Report supporting Appropriate Assessment Screening of Extensive Aquaculture in Dundalk Bay SAC [Site Code: 000455] and Dundalk Bay SPA [Site Code: 004026].

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1 Introduction

This is an Appropriate Assessment Screening document supporting the Appropriate Assessment of extensive aquaculture activities in Dundalk Bay, Co. Louth. This report assesses the potential effects of proposed extensive aquaculture activities on the Qualifying Interests (QIs) of the Dundalk Bay SAC and the Dundalk Bay SPA, among other Natura sites and features.

Extensive aquaculture is defined in Regulation 3(iii) of the Aquaculture (Licence Applications) (Amendment) Regulations 2018[1] as "aquaculture activities where there is no external supply of feed and the culture depends entirely on natural processes for production and supply of feed". Shellfish (molluscs, echinoderms, bivalves and gastropods) and seaweed aquaculture fall within this definition.

This report is to consider if the proposed aquaculture activities are likely to significantly affect the QIs or SCIs of Natura 2000 sites in view of their Conservation Objectives (COs). This is achieved by following the screening process in Section 5. If there is potential for the activities considered to likely, significantly affect QIs and their conservation features, they will be carried forward for full assessment and considered on a cumulative basis with other aquaculture activities and other potentially disturbing activities.

The information upon which this assessment is based is a list of applications and extant licences for aquaculture activities administered by the Department of Agriculture Food and the Marine (DAFM) and supplied to the Marine Institute; as well as information provided by the applicants in the form of a profile to Bord Iascaigh Mhara (BIM)[2]. The spatial extent of aquaculture licences is derived from a database managed by the DAFM[3].

1.1 Legislative Context

Articles 3 - 16 of the European Community (EC) Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna (the Habitats Directive[4]) provide the legislative means to protect habitats and species of Community interest through the conservation of an EU-wide network of protected sites, known as Natura 2000 sites[5].

The Habitats Directive was originally transposed into Irish law by the European Communities (Natural Habitats) Regulations, 1997 (S.I. No. 94 of 1997). The 1997 Regulations were subsequently replaced by the *European Communities (Birds and Natural Habitats) Regulations 2011*[6], as amended (referred to as the *2011 Birds and Natural Habitats Regulations*). Natura 2000 sites are referred to as European sites in these Regulations. The terms Natura 2000 sites and European sites are synonymous - the term Natura 2000 sites is used in this report. Natura 2000 sites in Ireland form part of the Natura 2000 European network of protected sites, include Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

[1] Fisheries (Amendment) Act 1997 - Revised Acts
[2] BIM, 2022. Appropriate Assessment Profile – Dundalk Bay, Co Louth. (2022 - unpublished report)
[3] DAFM - Aquaculture viewer – AquaMIS Link
[4] The Habitats Directive https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
[5] Natura 2000 https://ec.europa.eu/environment/nature/natura2000/index_en.htm
[6] European Communities (Birds and Natural Habitats) Regulations 2011 NPWS Link

SACs are designated due to their significant ecological importance for habitats and for species protected under Annex I and Annex II respectively of the Habitats Directive. SPAs are designated for the protection of populations and habitats of bird species protected under the Birds Directive, EC 79/409/EEC[7]. The specific named habitats and/or (non-bird) species for which a SAC is designated are called the Qualifying Interests (QI) of the site. The specific named bird species for which a SPA is designated is called the 'Special Conservation Interests' (SCI). However, in practice, the common terminology of QI applies also to SCI. The term QI is used throughout this report.

Under Article 6(3) of the Habitats Directive any plan or project likely to significantly affect, either individually or in combination with other plans or projects (and it is not connected with or necessary for the management of a protected site), the integrity of a Natura 2000 site must be subject to an Appropriate Assessment (AA). The AA focuses on the likely significant effects of a plan or project on a Natura 2000 site and considers the implications for the site in view of its Conservation Objectives (COs). Every Natura 2000 site has COs which are set out by the National Parks and Wildlife Service (NPWS) - the competent authority for the management of Natura 2000 sites in Ireland. The AA process must also consider any plan or proposal in combination with other activities that have the potential to significantly affect the integrity of the Natura 2000 site.

DAFM is the aquaculture licensing authority under the *Fisheries (Amendment) Act (1997)*[8] and has responsibility for foreshore licensing functions in respect of activities wholly or primarily for the use, development or support of aquaculture under the Foreshore Act (1933)[9]. They determine applications for new, or renewal or review of, aquaculture and foreshore licences. They are also the competent authority responsible for the undertaking an AA of aquaculture licence applications. As part of the licensing process DAFM must determine if the proposed aquaculture activities, individually or in-combination with other activities, are likely to significantly impact the Conservation Status of QIs and the integrity of the Natura 2000 site. DAFM must base its determination on an AA and is also responsible for ensuring that an AA is carried out.

AA of aquaculture operations are carried out against the Conservation Objectives for the conservation features of the Natura 2000 site, as defined by the NPWS. This report supporting the AA, informs part of the assessment process – Stage 1 Screening

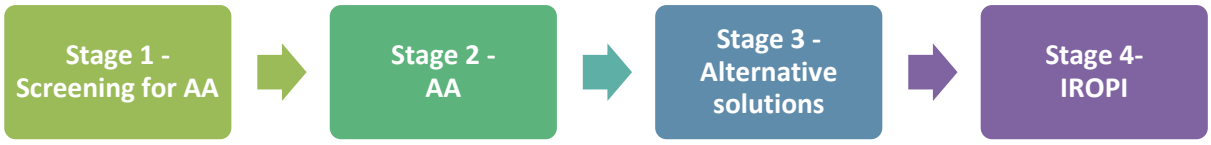
1.2 Appropriate Assessment (AA) Process

The requirement for an AA derives directly from Article 6(3), which outlines the decision-making tests for considering plans and projects that may have a significant effect on a Natura 2000 site. No definition of the content or scope of AA is given in the Habitats Directive, but the concept and approach are set out in EC guidance[10]. The *Guidance on Appropriate Assessment of Plans and Projects in Ireland* document[11] published by the Department of Environment, Heritage and Local Government (DEHLG) in 2009, sets out how an AA of plans

[7] The Birds Directive https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
[8] Fisheries (Amendment) Act, 1997 Lawreform.ie
[9] Foreshore Act 1933 Revised Acts (lawreform.ie)
[10] EC 2018. Guidance on Aquaculture and Natura 2000 Sustainable aquaculture activities in the context of the Natura 2000 Network Link
[11] DEHLG, 2009. Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Link

or proposals in Natura 2000 sites in Ireland should be carried out in alignment with EC guidance. In 2021, the Office of the Planning Regulator (OPR) published a practice note on AA Screening[12], which provides guidance on how a planning authority should screen an application for planning permission for AA.

The *Guidance on Appropriate Assessment of Plans and Projects in Ireland* document promotes a four-stage process to complete the AA. The four stages are:



The key procedures involved in completing the first two stages of the AA process are described below. Stage 3 and Stage 4 (Imperative reasoning of overriding public interest) are not applicable here.

