed Fisheries Natura Plan (FNP) for seed mussel (2023-2027) in the Irish Sea. It determines that an appropriate assessment is necessary as significant effects on all qualifying interests (habitats and species) in Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the Irish Sea including, in the case of mobile species, effects that might arise in proximity to these sites cannot be discounted on the basis of the potential effects described in a Natura Impact Statement (NIS) relative to conservation objectives specified for habitats and species in SACs and SPAs. Qualifying interests (QIs), or species of special conservation interest (SCIs), are those species or habitats which are listed as the reasons for the designation of the sites as SACs and SPAs and for which specific conservation objectives and targets have been specified.

The geographic scope of the screening extends from Carnsore Point in the south to Carlingford Lough in the north and includes all waters in between and out to the 12nm limit. Waters outside of the designated sites are included in the screening so that the effects of fisheries, generally, in the Irish Sea on qualifying interests, and where the distributional range of these species extends well beyond the borders of the sites, can be incorporated. The geographic scope of the screening is, however, also species specific depending on the particular behaviours of the species concerned.

A diverse range of habitats and species are designated in SACs and SPAs in the Irish Sea. In the marine environment and excluding coastal habitats where there is no overlap with fisheries, these include estuaries, intertidal mud and sand flats, sand banks, reefs and site specific features within these habitats which have been identified through site surveys. Grey Seal, Harbour Porpoise, Allis shad, Twaite shad, Sea lamprey and Salmon are designated in SACs while a range of species of seabirds, wading birds and other bird species inhabiting coastal habitats are designated in SPAs.

Mussel seed beds may be found in relatively small areas at the edge of sand banks and on coarse current swept sediments and rocky habitat both inter-tidally and sub-tidally. Their extent and distribution may change annually depending on larval supply, substrate availability and post settlement survival.

The assessment of the proposed seed mussel fishery, as described in the Fisheries Natura Plan (FNP) 2023-2027, finds that the majority of fishing activity by this fleet, since 1970, has occurred outside of SACs and SPAs. This is also highly likely to be case in the period 2023-2027. In addition, since the last appropriate assessment and under the last Fisheries Natura Plan (2018-2022) the seed mussel fishery has been excluded, by Fishery Natura Declaration (FND), from a number of SACs and SPAs and QIs therein are no-longer subject to pressure from the seed mussel fishery.

The screening process, therefore, screened out all those QIs within SACs and SPAs where fishing has been excluded (FND 2018/FND 2019). Features such as estuaries within SACs for which no spatial overlap with the seed mussel fishery is likely as well as bird species within SPAs which have no spatial overlap with the seed mussel fishery were screened out. In addition, habitats and species such as Atlantic and Mediterranean salt Meadows and Hen Harrier were screened out due to there being no possibility of physical interaction with the seed mussel fishery.

Within SACs we recommend that the QI Sandbanks which are slightly covered by water at all times within the Blackwater Bank SAC and Long Bank SAC are carried forward for appropriate assessment. In addition, Harbour porpoise within Rockabill to Dalkey SAC should be subject to appropriate assessment. Finally, both seal species (Harbour and Grey) within Lambay Island SAC should be subject to appropriate assessment.

All QIs within The Raven, Dalkey Islands, Howth Head Coast, Irelands Eye, Lambay Island, Skerries Islands and Wicklow Head should be carried forward to appropriate assessment for possible effects of pressure from disturbance. In addition, common scoter within and without The Raven and Dundalk Bay SACs should be subject to appropriate assessment because of potential effects of prey removal by the proposed fishery.

In combination effects for prey removal by the razor clam fleet and in combination disturbance effect from the possible future development of Offshore Renewable Energy (ORE) in the Irish Sea are recommended for appropriate assessment.

3. Introduction

This document is a stage 1 screening report of a draft Fisheries Natura Plan (FNP) for seed mussel, on Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) in the Irish Sea. The geographic domain of the assessment extends from Carnsore Point in the south to Carlingford Lough in the north and seaward to the 12nm limit in order to ensure that activities outside the coastal sites that may be relevant to mobile species are included (Figure 1). The information upon which this assessment is based is a seed mussel Fisheries Natura Plan (2023-2027) drafted by the Bottom Grown Mussel Consultative Forum (BGMCF) and forwarded for consideration to DAFM, with an updated plan submitted by the BGMCF in May 2023.

Other fishing activities, which could result in additional or in combination effects to that of the seed mussel fishery are also considered.

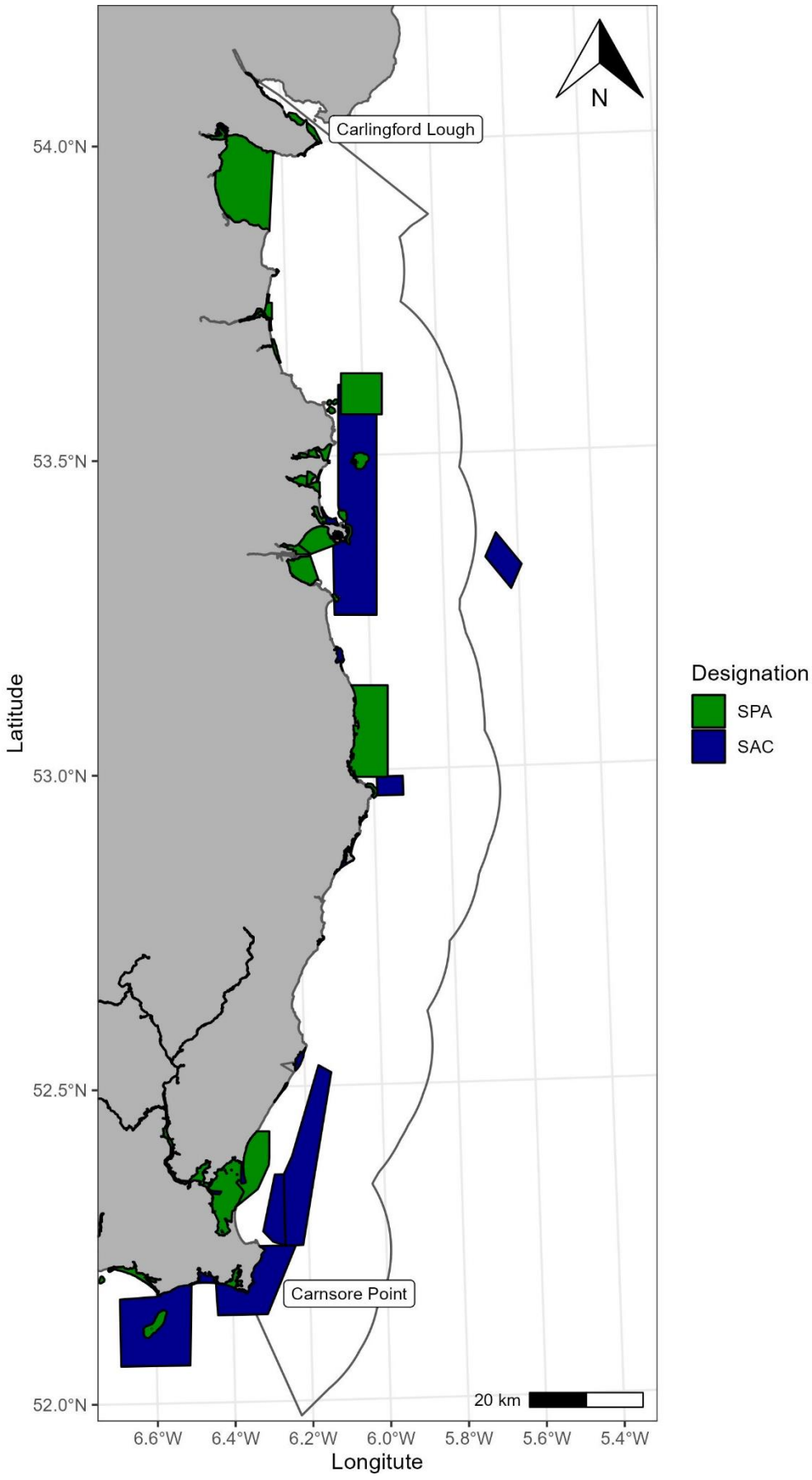

Figure 1 Assessment area including SACs (blue) and SPAs (green)

4. Scope of the Assessment

4.1 Scope of the screening (QIs, Natura 2000 sites)

- This screening process includes all marine qualifying interests (QIs) in Natura 2000 sites from Carnsore Point to Carlingford Lough and assesses whether there is likely to be significant interaction between the seed mussel fishery in this area with each QI which may warrant appropriate assessment. Some of the sites have dual designations as SACs and SPAs (Figure 1). The full list of SACs and SPAs within the scope of this assessment and their qualifying interests is presented in Table **1** and Table 2.
- The boundary to the study area was selected as the Irish Sea between Carnsore Point and Carlingford Lough. QI's that occur in this area are assessed. This may include mobile species and in particular seabirds that may migrate into the Irish Sea from other Natura 2000 sites. The site of origin of all individuals of populations of mobile species in the western Irish Sea is not known but the screening assessment is conservative in considering possible effects of the seed mussel fishery on such species irrespective of origin. In addition, there are no such species designated elsewhere and that migrate to the western Irish Sea and that are not also designated in the western Irish Sea. The screening in that sense is inclusive.