1.2.1 Stage 1: Appropriate Assessment Screening (this report)

Stage 1 AA Screening is the process that addresses and records the reasoning and conclusions in relation to whether a plan or project, alone or in combination with other plans and projects, is likely to have significant effects on a Natura 2000 site in view of the site's COs. If any effects, on the basis of objective information, are deemed to be significant, potentially significant, or uncertain, or if the screening process becomes overly complicated, then the process must proceed to *Stage 2 Appropriate Assessment*. Screening should be undertaken without the inclusion of mitigation. The triggers during Appropriate Assessment screening are based on the '*likelihood*' of a potential significant effect occurring and not on certainty. This test is based on the precautionary principle[13]. A high degree of evidence and justification is needed in circumstances when the process ends at screening stage on grounds of no likely significant effect.

1.2.2 Stage 2: Appropriate Assessment

This stage considers whether the plan or project, alone or in combination with other projects or plans, will have adverse effects on the integrity of a Natura 2000 site, and includes any mitigation measures necessary to avoid, reduce or offset negative effects. This stage requires a targeted scientific examination of the plan or project and the relevant Natura 2000 sites, to identify and characterise any possible implications for the site in view of the site's QIs and COs, taking account of in combination effects.

The sensitivity of identified QIs in relation to the proposed activities is assessed and the significance of any identified adverse effects is then determined. If adverse effects are determined to be likely, then their scale, magnitude, intensity, and duration are considered in light of the COs and relevant guidance documents. If the assessment is negative, then recommendations on mitigation measures or on licensing decisions will be made.

[12] OPR - Office of Planning Regulator (2021). Appropriate Assessment Screening for Development Management. March 2021. 43pp Link
[13] OPR - Office of Planning Regulator (2021). Appropriate Assessment Screening for Development Management. March 2021. 43pp Link

1.3 Data sources

This process and report rely on data and information from a broad range of diverse sources. Some of the key sources of information that are generally viewed, consulted and/or utilised to inform the screening and AA processes are listed below. Others are consulted as required, and significant sources are cited in the reports.

Reference documents and Sources of information used to inform this process include:

- The Application
- DAFM Aquaculture & Foreshore Management website
- DAFM - Aquaculture viewer – AquaMIS
- National Parks & Wildlife (NPWS) protected site, marine habitats and community type information
- NPWS Guidance documents
- BIM profiling report[14]
- Targeted scientific studies
- Primary research literature
- Grey literature, reviews and report documents
- Expert opinion
- Direct queries to applicants through DAFM
- Fisheries (Amendment) Act 1997
- Aquaculture (Licence Application) Regulations, 1998
- Aquaculture (Licence Application) (Amendment) Regulations 2018
- Ireland's Marine Atlas
- MI/BIM Inshore fishing reports
- DHLGH Foreshore licencing database
- EPA GeoHive
- EPA maps tool
- NPWS Status of EU Protected Habitats and Species in Ireland – Article 17 (Habitats & species
- EU Commission assessments of bird's population status and trends web tool
- Marine Life Information Network
- EPA Catchments.ie dashboard
- Ordnance Survey of Ireland (OSI)
- National Biodiversity Data Centre
- European Environmental agency
- OPR, 2021. Appropriate Assessment Screening for Development Management. March 2021; Office of Planning Regulator.
- DEHLG, 2009. Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities. NPWS, 2009 – updated in 2010 with reference to Natura Impact Statement.
- Möckel, S., 2017. The European ecological network "Natura 2000" and the appropriate assessment for projects and plans under Article 6 (3) of the Habitats Directive. Nature Conservation, 23.
- NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 1: Summary Overview. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill.
- EC Article 6 - Managing and protecting Natura 2000 sites
- EC Management of Natura 2000 sites: Best Practice
- EC 2000. Managing Natura 2000 sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.
- EC 2002. Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC. Office for Official Publications of the European Communities, Luxembourg.
- EC 2006. Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg.

[14] BIM, 2022. Appropriate Assessment Profile – Dundalk Bay, Co Louth. (2022 - unpublished report)

- EC 2018. Guidance on Aquaculture and Natura 2000 Sustainable aquaculture activities in the context of the Natura 2000 Network.
- EC 2012. Common methodology for assessing the impact of fisheries on marine Natura 2000. Service Contract No. 070307/2010/578174/SER/B. DGEnv Brussels.
- Poelman *et al*., 2022. Study on state-of-the-art scientific information on the impacts of aquaculture activities in Europe.
- Federal Agency for Nature Conservation information for the FFH impact assessment
- ABPMer, 2013a – h. Tools for Appropriate Assessment of Fishing and Aquaculture Activities in Marine and Coastal Natura 2000 Sites. Marine Institute.
- Marlin.ac.uk
- AMBI Sensitivity Scale
- MarESA
- Marine Institute (2013). A risk assessment framework for fisheries in Natura 2000 sites in Ireland: with case study assessments. Version 1.3., Galway, 31pp.
- Open Street Maps, Google Earth, and Bing aerial photography

1.4 Assumptions made for Appropriate Assessment Reports

Certain assumptions are made for this screening report to ensure that it follows a precautionary approach when considering the extent, magnitude, intensity, and duration of the potential significant effects of the proposed activities. These are:

- All aquaculture sites considered in this report are assumed to be fully operational, in that the operations (as well as environmental impacts) are occurring across the entire area of the sites, unless otherwise specified.
- Where multiple species are proposed to be cultured at a site, and in the absence of specific details, the assessment assumes that culture species most probable to result in likely significant effects on the surrounding ecosystem or Natura 2000 QIs will be the primary culture species considered, and that it is cultured throughout the entire area of the proposed site. This ensures that the report considers the highest potential impact in relation to the prospective culture species interaction with the surrounding environment.
- Other assumptions may be identified on a case-by-case basis and clearly communicated in the AA report.

2 Overview of Proposed Aquaculture Activities in Dundalk Bay

Currently within Dundalk Bay there are no sites licenced for extensive aquaculture production. This report considers the likely interactions between six proposed aquaculture sites within Dundalk Bay and Natura 2000 conservation features. All six sites considered are new applications (Table 2-1 and Figure 2-1):

The proposed aquaculture sites and access routes to these sites are presented in Figure 2-2.

Table 2-1 Licenced aquaculture and applications for aquaculture activities considered in this report.

Site No.	Status	Species	Total Area* (ha)	Access Indicated
T01-097A	Application	Pacific oyster	1.9	Yes
T01-122A	Application	Pacific oyster	13.1	Yes
T01-099A	Application	Pacific oyster	25.71	Yes
T01-123A	Application	Pacific oyster	14.46	Yes
T01-1001	Application	Blue mussel	72.03	Yes
T01-1002	Application	Blue mussel	72.05	Yes

** Site area is taken from the AquaMIS on-line database. https://dafm-maps.marine.ie/aquaculture-viewer/*

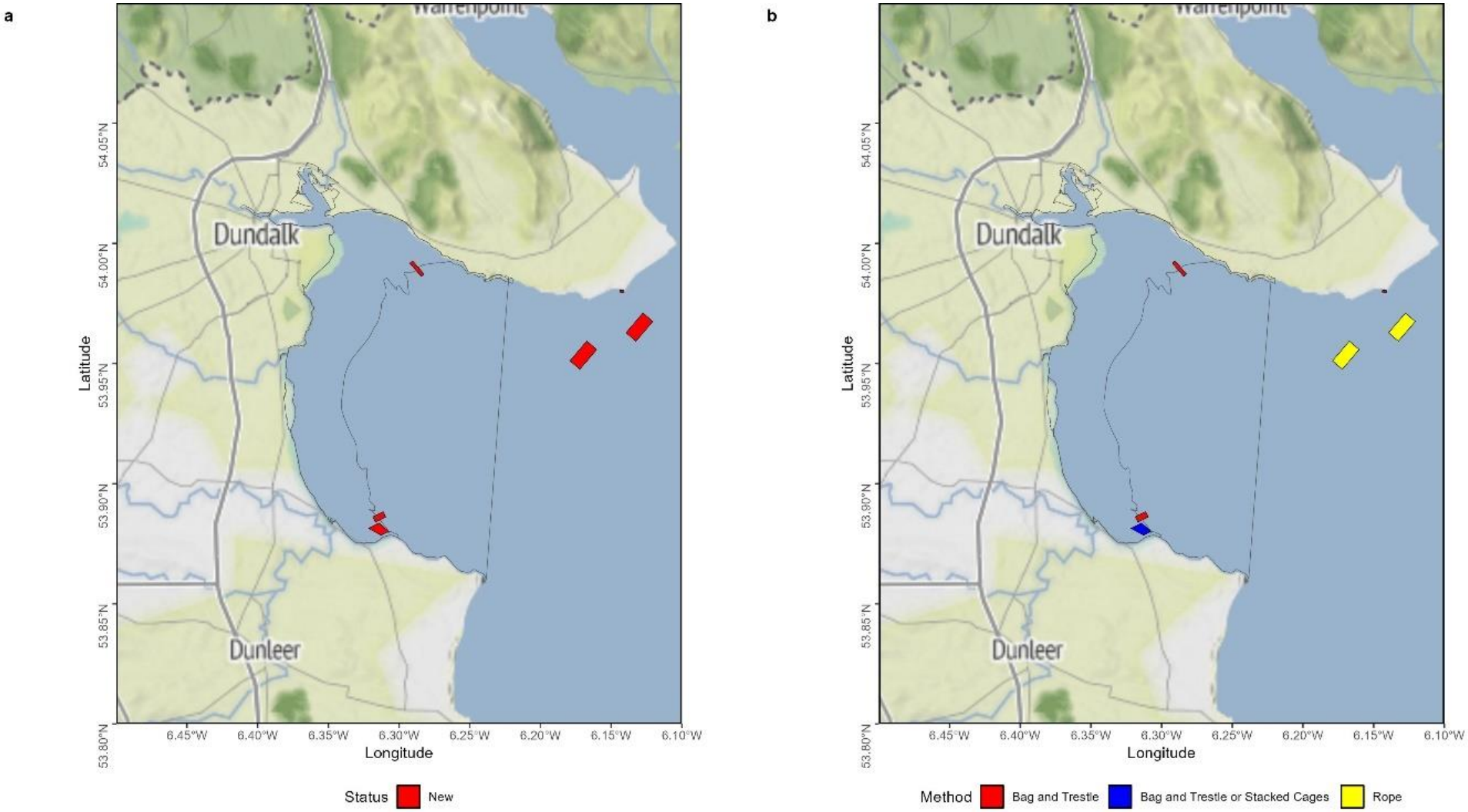


Figure 2-1 Proposed extensive aquaculture sites in Dundalk Bay.

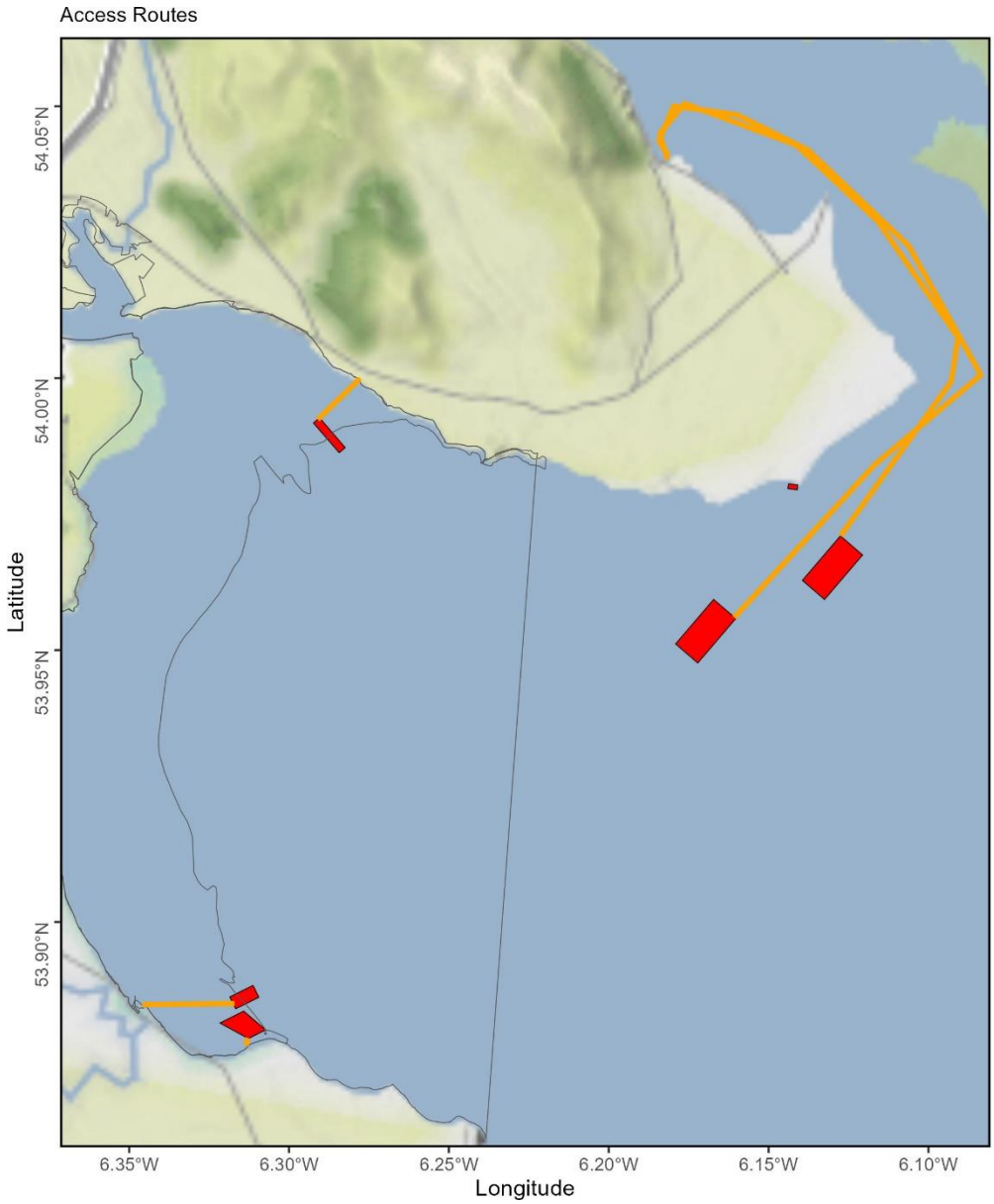


Figure 2-2 Proposed extensive aquaculture site access routes in Dundalk Bay (Note: Access to site T01-097A is directly from land and is not visible in this figure)