Table 1 **The list of SACs in the Irish Sea within 12nm and the Qualifying Interests (QIs) where n>1 indicates the number of habitat features within the QI that are listed in the Conservation Objectives. Rows coloured orange indicate those QIs which have been filtered out based on the feature filter (screening filter 1). Cells labelled green are those filtered out based on the spatial overlap filter (screening filter 2). Cells coloured yellow are those filtered out based on the legislation filter (screening filter 3). The cells coloured blue are those which are recommended for appropriate assessment. Filters are described in the Screening for Appropriate Assessment in Section 6.**

Qualifying interest	Baldoyle Bay	Blackwater Bank	Boyne Coast and Estuary	Bray Head	Buckroney-Brittas Dunes and Fen	Cahore Polders and Dunes	Carlingford Shore	Carnsore Point	Clogher Head	Dundalk Bay	Kilmuckridge-Tinnaberna Sandhills	Kilpatrick Sandhills	Lambay Island	Long Bank	Magherabeg Dunes	Malahide Estuary	North Dublin Bay	Raven Point Nature reserve	Rockabill to Dalkey	Rogerstown Estuary	Slaney River Valley SAC	South Dublin Bay	Wicklow Reef	The Murrough Wetlands
1110 Sandbanks which are slightly covered by sea water all the time		2												1										
1130 Estuary			2							3										4	4			
1140 Mudflats and sandflats not covered by seawater at low tide	2		2					1		3						5	3	2		4	4	2		
1170 Reefs								3					2						2				1	
1310 Salicornia and other annuals colonizing mud and sand	1									1						1	1			1				
1330 Atlantic salt meadows (Glauco-Puccinellietalia maritimae)	1						1			1						1	1	1		1				1
1351 Harbour porpoise Phocoena phocoena																			1					
1364 Grey seal (Halichoerus grypus)													1											
1410 Mediterranean salt meadows (Juncetalia maritimi)	1				1					1						1	1			1				
2110 Embryonic shifting dunes					1	1						1			1		1	1						
2120 Shifting dunes along the shoreline with Ammophila arenaria ('white dunes')					1	1					1	1			1	1	1	1		1				

2130 Fixed coastal dunes with herbaceous vegetation ('grey dunes')					1	1					1	1			1	1	1	1		1				
2170 Dunes with Salix repens ssp. argentea (Salicion arenariae)					1													1						
2190 Humid dune slacks					1												1	1						
Alkaline fens [7230]					1																			1
Allis shad (Alosa alosa) [1102]																					1			
Alluvial forests with Alnus glutinosa and Fraxinus excelsior (Alno-Padion, Alnion incanae, Salicion albae) [91E0]																					1			
Annual vegetation of drift lines [1210]					1	1	1					1			1		1	1						1
Atlantic decalcified fixed dunes (Calluno-Ulicetea) [2150]					1							1			1									
Brook lamprey (Lampetra planeri) [1096]																					1			
European dry heaths [4030]				1					1															
Freshwater pearl mussel (Margaritifera margaritifera) [1029]																					1			
Harbour Seal (Phoca vitulina)													1											
Old sessile oak woods with Ilex and Blechnum in British Isles [91A0]																					1			
Otter (Lutra lutra) [1355]																					1			
Perennial vegetation of stony banks [1220]					1		1			1														1
Petalwort (Petalophyllum ralfsii) [1395]																	1							
Petrifying springs with tufa formation (Cratoneurion) [7220]															1									
River lamprey (Lampetra fluviatilis) [1099]																					1			
Salmon (Salmo salar) [1106]																					1			
Sea lamprey (Petromyzon marinus) [1095]																					1			

Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia)(*important orchid sites) [6210]				1																				
Spartina swards (Spartinion maritimae) [1320]																1	1			1				
Twaite shad (Alosa fallax fallax) [1103]																					1			
Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]				1					1				1											
Water courses with Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260]																					1			
1410 Mediterranean salt meadows (Juncetalia maritimi)																								1
Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210]																								1

Table 2. SPAs and QIs in the Irish Sea, where 1 indicates where a species is a CO for a specific site, a number greater than one indicates the number of habitat features within the QI listed in the Conservation Objectives. Rows coloured orange indicate those QIs which have been filtered out based on the feature filter (screening filter 1). Cells labelled green are those filtered out based on the spatial overlap filter (screening filter 2). Cells coloured yellow are those filtered out based on the legislation filter (screening filter 3). The cells coloured blue are those which are recommended to go forward to a stage 2 appropriate assessment. Filters are described in the Screening for Appropriate Assessment in Section 6.

Qualifying interest	Baldoyle Bay	Boyne Estuary	Carlinford Lough	Dundalk Bay	Malahide Estuary	North Bull Island	River Nanny Estuary and Shore	Rockabill	Rogerstown estuary	South Dublin Bay and River Tolka Estuary	The Raven	Wexford Harbour and Slobs	Cahore Marshes	Dalkey Island	Howth Head Coast	Irelands Eye	Lambay Island	Skerries Islands	The Murrough	Wicklow Head
Little Grebe Tachybaptus ruficollis wintering [A004]												1								
Grey Heron Ardea cinerea wintering [A028]												1								
Bewick's Swan Cygnus columbianus wintering [A037]												1								
Whooper Swan Cygnus cygnus wintering [A038]												1								
Brent Goose Branta bernicla hrota [A046]	1		1		1	1			1	1		1						1	1	
Shelduck Tadorna tadorna [A048]	1	1		1	1	1			1			1								
Scaup Aythya marila wintering [A062]												1								
Hen Harrier Circus cyaneus post-breeding/roost [A082]												1								
Coot Fulica atra wintering [A125]												1								
Oystercatcher Haematopus ostralegus [A130]		1		1	1	1	1		1	1		1								
Ringed Plover Charadrius hiaticula [A137]	1			1			1		1	1										
Golden Plover Pluvialis apricaria [A140]	1	1		1	1	1	1			1		1	1							
Grey Plover Pluvialis squatarola [A141]	1	1		1	1	1			1		1	1								

Lapwing Vanellus vanellus [A142]		1		1								1	1								
Knot Calidris canutus [A143]		1		1	1	1	1		1	1		1									
Sanderling Calidris alba [A144]		1				1	1			1	1	1									
Purple Sandpiper Calidris maritima [A148]								1											1		
Black-tailed Godwit Limosa limosa [A156]		1		1	1	1			1			1									
Bar-tailed Godwit Limosa lapponica [A157]	1			1	1	1				1		1									
Redshank Tringa totanus [A162]		1		1	1	1			1	1		1									
Turnstone Arenaria interpres [A169]		1				1													1		
Little Tern Sterna albifrons [A195]		1										1								1	
Arctic Tern (Sterna paradisaea) [A194]								1		1				1							
Black-headed Gull (Chroicocephalus ridibundus) [A179]				1		1				1		1								1	
Common Gull (Larus canus) [A182]				1																	
Common Scoter (Melanitta nigra) [A065]				1							1										
Common Tern (Sterna hirundo) [A193]								1		1				1							
Cormorant (Phalacrocorax carbo) [A017]											1	1				1	1	1			
Curlew (Numenius arquata) [A160]				1		1						1									
Dunlin (Calidris alpina) [A149]				1	1	1			1	1		1									
Goldeneye (Bucephala clangula) [A067]					1							1									
Great Crested Grebe (Podiceps cristatus) [A005]				1	1							1									
Greenland White-fronted Goose (Anser albifrons flavirostris) [A395]											1	1	1								
Greylag Goose (Anser anser) [A043]				1					1								1		1		

Herring Gull (Larus argentatus) [A184]				1			1									1	1	1	1	
Lesser Black-backed Gull (Larus fuscus) [A183]												1					1			
Mallard (Anas platyrhynchos) [A053]				1								1								
Pintail (Anas acuta) [A054]				1	1	1						1								
Red-breasted Merganser (Mergus serrator) [A069]				1	1							1								
Red-throated Diver (Gavia stellata) [A001]											1								1	
Roseate Tern (Sterna dougallii) [A192]								1		1				1						
Shoveler (Anas clypeata) [A056]						1			1											
Teal (Anas crecca) [A052]				1		1						1							1	
Wetlands & Waterbirds [A999]	1	1	1	1	1	1	1		1	1	1	1	1						1	
Wigeon (Anas penelope) [A050]												1	1						1	
Kittiwake (Rissa tridactyla) [A188]															1	1	1			1
Guillemot (Uria aalge) [A199]																1	1			
Razorbill (Alca torda) [A200]																1	1			
Puffin (Fratercula arctica) [A204]																	1			
Shag (Phalacrocorax aristotelis) [A018]																	1	1		
Fulmar (Fulmarus glacialis) [A009]																	1			
Common Whitethroat (Sylvia communis) [A309]																				1

4.2 Overview of sectoral activities

4.2.1 Seed mussel fishery

4.2.1.1 Stock status

Sub-tidal stocks of mussel in the western Irish Sea develop from seed settlement in spring on coarse substrates. Most of the beds were previously thought to be ephemeral features which were frequently washed out or predated on prior to mussels maturing. However, survey data over the period 2018-2022 shows various levels of survival overwinter and the presence of mixed age classes (BIM survey reports; www.bim.ie, Figure 2). The degree of stability and permanency in the location of mussel beds varies spatially and temporally. Larvae settle in early summer, increase in size during summer and are present at least until late autumn. Although there can be a high turnover of mussel beds these ecological features are present for most of the year in areas where they develop. Longevity of individual beds were reported by Troost *et al*. (2022) to be 2.3 years. Some sub-tidal mussel beds in the Irish Sea, therefore, may contribute significantly to larval production in some areas and in some years. The stock status changes seasonally and is driven by recruitment and growth in spring and summer and mortality during winter.

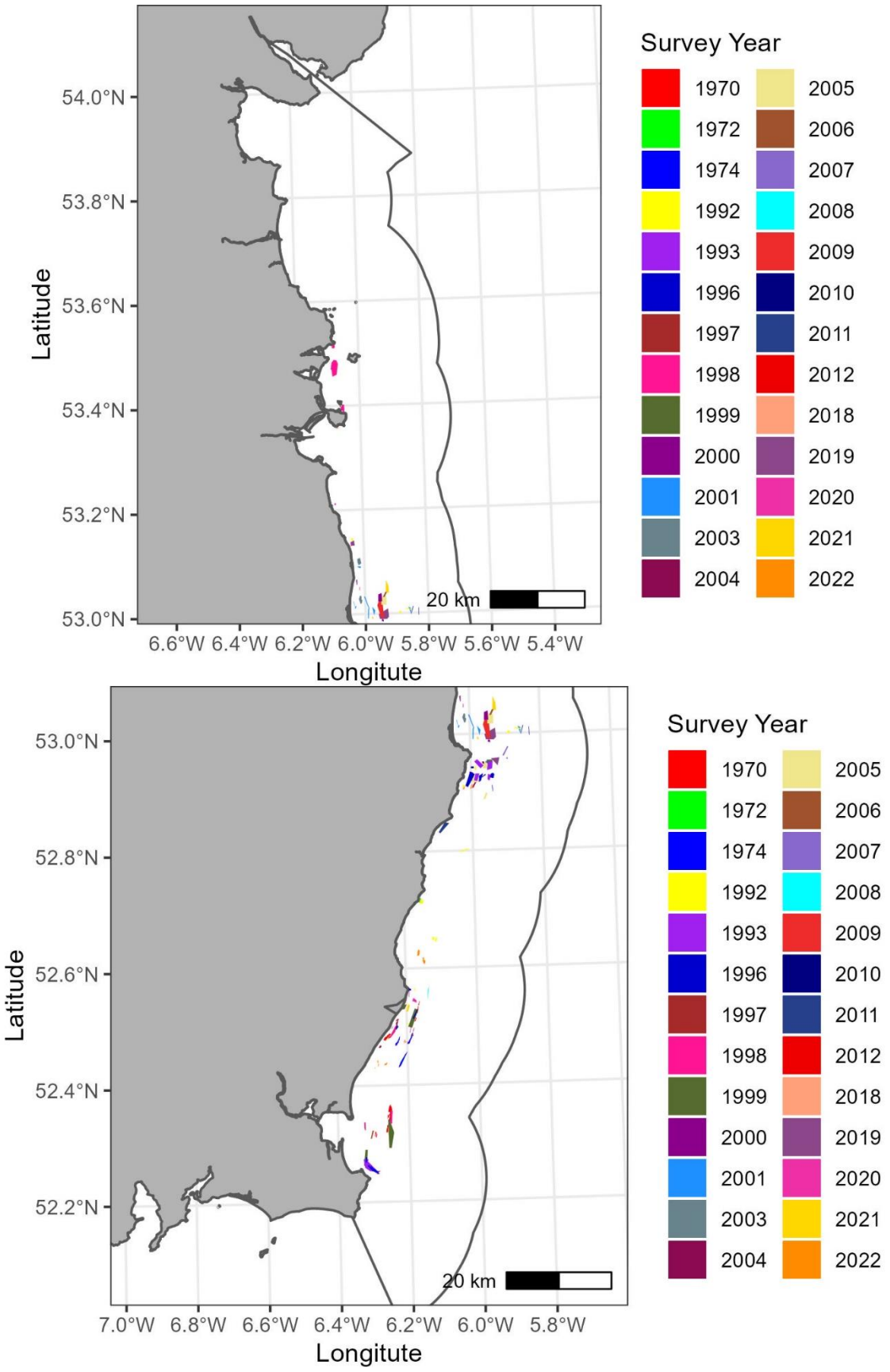

Figure 2 The location of seed mussel beds surveyed by BIM in the north (top) and south (bottom) Irish Sea between 2018 and 2022 (Source: BIM)

4.2.1.2 Seed mussel Fisheries Natura Plan

The seed mussel Fisheries Natura Plan proposes to fish for seed mussel in the Irish Sea each year in the period 2023-2027. The main conditions and constraints that will apply to this fishery, and as described in the Fisheries Natura Plan are as follows:

- Fishing is proposed in any or all seed beds that are found in any year in the Natura sites listed in the plan and external to those sites. These areas are likely to be on sand, mud, coarse sands and mixed sediments. Seed has been documented as occurring on suitable intertidal substrates in the Rockabill to Dalkey Island SAC and Howth, Lambay and Skerries and at Dunany point immediately adjacent to the Dundalk Bay SPA.
- Fishing by hand gathering in intertidal reef and mixed sediment habitats is not excluded and historically occurred along the Louth and North Dublin Coast.
- Fishing will occur on suitable neap tides (<7m as predicted in the Llanelli tide tables) subject to seed availability, allocation and suitable weather conditions. Suitable tides will be agreed at the first meeting of the BGMCF in the calendar year.
- Fishing may occur in early spring (2 tides) but mainly in autumn between Aug and Dec. Force majeure may be used to open the fishery at other times.
- A maximum of 70 days per year will be fished between the hours of 06:00 to 18:00 each day.
- A maximum of 35 vessels may be permitted in any given year. Each vessel will hold a seed mussel authorization. Generally, a lower number of vessels than this actually fish (Table 3).
- Mussel vessels over 15m in length are required to have the EU Vessel Monitoring System (VMS).
- Commercial dredges are 2-4m in width (on the mud bar), toothless and include a 2-3m long bag. The bottom part of the bag is made from chain mail or nylon mesh. Up to 4 dredges are used by each vessel depending on size. Where chain link is used rubber mat or rope dollies are to be attached to the belly of the dredge to minimize disturbance of the substrate.
- Seed beds are opened only when advised by the Bottom Grown Mussel Consultative Forum (BGMCF) and when the Minister authorizes that opening based on the advice. The main criteria are the presence of commercial quantities of seed and that the seed is of suitable size to survive post-harvest transport.
- Prior notification of fishing to SFPA is required.