2.1 Intertidal Oyster Culture

Pacific oyster (*Magallana gigas*) cultivation comprises oysters in bags placed on a variety of trestle designs. The standard trestle most commonly used, holds 6 bags and is L 3m x W 1m, H 0.4 – 1.2m. A variety of mesh bags and or hanging baskets can be used. The configuration is dependent on the hydrological characteristics of a site. The goal is to maximise growth rate, quality (i.e. meat yield, shell shape) and reduce handling on the shore. Plastic (HDPE) mesh bags are typically attached with rubber straps and hooks. Over 2-3 years as the oysters grow, they are graded and bags of larger mesh sizes i.e. 6mm, 9mm, and 14mm, are used.

Intertidal oyster applications will require Aids to Navigation (AtoNs), i.e. marker poles at each of the four corners of the sites. Each marker poles comprises of a concrete filled tractor or truck tyre base measuring 1100mm

diameter X 400mm depth with a 1500mm length outer pole cemented in centre. This pole measures 1100mm exposed at top and has diameter 76mm. A 6metre inner pipe extends out from this centre outer pipe which has a 2metre yellow outer sleeve and St. Andrews Cross attached at the top. A concrete base of a tyre with cement, is partially buried in intertidal seabed substrate.

Husbandry Strategies

The production cycle starts in spring and or autumn by stocking out with either diploid or triploid hatchery oyster seed (G4–G6, i.e. 4-6mm). It is sourced mainly from French hatcheries (occasionally from the UK).

There are three main grow out strategies, influenced by the characteristics of the site and the market. Grades / Categories of oysters are usually from the French market (e.g. Huitre– Vendée–atlantique.fr).

1. Produce half-grown and sell on early in the growth cycle,
2. Produce standard grade oysters (<10.5% meat yield). 80-100g
3. Produce 'Speciale' grade oysters (>10.5-15% meat yield), 80-100g

While triploid stocks allow for year-round harvesting it is pointed out that they can sometimes grow too quickly for good shape and meat yield to be attained. The husbandry technique of the best time and position for oysters on the shore (low or high) is site specific and determined over time and by keeping good records.

Activity Levels

Husbandry and harvesting, takes place all year round, with shaking / turning bags, removal of fouling and movement of stocks. The sites are positioned between mean Low Water Spring and mean Low Water Neap, allowing a maximum of 3 hours exposure depending on tide, weather and wind. To this end, low spring tides are important.

A notable feature, of the East coast of the island of Ireland, is that low spring tides occur during early morning and late evening, therefore are in darkness during winter. Onshore work, e.g. grading, packing, depuration, preparation of bags / trestles, occurs during high tides.

During ongrowing, oyster bags are thinned out and graded on land at a handling facility twice per year, then returned in larger bags to the trestles. After 2 years, finally they are moved to a high shore, low water cover, location and trained (up to 6 weeks) to remain tightly closed for transport (i.e.''hardened''). Then removed, graded, to be depurated, packed and shipped for distribution.

A rule of thumb is producers access their sites 6 days per fortnight – 156 days per year. Activity in winter is less and more difficult than during spring / summer. A hardening/storage area (i.e. upper shore) would be accessed more often (e.g. 250-300 days per year).

Intertidal sites proposed are to be accessed by tractor and trailer, using a fixed route (Figure 2-2).

2.2 Suspended Mussel Culture

There are two locations proposed for suspended longline mussel farming in Dundalk Bay, namely Site T01-1001 and T01-1002. Each site is 72 hectares. It is proposed that the sites would be accessed using a boat from Greenore in Carlingford Lough.

The culture method involves placing settlement media (such as rope, strap, mesh) in the water column, known as a 'dropper' on which natural juvenile mussels settle. Depending on a number of seasonal and local factors this takes place in April, May or June. The naturally collected mussel seed is then on-grown for typically 18-24 months before being harvested as per market requirements and in line with shellfish and water quality parameters. As these mussels grow the stock may be relocated to other culture areas (within Ireland or beyond), or remain *in-situ*. Some farms grade the mussels during the 18-24 months, using the "New Zealand" continuous rope system, whereby the mussels are re-packed at a specific density using bio-degradable cotton mesh around the rope, the mesh rots away after the mussels have re-attached using their byssal threads. All of the longlines in use are double head rope longlines, constructed from polypropylene mostly of 110 m in length, with typically 30 x 210-250 L floatation units (generally grey in colour) and anchored at each end with 2.5 tonne concrete weights. In general, the long-line density is no greater than 3 lines per hectare.

The suspended mussel aquaculture sites proposed navigation plan is a marking scheme with a placement of 4 x yellow NAV02 buoys at each corner of each site. Each buoy has an inbuilt St. Andrews Cross and radar reflector. A flashing yellow light will be added to top flange of buoy. It is proposed that all lights will be synchronised.

These buoys will be moored onto the seabed using 1.5 tonne mooring block measuring (1.1m x 1.1m x 0.55m) + 5 metre mooring chain (32mm), shackles + Rope – Dyneema 22mm. Sub-tidal buoys will be used mid-line to assist keep rope and chain off seabed. Length of Dyneema rope will depend on each location using 2:1 ratio for this proposed tighter mooring system.

3 Pressures and impacts of aquaculture activities on Natura 2000 features

3.1 Habitats and Species QIs

3.1.1 Physico-Chemical Effects

The introduction of shellfish alters the surrounding environment, both physically and biologically, not only due to the presence of the culture organisms (e.g. increased deposition, disease, shading, fouling, alien species) but also due to the activities associated with the culture mechanisms (e.g. structures resulting in current alteration, sediment compaction). Filter feeding organisms, for the most part, feed at the lowest trophic level, usually relying primarily on the ingestion of phytoplankton. The process is extractive in that it does not rely on the input of feedstuffs to produce growth. Suspension feeding bivalves such as oysters and mussels can modify their filtration to account for increasing loads of suspended matter in the water and can increase the production of faeces and pseudofaeces (non-ingested material) which result in the transfer of both organic and inorganic particles to the seafloor. This process is a component of benthic-pelagic coupling. Faeces and pseudofaeces can

accumulate on the seafloor beneath extensive aquaculture installations and can alter the local sedimentary habitat type in terms of organic content and particle size which has, in certain circumstances, been shown to alter the resident faunal communities.