- Logbooks are maintained by operators and catch data reported by SMS to SFPA.

4.2.1.3 BIM surveys

- BIM surveys are conducted between May and Sept using light and heavy box dredges and consist of three steps: 1. Surveying previously known beds to assess potential remaining stock which generates acoustic images from side scan sonar, these are then ground-truthed using a 1m dredge. 2. Seed mussel biomass is estimated, mapped and then randomly sampled using a 0.1m^2 day grab. A density map is then produced using an IDW interpolation. 3. A post fishery survey and analysis is then carried out using the same methods.
- In addition, commercial vessels may be permitted to survey for seed under permit from the SFPA. These surveys may occur prior to May and August opening dates over 1-2 tides. Given the large areas of the fishery not all beds are identified by a formal survey in advance of fishing. Beds may be discovered and exploited during the fishing season by industry. All seed fishing locations are reported via log book and SMS (mobile phone message) returns to the SFPA.

4.2.1.4 Fishing effort, landings and regulation

- Most of the fishing effort occurs from August onwards although in some years limited fisheries may occur in May. The number of days fished varied from 15-21 during the period 2017-2021 (Figure 3; Table 3). Contradictory to what the FNP states, all vessels over 12m in length are required to have VMS on board. VMS hotspots of fishing activity show general spatial correspondence with the BIM surveys. Precise mapping of the location of the fishery relative to the BIM surveys is limited due to the low resolution of the VMS data that was available for this screening report.
- A biomass of 1500 tonnes has been used in previous years as a minimum biomass required to open the fishery. This minimum is not referred to in the plan.

Table 3 Seed fishing statistics in NI and ROI waters between 2017-2021 (Source: Natura Fishery Plan 2023-2027)

Fishery Profile	2017	2018	2019	2020	2021
Total Seed fished (net)	6851	5286	10345	8921	9270
Days fished	21	15	21	20	16
Vessels	23	16	21	21	18

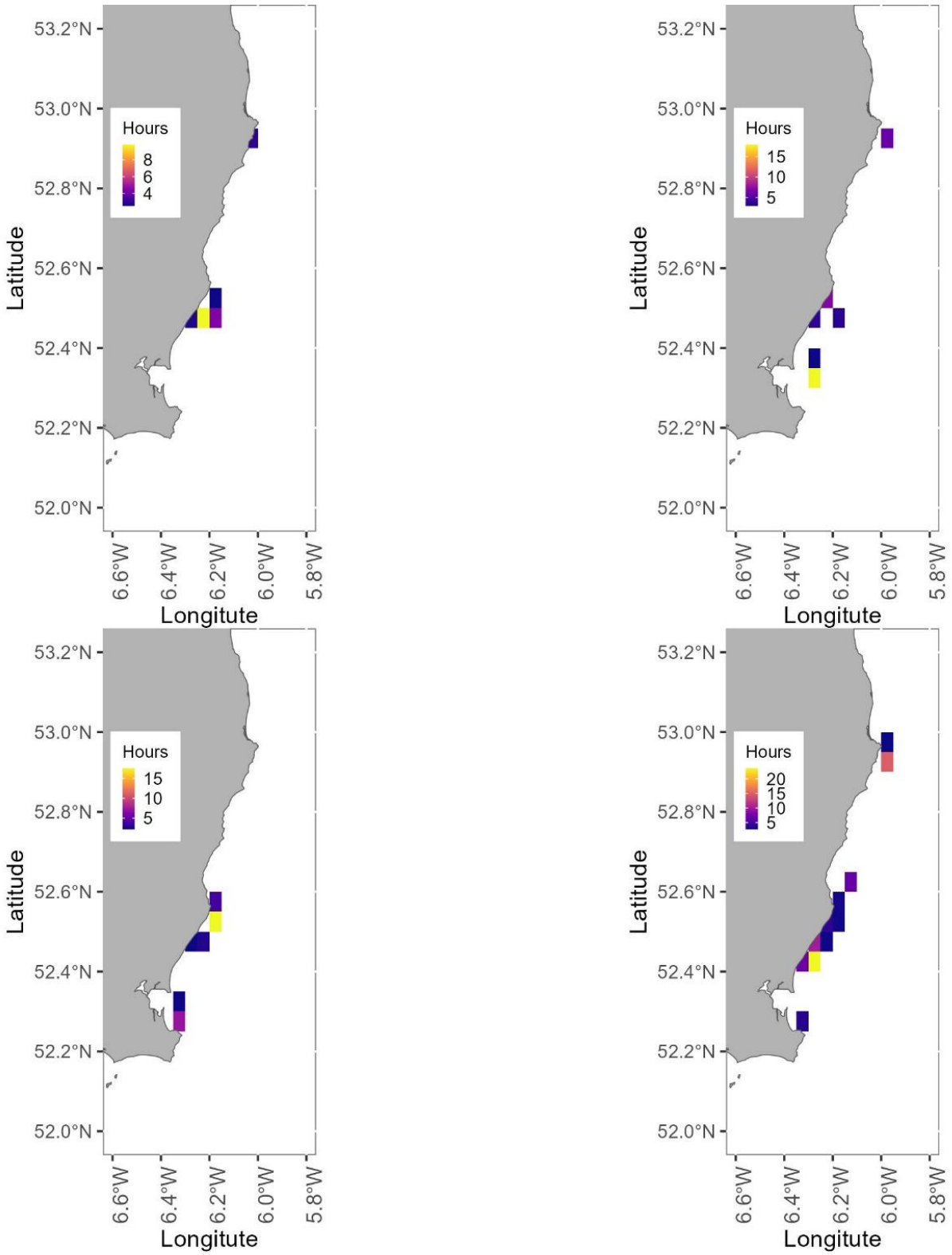

Figure 3 Distribution of fishing effort (VMS hrs) for seed mussel 2018-2021 and BIM survey effort in that year. VMS grid resolution is 0.05dd. VMS data associated with fishing was filtered at less than 4 knots and cells with less than 2 hours of fishing were removed from the plots in order to more accurately predict the actual spatial footprint of fishing. The precision of the footprint is limited by the low resolution of the VMS data which reports position every 2hrs.

4.2.1.5 Current exclusion zones

- Fisheries Natura Declarations 3/2018 and 2/2019 prohibit fishing in a number of SACs and SPAs or specific habitats in these sites (Table 45).
    - Fishing is excluded from 7 SACs and SPAs
    - Fishing is excluded from all intertidal habitats
    - Fishing is excluded from reef habitat in 3 SACs or SPAs (Figure 4).
- It is assumed for the purposes of this screening assessment that the fishery in the period 2023-2027 will comply with these exclusion zones even if some of the sites are listed in the FNP.

Table 4 SACs and SPAs which have seed mussel fishery exclusion zones implemented (as listed or inferred from FND 3/2018, 2/2019, Regulation 6(1) Determination 2018).

Site	Listed in FNP	Excluded area
Lambay Island SAC	Yes	Fishery excluded from site
Malahide Estuary SAC and SPA	Yes	Fishery excluded from site
Wicklow Reef SAC	Yes	Reef exclusion zone
Rockabill to Dalkey SAC	Yes	Reef exclusion zone
North Bull Island SPA	Yes	Fishery excluded from site
Rockabill SPA	Yes	Reef and intertidal exclusion zone
South Dublin Bay and River Tolka SPA	No	Fishery excluded from site
Baldoyle Bay SAC and SPA	No	Fishery excluded from site
Rogerstown Estuary SAC and SPA	No	Fishery excluded from site
Carnsore SAC	Yes	Fishery excluded from site

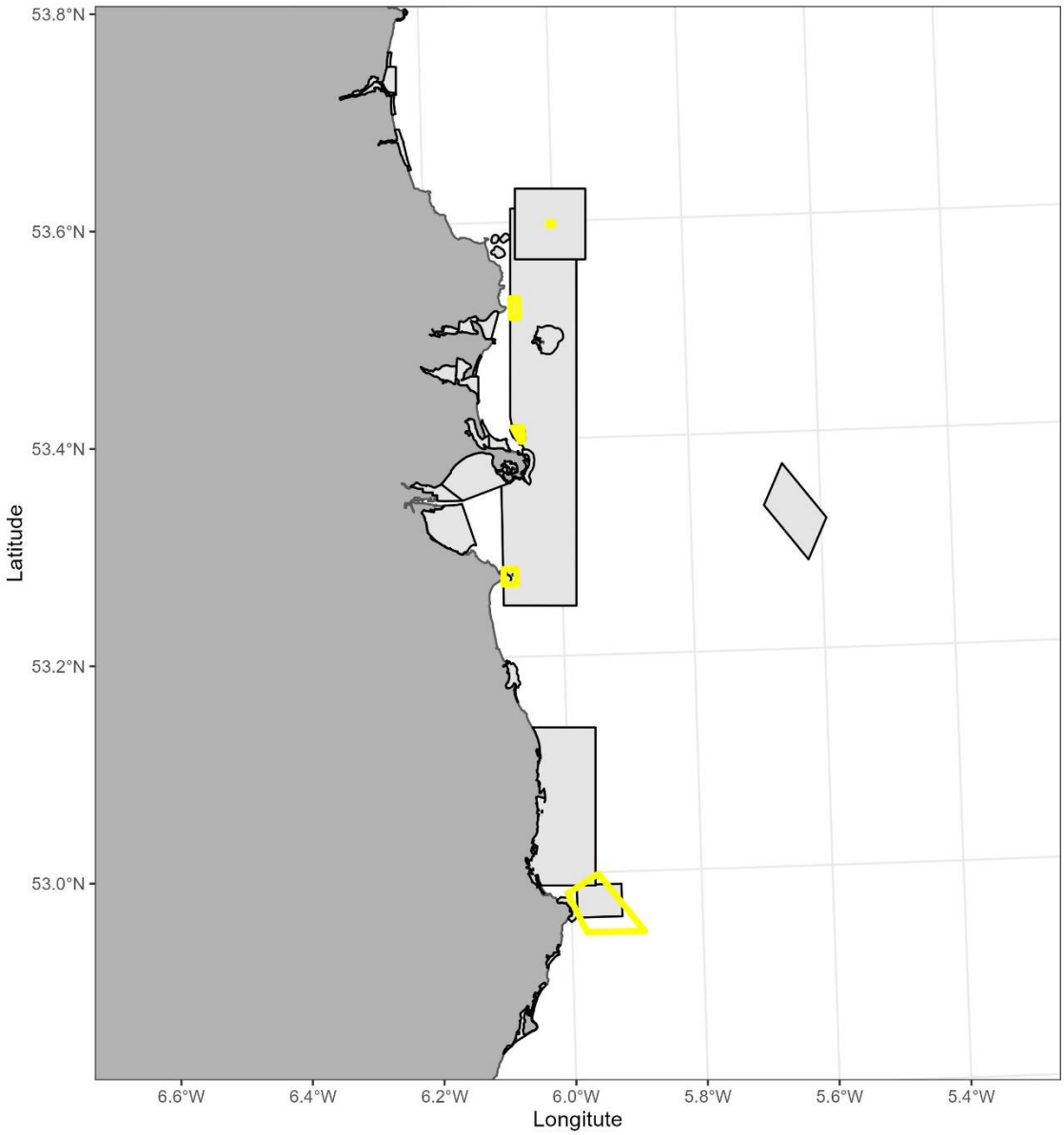

Figure 4 North Irish Sea SACs (black) with mussel exclusion zones on reef habitat (yellow)

4.2.2 Other fisheries

In addition to seed mussel fishing the main fishing activities in the western Irish Sea are (Table 5):

- Bottom trawling for *Nephrops* and mixed species of demersal fish
- Beam trawling for rays and flatfish
- Dredge fishing for scallop
- Dredge fishing for razor clams
- Dredging for cockle (Dundalk Bay only)
- Potting for whelk and crustaceans
- Trammel netting for bait

- Hand gathering of periwinkle

- Different fisheries occur in different areas reflecting the spatial distribution of target species, which in turn, for some species in particular, reflects the distribution of specific habitats (sediments, current speeds).
- The bottom trawl fishery, targeting *Nephrops* and to a lesser extent various species of groundfish, occurs mainly on mud and sandy mud in the north west Irish Sea.
- Inshore of the trawl fishery, in the north Irish Sea, and on coarser sediments, there is a scallop fishery prosecuted by a very limited number of inshore Irish vessels. Inshore vessels from Northern Ireland may also fish scallop in this area but seaward of the Irish baselines.
- Closer inshore, up to the lower water mark, a dredge fishery for Razor clams (*Ensis* spp.) occurs on muddy sand and mixed sediments in the area from Dundalk Bay south to Malahide and separately in Rosslare Bay and north to Curracloe off the east Wexford coast.
- Cockles are dredged in intertidal habitats in Dundalk Bay
- Lobster are fished with traps along coastal reefs.
- Crab are targeted in various areas both inshore and offshore on sedimentary habitats
- Further south, currents are stronger and sediments coarser. There is a significant, large vessel, scallop fishery offshore from Wicklow to Carnsore Pt which overlaps with a beam trawl fishery for rays and mixed demersal fish. Some bottom trawling also occurs here targeting rays and mixed demersal fish.
- Towards the coast there is an extensive and important pot fishery for whelk on the landward and seaward slopes of sandbanks.
- Mussel seed may be found in small patches at the edge of sand banks and on coarse sediments and rock which are scoured by strong currents.
- In some years and depending on quota availability, there is a pelagic fishery for herring off county Down in the western Irish Sea.

Table 5 Fishing metiers, target species, gears and data quality of the metiers in the Irish Sea.

Metier description	Target species	Scientific name	Gears	Static or mobile gear	Data quality
Trap – crustacean	Shrimp	*Palaemon serratus*	Shrimp pots	Static	Number of boats fishing known, amount of gear approximate, location of fishing generally known.
	Lobster	*Homarus gammarus*	Side and top entrance creels	Static	
	Crab	*Cancer pagurus*			

	Velvet crab	*Necora puber*			
Trap – whelk	Whelk	*Buccinum undatum*	Whelk pots	Static	Number of boats fishing known, amount of gear approximate, location of fishing generally known.
Dredge – benthic	Scallop	*Pecten maximus*	Spring loaded scallop dredge	Mobile	Number of boats fishing known, amount of gear known approximately, fishing on a defined footprint. VMS data vessels >12m
	Razor clam	*Ensis siliqua*	Hydraulic dredges	Mobile	Number of boats fishing known, amount of gear known. High resolution VMS data available for all vessels
	Cockle	*Cerastoderma edule*	Hydraulic dredges	Mobile	Good. iVMS tracking of vessels. Limited entry fishery
	Mussel	*Mytilus edulis*	Mussel dredge	Mobile	Historic distribution of mussel beds very well defined. VMS data all vessels
Beam trawl - demersal	Rays	Mixed species	Beam trawl	Mobile	Number of boats known, gear type and dimensions approximately known. VMS data all vessels.
	Plaice	*Pleuronectes platessa*			
	Sole	*Solea solea*			
Otter trawl – demersal	Plaice	*Pleuronectes platessa*	Bottom Otter trawl	Mobile	Number of boats known, gear type and dimensions approximately known. VMS data all vessels except a small number of trawlers under 12m.
	Prawns	*Nephrops norvegicus*			
	Cod	*Gadus morhua*			
	Sole	*Solea solea*			
	Haddock	*Melanogrammus aeglefinus*			
	Whiting	*Merlangius merlangus*			
	Pollack	*Pollachius pollachius*			
	Ray	Mixed species			
Hand gathering	Periwinkle	*Littorina littorea*	Hand picking	Mobile	Intensity and frequency of activity poorly known
Trammel net	Various fish		Trammel nets	Static	Intensity and frequency of activity poorly known

4.2.3 Other sectoral activity in the area

- There are three other sectors which are present in that area; shipping, aquaculture and the expect expansion of Offshore Renewable Energy (ORE) over the course of the FNP (Figure 1).
- All three sectors could interact in combination with the seed mussel fishery for disturbance pressure which flushes birds from foraging areas increasing energy expenditure.
- The main aquaculture areas are in Carlingford Lough and in Wicklow Harbour as well as some mussel long line production east of Arklow. Shipping density is mainly concentrated around Dublin port. There have been large applications for ORE developments including foreshore applications for site investigations (Figure 5).