Moderate enrichment due to deposition can lead to increased diversity due to increased food availability; however further enrichment can lead to a change in sediment biogeochemistry (e.g. oxygen levels decrease and sulphide levels increase) which can result in a reduction in species richness and abundance resulting in a community dominated by specialist species. In extreme cases of protracted organic enrichment, anoxic conditions may occur where no fauna survives, and the sediment may become blanketed by bacterial mats.

The physical presence of aquaculture structures (trestles, anchor blocks and AtoN bases) may reduce water flow and allowing suspended material (silt, clay as well as faeces and pseudo-faeces) to fall out of suspension to the seafloor. The build-up of material will typically occur directly beneath the structures and can result in accumulation of fine, organically rich sediments. These sediments may result in the development of infaunal communities distinct from the surrounding areas. The accumulation of material beneath oyster trestles is dictated by a number of factors, including:

- Hydrography – low current speeds (or small tidal range) may result in material being deposited directly beneath structures. If tidal height is high and large volumes of water moved through the culture area an acceleration of water flow can occur beneath or around the structures (bouys, trestles, AtoNs), resulting in a scouring effect or erosion and no accumulation of material.
- Turbidity of water – oysters have a plastic response to increasing suspended matter in the water column with a consequent increase in faecal or pseudo-faecal production. Oysters for example can be cultured in estuarine areas (given their polyhaline tolerance) and as a consequence can be exposed to elevated levels of suspended matter. If currents in the vicinity are generally low, elevated suspended matter can result in increased build-up of material beneath culture structures.
- Density of culture – the density of culture organisms affect the likelihood of accumulation on the seafloor. In addition, if structures are located in close proximity a greater effect can be realised with resultant accumulations. Close proximity may also result in impact on shellfish performance due to competitive interactions.
- Exposure of sites - the degree to which the aquaculture sites are exposed to prevailing weather conditions will also dictate the level of accumulated organic material in the area. As fronts move through culture areas increased wave action will re-suspend and disperse material away from the trestles.

Access to extensive culture sites, particularly using vehicles over the foreshore, can also present a potential risk of impact on marine species and communities[15] on foot of compaction of sediment.

[15] Forde, J., F.X. O'Beirn, J.P.J. O'Carroll, A. Patterson, R. Kennedy. 2015. Impact of intertidal oyster trestle cultivation on the Ecological Status of benthic habitats. Marine Pollution Bulletin 95: 223–233

Intertidal oyster culture on bags and trestles and suspended mussel culture exert these pressures on the benthos.

3.1.2 Habitat loss

The anchoring of all types of moorings (suspended culture systems and AtoNs) will cause physical loss and change of habitat in the direct footprint of the moorings (i.e. smothering). This pressure will continue for the entire length of time the structure is in place.

3.1.3 Shading

Shading may be an issue as a consequence of the structures associated with intertidal oyster culture. The trestles and bags are held relatively close to the seabed and as a consequence may shade sensitive species (e.g. seagrasses) found underneath. Intertidal oyster culture on bags and trestles, suspended culture of mussels and seaweeds exert these pressures on the benthos.

3.1.4 Non-native Species

Non-native (alien) species may be introduced to environments accidentally or deliberately. Aquaculture is considered a vector for the introduction of alien species. Aquaculture is responsible for the introduction of alien species intended for culture and as a result of unintended transmissions arising from imports or movements of aquaculture stock.

Oyster culture poses a risk in terms of the introduction of the non-native species Pacific oyster (*M. gigas*). Wild recruitment of *M. gigas* has been documented in a number of bays on the west and north coasts of Ireland and the species appear to have become naturalised in these areas (i.e. establishment of a breeding population)[16] . Naturalised populations may compete with the native species for space and food. The culture of large volumes of Pacific oysters may increase the risk of successful reproduction and the establishment of 'wild' breeding populations.

Other types of aquaculture, particularly suspended and bottom mussel culture but also suspended seaweed present a risk for the introduction of alien species as 'hitchhikers' on and among culture stock. There is potential that alien species may spread or proliferate to a degree that can result in environmental damage.

3.1.5 Pathogens

As a generalisation, marine farmed organisms are affected by a range of disease, much as other domesticated agriculture stock. Due to the nature (high density) of the shellfish culture methods there is potential for risk of

[16] Kochmann J, et al. (2012) Genetic evidence for the uncoupling of local aquaculture activities and a population of an invasive species – a case study of Pacific oysters (*Crassostrea gigas*). J Heredity 103:661-671
Kochmann, J., et al. (2013). Environmental factors associated with invasion: modelling occurrence data from a coordinated sampling programme for Pacific oysters. Biol Invasions 15, 2265–2279. https://doi.org/10.1007/s10530-013-0452-9
Zwerschke et al (2017). Co-occurrence of native *Ostrea edulis* and non-native *Crassostrea gigas* revealed by monitoring of intertidal oyster populations. J. Mar. Biol. Assoc. UK doi:10.1017/S0025315417001448

transmission of disease within the cultured stock, and between the stock and wild populations. All aquaculture activities have the potential to introduce disease risk to the surrounding environment.

3.2 Ornithology QIs

The main pressures which are likely to be exerted on bird species from the proposed extensive aquaculture activities are:

3.2.1 Disturbance

Disturbance on marine birds can be either visual (e.g. lights from machinery, AtoNs on a site) or noise (e.g. the sound from a tractor's engine or a vessel). Some species are more sensitive to disturbance than others[17]. Both types of disturbance can cause birds to flush (escape) from the direct area to another area. Flushing may result in birds moving from a higher-quality foraging habitat and, thus, potentially resulting in reduced body condition. In addition, the energy expended flying away from a region may also reduce body condition. Persistent levels of disturbance can cause population level effects on bird species[18].

3.2.2 Exclusion from foraging habitats

Exclusion from foraging habitats occurs when physical structures take up space in areas which birds would otherwise use for foraging. Exclusion affects different birds in different ways. Some species (e.g. oystercatcher) regularly forage within oyster trestles whilst grey plover are known to avoid trestles[22]. Exclusion from foraging habitats decreases the available foraging habitat and prey for that species. It makes foraging conditions more challenging and can lead to increases in intraspecific competition for resources. If enough habitat is removed this can have population level effects. Oyster culture using bags and trestles, seaweed culture, suspended mussel culture all exert exclusion pressure on marine birds.

3.2.3 Prey competition

Direct or indirect competition occurs when prey consumed by a species is targeted by aquaculture (or catches them as bycatch). The main aquaculture type that exerts this pressure is bottom mussel culture which lays seed mussel into intertidal or subtidal regions to grow on and subsequently harvests them. The subsequent harvesting removes a potential food source, both the mussel itself and potentially other bivalve and polychaete species as bycatch.

3.2.4 Entanglement or collision

Entanglement or collision has the potential for direct mortality or indirectly through causing injury or debilitation which later results in reduced fitness or mortality. If this affects enough individuals in a short time frame, then there can be significant population decline. Entanglement or collision is not thought to be

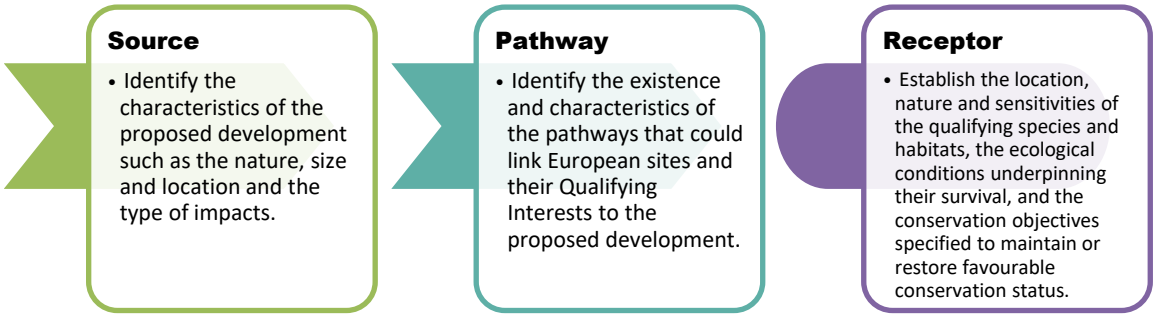
[17] Gittings, T. & O'Donoghue, P.D. (2012). *The effects of intertidal oyster culture on the spatial distribution of waterbirds*. Report prepared for the Marine Institute. Atkins, Cork

[18] Fliessbach, Katharina Leonia, et al. "A ship traffic disturbance vulnerability index for Northwest European seabirds as a tool for marine spatial planning." *Frontiers in Marine Science* 6 (2019): 192.

a major issue for aquaculture, however, there is the possibility of entanglement with bands used to close oyster bags on trestles.

4 Methods for screening QIs

A key consideration as to whether an activity is likely to adversely affect Natura 2000 QIs, is if there is a pathway of connectivity between the QI and the source(s) of potential impacts associated with the activity. The QIs could be at risk of negative effects where a Source-Pathway-Receptor (S-P-R) link exists between the proposed activities and the conservation features of the site, and the risk cannot be dismissed.



The link can be direct and facilitated by terrestrial, aquatic and airborne transfer of a particular pressure (i.e. direct spatial overlap), or the nature and location of the activity may be indirect and interact at a functional level, and impact on behaviour or resource acquisition of a qualifying interest[19] (i.e. proximity between QI and proposed activities).

A screening assessment is an initial evaluation of the existence of S-P-R links between the proposed activities and any likely adverse effects on the QIs. For habitat QIs and associated Marine Community Types (MCTs) in this assessment, screening of the QIs against the proposed activities is, in the first instance, considered on the basis of direct spatial overlap. This is due to the fact that the proposed culture activities have been demonstrated to result in accumulation of organic matter beneath operations[20], negative impacts on benthic community composition have not been fully demonstrated[21] or are considered negligible and confined very closely to the footprint of the structures[22]. Any effects on marine community types from shellfish culture is generally confined to the area beneath the structures. On this basis, there is unlikely to be a hydrological link from this immediate area to distant habitats. Calculation of area of access routes across the shore is generated by assigning a putative route width of 10m, which is considered a sufficiently precautionary estimate.

Indirect effects are also considered whereby the likely impact of the activity on behaviour or resources required by mobile species (e.g. mammals, fish) is considered.

[19] OPR, 2021. Appropriate Assessment Screening for Development Management. March 2021; Office of Planning Regulator.
[20] Chamberlain, J., Fernandes, T.F., Read, P., Nickell, T.D., Davies Chamberlain, I.M., 2001. Impacts of biodeposits from suspended mussel (Mytilus edulis L.) culture on the surrounding surficial sediments. ICES J. Mar. Sci. 58, 411–416. https://doi.org/10.1006/jmsc.2000.1037
[21] Wilding TA, Nickell TD (2013) Changes in Benthos Associated with Mussel (Mytilus edulis L.) Farms on the West-Coast of Scotland. PLoS ONE 8(7): e68313. doi:10.1371/journal.pone.0068313
[16] Christensen, P.B., Glud, R.N., Dalsgaard, T., Gillespie, P., 2003. Impacts of longline mussel farming on oxygen and nitrogen dynamics and biological communities of coastal sediments. Aquaculture 218, 567–588.
McKindsey, C.W., Archambault, P., Callier, M.D., Olivier, F., 2011. Influence of suspended and off-bottom mussel culture on the sea bottom and benthic habitats: a review. Can. J. Zool. 89, 622–646.

The process of determining likely significant effects for bird SCIs is based on impacts/pressures from the proposed activities and the conservation objectives outlined by NPWS. All SPAs with a 15 km range of the proposed activities are considered for screening. The foraging range or breeding site location (depending upon the conservation objectives) of the SCI is considered before determining if there is likely to be spatial overlap with the proposed activities. If there is no spatial overlap, then there is not likely to be an S-P-R pathway for interaction, and the SCI is therefore screened out. If it is deemed that there is spatial overlap, then the pressures exerted by the proposed activities are considered e.g. disturbance, exclusion from foraging grounds. If these pressures are not deemed to interact with the SCI and associated conservation objectives, then the SCI can be screened out. If it is deemed likely to be interaction between the pressures and the SCI, the population trends at the site are considered. If there is evidence that the population has declined or if no such data is available, then the SCI is screened in. Where there is no evidence of population decline then consideration is given to the species resilience to the pressure based on scientific literature. If there is sufficient evidence that the species has the ability to resist the pressure to the extent that likely significant effects can be ruled out, then that SCI is screened out. If no such evidence is available, it is screened in. At all stages a precautionary approach is used in the absence of reliable data.

While the guide value of 15 km range can inform habitats and species with defined ranges, it may not apply effectively to migratory or mobile species or to those with large foraging ranges (e.g. birds and mammals). Such species may interact with the proposed activity as a result of the structures along their migratory route or impacting on their foraging behaviour. This report has therefore extended this screening to a defined list of 22 bird species and 4 mammal species with large foraging ranges, based on the Annex II species list and from the literature[23,24]. Bird species have been identified based on their foraging ranges. The Bottlenose Dolphin (*Tursiops truncatus*) [1349] and Harbour Porpoise (*Phocoena phocoena*) [1351] are considered for screening as they are a wide-ranging species but for which a specific foraging range in Ireland could not be established[25]. The Grey Seal (*Halichoerus grypus*) [1364] is considered as its foraging range extends up to 448 km. Likewise, Harbour Seal (*Phoca vitulina*) [1365] is considered as its foraging range extends up to 273 km[26], both of these foraging ranges are well beyond the boundary of their designated Natura sites.

The following Annex II species have the potential to overlap the proposed site, and are considered further as long-ranging species in this screening:

- Bottlenose Dolphin (*Tursiops truncatus*) [1349]

23 Thaxter, C.B., Lascelles, B., Sugar, K., Cook, A.S.C.P., Roos, S., Bolton, M., Langston, R.H.W. and Burton, N.H.K Seabird foraging ranges as a preliminary tool for identifying candidate Marine Protected Areas (2012). Biological Conservation 156: 53-61.