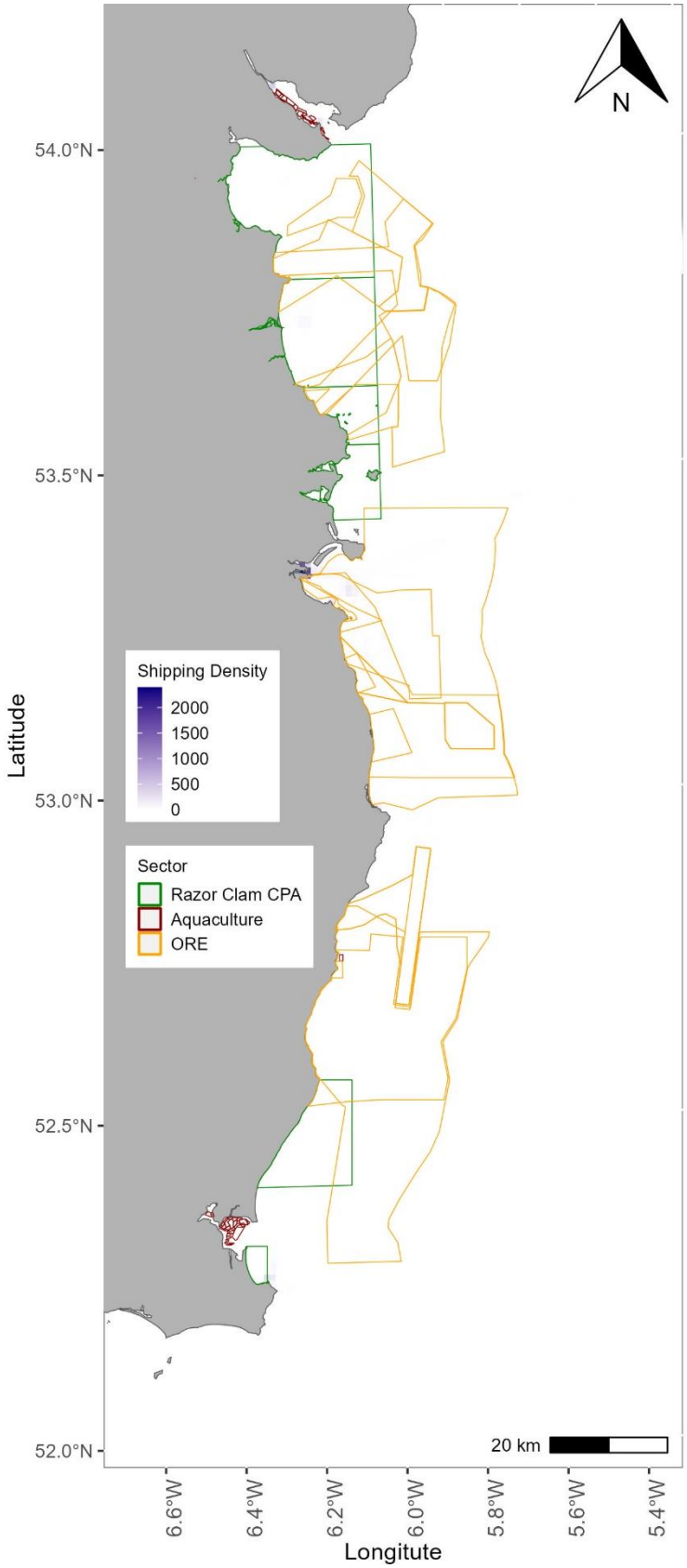

Figure 5 other sectors active within the Irish Sea. High shipping density is in dark blue, razor clam classified production areas are in green, aquaculture sites are in red and ORE sites with determinations are in orange.

5. Natura Impact Statement

- The seed mussel fishery, by using bottom dredges to fish for mussels, will cause physical abrasion to the sea bed.
- Mussel dredges do not penetrate the sediment so no shallow or deep disturbance of the sediment will occur. The disturbance is primarily at the surface.
- Seed mussel, which is a food source for a number of fish species, scavenging and predatory invertebrates and diving birds such as Common Scoter, will be removed.
- Non-target organisms, living in seed mussel beds, may be captured by the fishing gear. These include whelk, crab, starfish and flat fish.
- Vessels may cause disturbance to flocks of resting or foraging seabirds or cause disturbance to marine mammals.
- Seabird or mammal by-catch is highly unlikely.
- In summary, the main pressures likely to be exerted on the QIs are: abrasion (benthic habitats), competition for resources (birds), by-catch (benthic epifauna) and disturbance (birds, mammals).
- In addition to mussel dredging razor clam fishing occurs in close proximity to seed mussel fishing and is likely to remove seed mussel as bycatch. This effect could work in combination with the seed mussel fishery to exacerbate prey removal for bivalve feeding birds and disturbance from fishing vessels.
- Other sectors present in the area include shipping and aquaculture. In addition, offshore renewable energy is predicted to expand in the region throughout the course of the FNP (2023-2027). The main pressure exerted on QIs which could act in combination with the seed mussel fishery is disturbance on all bird QIs which could lead to exclusion from fishing grounds and increased energy expenditure due to continued flushing from an area.

6. Screening for Appropriate Assessment

A screening exercise is an initial evaluation of whether an activity could have or could not have a significant effect on QIs within Natura 2000 sites or on those QIs if they move out of the protected sites (*ex situ* effects). The screening process may, therefore, lead to exclusion of certain activities, projects or plans from appropriate assessment, thereby simplifying the assessments, if this can be justified, unambiguously, using limited and clear cut criteria. Screening should be used as a conservative filter that minimises the risk of false negatives.

6.1 Screening methods

- Screening filters were applied to the matrix of QIs and seed mussel fishing activities to determine if they could be screened out from further assessment as follows

  Filter 1 **(Feature filter)**: Where the nature of the QIs within the Natura 2000 is such that there is no possibility of an interaction with seed mussel fisheries, either within the site or out with the site, such QIs for the site are excluded from further assessment.

  Filter 2 **(Spatial overlap filter)**: Where the location of the Natura 2000 site and its QIs is such that seed mussel fisheries in the site could potentially interact with them but where data on current or previous seed mussel fishery activities indicates that seed mussel fisheries, past or present, have not occurred in the site, and where effects of *ex situ* seed mussel fishing activities can be discounted. An *ex situ* effect is where a fishery outside the site could affect a QI for which the site is designated e.g. birds from a given site might rely on a food resource which is outside of the site.

  Filter 3 **(Fisheries legislation filter)** Where current legislation already prohibits fishing in these Natura 2000 sites or on specific QIs within those sites e.g. reefs, then these QIs, for such sites, are excluded from further assessment.

QI-fishery interactions that are recommended for appropriate assessment therefore **include** the following:

1. Where the seed mussel fishery as described in the FNP overlaps spatially with a QI in a Natura 2000 site.
2. Seed mussel fishing activity that may be outside of Natura 2000 sites but which can interact with the QI because of the behaviour of the QI (such as seabird foraging areas). In these situations, the geographic scope of the assessment is determined on a case by case basis with the objective of capturing all seed mussel fishing activity that may interact with the QI for which the site is designated.

6.2 Screening methods: further comments on SPA QIs

- As noted for both SACs and SPAs screening filters have been applied to the matrix of QIs and seed mussel fisheries activities to determine if they can be excluded from further assessment. In the case of SPAs, and the bird species for which they have been designated, a number of other factors have also been taken into account to inform this process.
- Due to the variation in site character, the QIs for which Irish Sea SPAs are designated can include breeding, wintering and roosting birds. In the case of some of the tern species, sites such as Dalkey Island SPA (4172) are designated as an autumnal roost for large numbers of terns, while sites such as Wexford Harbour and Slobs (4076) are designated for both wintering and roosting Hen Harrier. For some QIs their status can vary from site to site with the same species categorised as either breeding, wintering and both according to the site in question (e.g. Cormorant & Herring Gull). As such the way in which a site is used by a QI species was considered as part of this assessment.
- Due to the extent of the area under consideration in this assessment QIs occupy a range of habitat types; forage in different ways and travel varying distances to feed thereby putting them at varying degrees of risk from ex-situ fishery practices. A literature review was undertaken to evaluate published data on habitat preferences, diet (Table 66) and dispersal distances of breeding birds (Table 77) from a colony for all species not screened out by the 2 step filter process outlined above; consideration is also given to foraging distances for birds from communal roosts (e.g. cormorant) or, where available, to non-breeding birds.

Table 6. Biological assessment of habitat preferences and diets of QIs in SPAs

Species	Habitat (only habitat preferences relevant to this study are included)	Diet (dominant component)
Common Whitethroat ***Sylvia communis*** **[A309] breeding**	Coastal Scrub	Insects
Hen Harrier ***Circus cyaneus*** **[A082] non-breeding / roosting**	Coastal wetlands	Birds / small mammals
Red-throated Diver ***Gavia stellata*** **[A001] non-breeding**	Shallow inshore & coastal waters	Mainly fish
Little Grebe ***Tachybaptus ruficollis*** **[A004] non-breeding**	Ponds, lakes and shallow, sheltered coastal / estuarine waters	Mainly fish / Invertebrates
Great Crested Grebe ***Podiceps cristatus*** **[A005] non-breeding**	Shallow inshore & coastal waters outside the breeding season	Mainly fish
Cormorant ***Phalacrocorax carbo*** **[A017] non-breeding & breeding**	Fairly sheltered waters; avoids deep water. Breeds on offshore islands	Fish
Shag ***Phalacrocorax aristotelis*** **[A018] breeding**	Coastal waters; nesting on cliff ledges. Prefers to forage in sheltered waters	Fish
Grey Heron	Estuaries & coastal rocky shore	Fish

Ardea cinerea **[A028] non-breeding**		
Red-breasted Merganser ***Mergus serrator*** **[A069] non-breeding**	Shallow inshore & coastal waters	Fish, crustaceans
Bewick's Swan ***Cygnus columbianus*** **[A037] non-breeding**	Coastal wetlands, estuaries and rocky shorelines (in case of brent geese & wigeon)	Plant Material
Whooper Swan ***Cygnus cygnus*** **[A038] non-breeding**		
Greylag Goose ***Anser anser*** **[A043] non-breeding**		
Brent Goose ***Branta bernicla hrota*** **[A046] non-breeding**		
Wigeon ***Anas penelope*** **[A050] non-breeding**		
Coot ***Fulica atra*** **[A125] non-breeding**	Coastal wetlands; ponds, lakes & brackish lagoons	Plant Material (some animal matter also)
Teal ***Anas crecca*** **[A052] non-breeding**	Dabbling ducks – using shallow estuarine / coastal waters	Mixed plant / Invertebrate material
Mallard ***Anas platyrhynchos*** **[A053] non-breeding**		
Pintail ***Anas acuta*** **[A054] non-breeding**		
Shoveler ***Anas clypeata*** **[A056] non-breeding**		
Shelduck ***Tadorna tadorna*** **[A048] non-breeding**	Estuarine mudlfats	Bivalves; mainly *Hydrobia*
Scaup ***Aythya marila*** **[A062] non-breeding**	Coastal estuaries, bays & shallow marine waters	Mainly molluscs / crustaceans
Common Scoter ***Melanitta nigra*** **[A065] non-breeding**	Coastal estuaries, bays & shallow marine waters	Bivalves
Goldeneye ***Bucephala clangula*** **[A067] non-breeding**	Coastal estuaries, bays & shallow marine waters	Mainly molluscs / crustaceans
Oystercatcher ***Haematopus ostralegus*** **[A130]**	Intertidal waders using estuarine and coastal intertidal habitats and, for some species, often associated grasslands	Poychaetes, oligochaetes, molluscs, insects etc.
Ringed Plover ***Charadrius hiaticula*** **[A137]**		
Golden Plover ***Pluvialis apricaria*** **[A140]**		
Grey Plover ***Pluvialis squatarola*** **[A141]**		
Lapwing ***Vanellus vanellus*** **[A142]**		
Knot ***Calidris canutus*** **[A143]**		
Sanderling ***Calidris alba*** **[A144]**		
Purple Sandpiper ***Calidris maritima*** **[A148]**		
Dunlin ***Calidris alpina*** **[A149]**		
Black-tailed Godwit ***Limosa limosa*** **[A156]**		
Bar-tailed Godwit ***Limosa lapponica*** **[A157]**		
Curlew ***Numenius arquata*** **[A160]**		
Redshank ***Tringa totanus*** **[A162]**		
Turnstone ***Arenaria interpres*** **[A169]**		
Black-headed Gull ***Chroicocephalus ridibundus*** **[A179] non-breeding**	Very adaptable using both coastal, inshore & inland habitats	Varied - Plant & Animal
Common Gull ***Larus canus*** **[A182] non-breeding**	Coastal	Fish & invertebrates (incl. bivalves)
Lesser Black-backed Gull ***Larus fuscus*** **[A183] non-breeding**	Coastal & at sea	Omnivore (fish dominant)
Herring Gull ***Larus argentatus*** **[A184] non-breeding & breeding**	Breeds on coastal cliffs / island. Winters all along the coast & inland	Omnivore (including scavenging)

Kittiwake *Rissa tridactyla* [A188] breeding	Breeds on sea cliffs; feeds at sea	Fish, crustaceans
Roseate Tern *Sterna dougallii* [A192] breeding	Coastal waters	Small Fish
Common Tern *Sterna hirundo* [A193] breeding	Coastal waters	Small Fish
Arctic Tern *Sterna paradisaea* [A194] breeding	Coastal waters	Small Fish
Little Tern *Sterna albifrons* [A195] breeding	Coastal waters	Small Fish
Guillemot *Uria aalge* [A199] breeding	Breeds on sea cliffs; feeds at sea	Small fish & invert.
Razorbill *Alca torda* [A200] breeding	Breeds on sea cliffs; feeds at sea	Small fish & invert
Puffin *Fratercula arctica* [A204] breeding	Breeds on sea cliffs; feeds at sea	Small fish & invert
Fulmar *Fulmarus glacialis* [A009] breeding	Breeds on sea cliffs; feeds at sea	Fish, offal (discards), crustaceans

- An analysis of average foraging distances was also undertaken. The main source of information for this assessment was a review of the distances over which waterbirds forage offshore as part of a *Habitats Regulations Assessment of the Draft Plan for Offshore Wind Energy in Scottish Territorial Waters: Appropriate Assessment Information Review* (SNH 2011)[1] as well as a review of sources such as BWPi (Cramp & Simmons 2004) (Table 7).

[1] This can be viewed in full at:

https://webarchive.nrscotland.gov.uk/3000/https://www.gov.scot/Publications/2011/03/04165857/71

Table 7. Summary of foraging ranges (km) (including breeding seabirds) [* Quoted by Marine Scotland, 2011]

	Birdlife International 2010*	BLI Mean Max*	BTO Review (Roos *et al*., 2009 in ABPmer 2010)*	Furness & Tasker (2000)*	Ratcliffe *et al*. (2000)*	Fenny & Walls (2009)*	Seabirds Wikispace Max	Seabirds Wikispace Mean Max	Seabirds Wikispace Mean	Cramp & Simmons, 2004	Various Sources, See Annex II
Red-throated Diver [A001]	50	12	13	<5			50	12.21	11.06	5-10	9-29
Little Grebe [A004]											
Great Crested Grebe [A005]											
Cormorant [A017]	50	32	35	<5		15	50	31.67	8.46	3-10	5-22
Shag [A018]	20	16	17	<10		15	20	16.42	6.53	50	
Red-breasted Merganser [A069]											60
Common Scoter [A065]	200	8	unknown				200	8.2	4.5		
Black-headed Gull [A179]					<15						
Lesser Black-backed Gull [A183]							44-84			20-80	5.4-37.8
Herring Gull [A184]			54	<10	<40	40				22-63	40
Kittiwake [A188]							200	65.81	25.45	10-35	13-73
Roseate Tern [A192]	30	18				20-30	30	18.28	12.3		
Common Tern [A193]	37	34					37	33.81	8.67		
Arctic Tern [A194]	20.6	12	25	<5		20-30	20.6	12.24	11.75		
Little Tern [A195]	11	7					11	6.94	4.14		32-100
Guillemot [A199]	200	61	123	<50		40	200	60.61	24.49	9-20	40
Razorbill [A200]	51	31	150	<20		40	51	31	10.27		
Puffin [A204]							200	62.2	30.35		
Fulmar [A009]	664	311	245	>50		>100	664	311.43	69.35		10-30