24 Woodward, I., Thaxter, C.B., Owen, E. & Cook, A.S.C.P. 2019. Desk-based revision of seabird foraging ranges used for HRA screening, Report of work carried out by the British Trust for Ornithology on behalf of NIRAS and The Crown Estate, ISBN 978-1-912642-12-0.

25 IAMMWG. 2023. Review of Management Unit boundaries for cetaceans in UK waters (2023). JNCC Report 734, JNCC, Peterborough, ISSN 0963-8091. https://hub.jncc.gov.uk/assets/b48b8332-349f-4358-b080-b4506384f4f7

26 Carter MID, Boehme L, Cronin MA, Duck CD, Grecian WJ, Hastie GD, Jessopp M, Matthiopoulos J, McConnell BJ, Miller DL, Morris CD, Moss SEW, Thompson D, Thompson PM and Russell DJF (2022) Sympatric Seals, Satellite Tracking and Protected Areas: Habitat-Based Distribution Estimates for Conservation and Management. Front. Mar. Sci. 9:875869. doi: 10.3389/fmars.2022.875869

- Harbour Porpoise (*Phocoena phocoena*) [1351]
- Grey Seal (*Halichoerus grypus*) [1364]
- Harbour Seal (*Phoca vitulina*) [1365].

The list of long-ranging birds to be considered are:

- Arctic tern (*Sterna paradisaea*) [A194]
- Atlantic Puffin (*Fratercula arctica*) [A204]
- Black-headed Gull (*Larus ridibundus*) [A197]
- Black Guillemot (*Cepphus grylle*) [A202]
- Black-legged Kittiwake (*Rissa tridactyla*) [A188]
- Common Gull (*Larus canus*) [A182]
- Common Tern (*Sterna hirundo*) [A193]
- Cormorant (*Phalacrocorax carbo*) [A683]
- Eider (Somateria mollissima) [A063]
- European Storm-petrel (*Hydrobates pelagicus*) [A014]
- Great Black-backed Gull (*Larus marinus*) [A187]
- Guillemot (*Uria aalge*) [A887]
- Herring Gull (*Larus argentatus*) [A184]
- Leach's Storm Petrel (*Hydrobates leucorhous*) [A854]
- Lesser Black-backed Gull (*Larus fuscus*) [A489]
- Little Tern (*Sternula albifrons*) [A885]
- Manx Shearwater (*Puffinus puffinus*) [A013]
- Mediterranean Gull (*Larus melanocephalus*) [A176]
- Northern Fulmar (*Fulmarus glacialis*) [A009]
- Northern Gannet (*Morus bassanus*) [A016]
- Razorbill (*Alca torda*) [A200]
- Red-throated Diver (*Gavia stellata*) [A001]
- Roseate Tern (*Sterna dougallii*) [A192]
- Sandwich Tern (*Thalasseus sandvicensis*) [A863]
- Shag (*Gulosus aristotelis*) [AB03]

Where there is spatial overlap and reasonable potential for likely significant effects on QIs to arise, a Stage 2 Appropriate Assessment is warranted. In the instance where there is no spatial overlap between an activity and a QI, and no likely direct or indirect interactions apparent, then likely significant effects may be screened out. If there is marginal spatial overlap but no reasonable potential for likely significant effects on QIs to arise then adverse effects may also be screened out.

5 Appropriate Assessment Screening

5.1 Identification of Relevant Natura 2000 Sites and QIs

The proposed licensed sites overlaps with both Dundalk Bay SAC and SPA and are within 15km of six other SACs and five other SPAs (see Table 5-1; Figures 5-1 and 5-2). Additionally, there are five SPAs which have QIs with long-ranging species who are likely to forage within range of the proposed activities (Table 5-2).

The characteristic features of these sites are identified, where a preliminary screening is carried out on the likely interaction with aquaculture activities based primarily upon the likelihood of spatial overlap for conservation objectives within 15km of SACs and SPAs. The screening assessment of aquaculture in relation to the Conservation Objectives for Dundalk Bay SAC is based on Version 1.0 of the objectives[27] and supporting documentation. The spatial data for conservation features was provided by NPWS[28].

Table 5-1. List and details of Natura sites within 15km (SACs and SPAs) and those SPA sites with long ranging species likely to interact with the proposed activities.

Natura site	Site code	Distance (Km)	Reference
SAC			
Dundalk Bay SAC	000455	0	Link
Carlingford Mountain SAC	000453	4.14	Link
Carlingford Shore SAC	002306	1.02	Link
Clogher Head SAC	001459	11.36	Link
Rostrevor Wood SAC	UK0030268	12.49	Link
Boyne Coast and Estuary SAC	001957	14.45	Link
SPA			
Dundalk Bay SPA	004026	0	Link
North-West Irish Sea SPA	004236	4.98	Link
Stabannan-Braganstown SPA	004091	7.66	Link
Carlingford Lough SPA	004078	9.22	Link
Carlingford Lough SPA	UK9020161	11.2	Link
SPA – Long ranging species			
Lambay Island SPA	004069	54.64	Link
Skerries Islands SPA	004122	44.31	Link
Stags of Broad Haven SPA	004072	229.21	Link
Saltee Islands SPA	004002	202.09	Link
Illanmaster SPA	004074	218.99	Link

Table 5-2 List of additional long ranging species from SPA sites (>15km) whose foraging range potentially overlaps with proposed aquaculture activities in Dundalk Bay.

[27] NPWS (2011) Conservation Objectives: Dundalk Bay SAC 000455, Dundalk Bay SPA 004026. Version 1.0. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
[28] NPWS Geodatabase https://www.npws.ie/maps-and-data/habitat-and-species-data

Species	Foraging Range (km)	Site Name	Distance to nearest SPA (km)
Atlantic puffin (*Fratercula arctica*)	62.4	Lambay Island SPA [004069]	54.7
Common Gull (*Larus canus*)	50.0	Dundalk Bay SPA [004026]	0.00
Common guillemot (*Uria aalge*)	338.0	Lambay Island SPA [004069]	54.7
European shag (*Phalacrocorax aristotelis*)	46.0	Skerries Islands SPA [004122]	44.3
Herring gull (*Larus argentatus*)	92.0	Dundalk Bay SPA [004026]	0.00
Kittiwake (*Rissa tridactyla*)	54.7	Lambay Island SPA [004069]	54.7
Leach's storm petrel (*Oceanodroma leucorhoa*)	657.0	Stags of Broad Haven SPA [004072]	229.2
Lesser black-backed gull (*Larus fuscus*)	533.0	Lambay Island SPA [004069]	54.7
Northern fulmar (*Fulmarus glacialis*)	2,736.0	Lambay Island SPA [004069]	54.7
Northern gannet (*Morus bassanus*)	709.0	Saltee Islands SPA [004002]	202.1
Razorbill (*Alca torda*)	313.0	Lambay Island SPA [004069]	54.7
Storm petrel (*Hydrobates pelagicus*)	227.7	Illanmaster SPA [004074]	219