6.4 Screening outcome for individual effects of the seed mussel fishery

6.4.1 SACs

- 31 QIs across 24 sites were excluded from further assessment based on the feature filter (filter 1) (Table 1). The seed mussel fishery has no overlap with these habitats and there are no *ex situ* effects.
- 2 QIs across 6 sites were excluded from further assessment using the spatial overlap filter (filter 2) (Table 1). The seed mussel fishery plan does not indicate that seed fishing will occur in these sites, there is no historic or current fishing in these sites or there are already exclusion zones in place in these sites which prohibit fishing for seed mussel (FND 3/2018, 2/2019). Fishing is not currently prohibited in the following SACs but there has not been any history of fishing for seed mussel in these sites: Intertidal habitats in Slaney River valley SAC has mussel aquaculture, in Wexford Harbour, which has been subject to a separate appropriate assessment. Much of the intertidal mudflat of Raven Point SAC is also in Wexford Harbour west of Raven point. There are no significant mussel beds in intertidal habitats in Dundalk Bay (source: MI annual intertidal surveys for cockles and associated bivalves). There is no history of fishing or no proposed fishing in the Boyne coast SAC.
- 3 QIs across 7 sites were excluded from further assessment using the fisheries legislation filter (filter 3) (Table 1; Table 5). Fishing is excluded from all intertidal habitats and are fully excluded from Lambay Island SAC, Malahide Estuary SAC, Baldoyle Bay SAC and Rogerstown Estuary SAC, Carnsore SAC so all remaining QIs in these sites are filtered out. In addition, Wicklow Reef SAC, Rockabill to Dalkey SAC have exclusion zones around reefs so these QIs at these sites are filtered out using the fisheries legislation filter.

6.4.2 SPAs

- Common Whitethroat, a species of interest at Wicklow Head SPA and Hen Harrier within Wexford Harbour and Slobs SPA was screened out by the feature filter (filter 1) as there is no possible spatial overlap between this species and the seed mussel fishery (Table 1).
- 49 QIs across 11 sites were screened out as there hasn't been any fishing in these sites in the past, the fishery plan does not explicitly propose any fishing for mussel in these sites (spatial overlap filter, filter 2) or there are exclusion zones which prohibit fishing for seed mussel in intertidal habitats in these sites (fisheries legislation filter, filter 3). Ex situ effects of mussel fishing, in terms of prey removal or disturbance and displacement can be discounted for gulls and terns (Table 1).

6.5 Screening outcome for in combination effects with the seed mussel fishery

- There is potential for in combination effects of prey removal between the seed mussel FNP and the razor clam fishery. The Classified Production Area (CPA) within which the razor clams can be fished overlaps spatially with the seed mussel VMS and the BIM survey areas. Therefore, we recommend that the in combination effects of seed mussel with the razor clam fishery should be brought forward for appropriate assessment.
- The small number of vessels and limited number of days fished by seed mussel dredgers means that overall disturbance from seed mussel fishing is not significant compared to the impact from shipping. In addition, there is no spatial overlap between these activities. Therefore, in combination effects of the seed mussel fishery with shipping and aquaculture are screened out.
- Data on ORE developments is currently very limited. Information on number of turbines, spatial distribution of turbines, area developed, construction and maintenance ports are not currently available. There is likely to be significant disturbance effect from increased shipping during construction phase and possible exclusion of birds from foraging areas during production phase. It is possible that this could overlap with seed mussel fishing areas. Therefore, as a precautionary approach we recommend that in combination effects should be brought forward for an appropriate assessment.

7. Conclusions and recommendations

There are four SAC sites which could not be screened out and which require appropriate assessment. These include Sandbanks which are slightly covered by seawater all the time within both Long Bank and Blackwater Bank SACs and where surface abrasion pressure could impact the qualifying habitat and its marine communities. In addition, the three marine mammal species, Harbour porpoise (Rockabill to Dalkey), Grey seal and Harbour seal (Lambay Island) are at potential risk from disturbance and warrants further assessment (Table 8).

Table 8. List of QIs and habitat features in the Irish Sea SACs to be assessed and the pressures exerted by the seed mussel fishery on those QIs or features.

Site no.	Name	Qualifying interests	Features	Pressure from seed mussel fishery
2161	Long Bank	1110 Sandbanks which are slightly covered by sea water all the time	Sand with Nephtys cirrosa and Bathyporeia elegans community complex	Surface disturbance and abrasion
2953	Blackwater Bank	1110 Sandbanks which are slightly covered by sea water all the time	Sand with Nephtys cirrosa and Bathyporeia elegans community complex	Surface disturbance and abrasion
2953	Blackwater Bank	1110 Sandbanks which are slightly covered by sea water all the time	Cobble with Epifaunal community	Surface disturbance and abrasion
3000	Rockabill to Dalkey	1351 Harbour porpoise *Phocoena phocoena*		Disturbance
0204	Lambay Island	1364 Grey Seal *Halichoerus grypus* 1364 Harbour Seal *Phoca vitulina*		Disturbance

Within the SPAs, all QIs within 7 sites, The Raven, Howth Head Coast, Irelands Eye, Skerries Islands, Wicklow Head, Dalkey Island and The Murrough where seed mussel fishing is likely to occur are at risk from disturbance and warrant appropriate assessment (Table 9). In addition to this Common scoter, which is an offshore bivalve feeder, may be susceptible to both *in situ* and *ex situ* effects of prey removal and should be subject to appropriate assessment for The Raven SPA and Dundalk Bay SPA (Table 9).

Table 9. Pressures exerted by the seed mussel fishery per SCI and SPA which were taken forward for appropriate assessment.

Site no.	Name	Qualifying interests	Pressure from seed mussel fishery
4019	The Raven	Red-throated Diver (*Gavia stellata*) [A001]	Disturbance
4019	The Raven	Cormorant (*Phalacrocorax carbo*) [A017]	Disturbance
4019	The Raven	Common Scoter (*Melanitta nigra*) [A065]	Prey removal, disturbance

4026	Dundalk Bay	Common Scoter (*Melanitta nigra*) [A065]	Prey removal, disturbance
4113	Howth Head Coast	Kittiwake (*Rissa tridactyla*) [A188]	Disturbance
4117	Irelands Eye	Cormorant (*Phalacrocorax carbo*) [A017]	Disturbance
4117	Irelands Eye	Herring Gull (*Larus argentatus*) [A184]	Disturbance
4117	Irelands Eye	Kittiwake (*Rissa tridactyla*) [A188]	Disturbance
4117	Irelands Eye	Guillemot (*Uria aalge*) [A199]	Disturbance
4117	Irelands Eye	Razorbill (*Alca torda*) [A200]	Disturbance
4122	Skerries Islands	Cormorant (*Phalacrocorax carbo*) [A017]	Disturbance
4122	Skerries Islands	Shag (*Phalacrocorax aristotelis*) [A018]	Disturbance
4122	Skerries Islands	Herring Gull (*Larus argentatus*) [A184]	Disturbance
4127	Wicklow Head	Fulmar (*Fulmarus glacialis*) [A009]	Disturbance
4127	Wicklow Head	Kittiwake (*Rissa tridactyla*) [A188]	Disturbance
4127	Wicklow Head	Guillemot (*Uria aalge*) [A199]	Disturbance
4127	Wicklow Head	Razorbill (*Alca torda*) [A200]	Disturbance
4172	Dalkey Island	Roseate Tern (*Sterna dougallii*) [A192]	Disturbance
4172	Dalkey Island	Common Tern (*Sterna hirundo*) [A193]	Disturbance
4172	Dalkey Island	Arctic Tern (*Sterna paradisaea*) [A194]	Disturbance

It is recommended that prey removal by the razor clam fleet working in combination with the seed mussel fishery be carried forward for an appropriate assessment. Finally, it is recommended that disturbance from ORE and seed mussel fishing be carried forward for appropriate assessment.