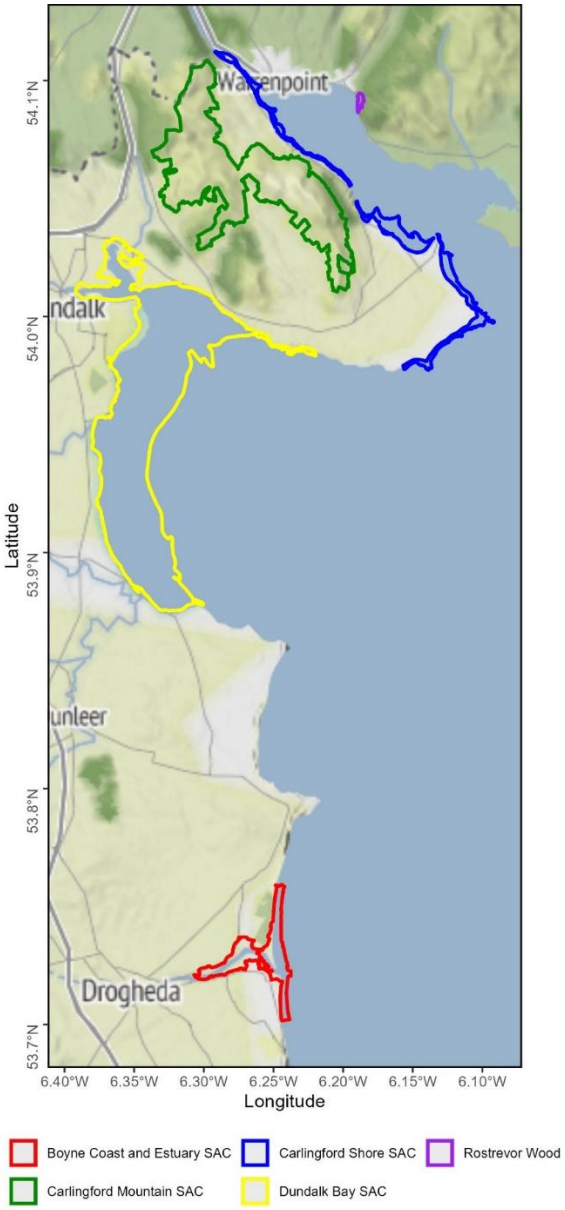


Figure 5-1 SAC sites adjacent to the proposed aquaculture sites in Dundalk Bay and considered in the assessment.

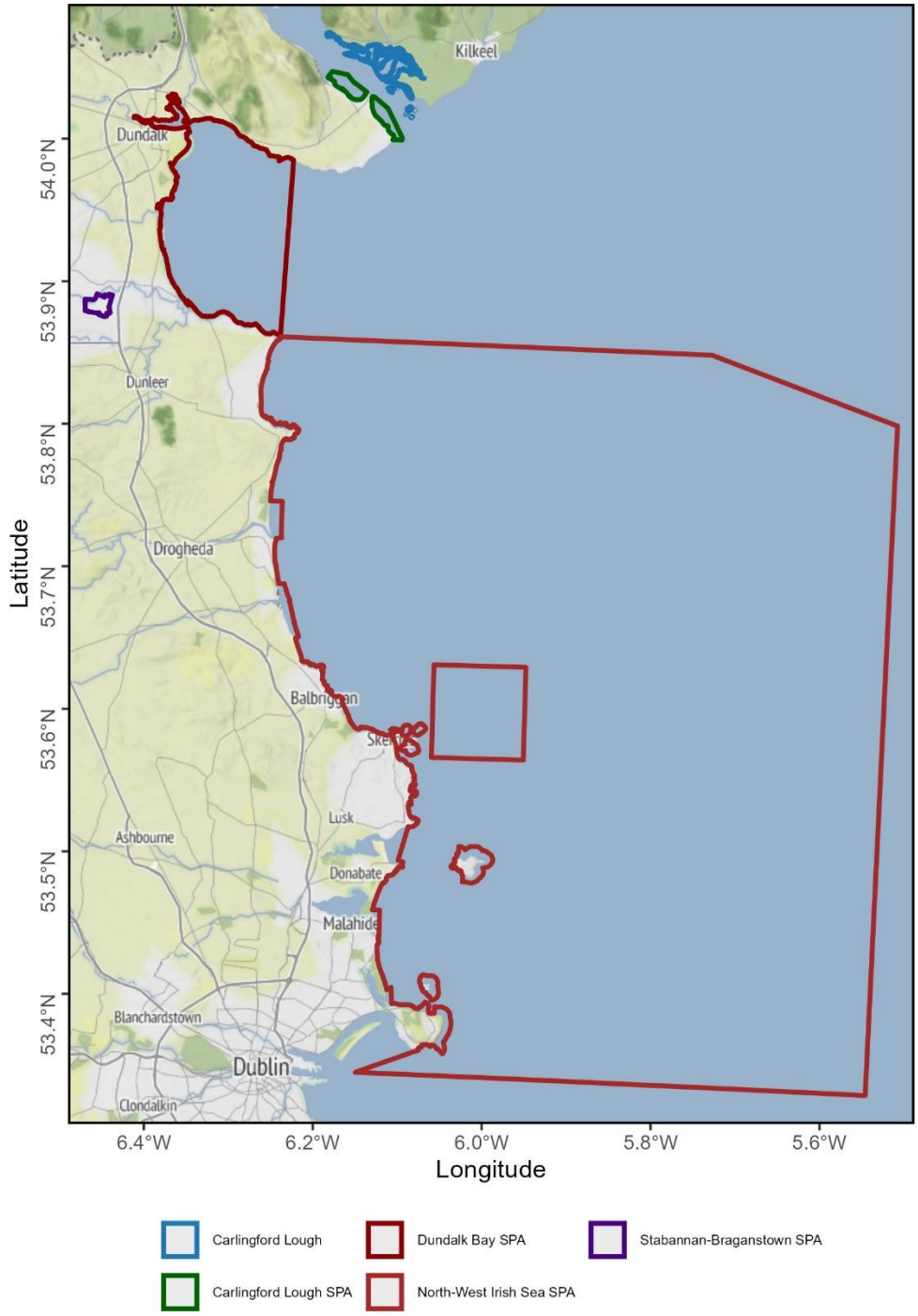


Figure 5-2 SPA sites adjacent to the proposed aquaculture sites in Dundalk Bay and considered further in the assessment.

5.1.1 Dundalk Bay SAC (Site 000455) – Qualifying Interests

All activities considered within this assessment border or occur within or adjacent to the Dundalk Bay SAC and therefore, have the potential to interact with the conservation features of this Natura 2000 site. Dundalk Bay, Co. Louth, is a large open, shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16 km from Castletown River on the Cooley Peninsula in the north, to Annagassan/Salterstown in the south. The bay encompasses the mouths and estuaries of the Rivers Dee, Glyde, Fane, Castletown and Flurry. A full list of qualifying interests are provided in Table 5-3. Dundalk Bay SAC is designated for the Annex I qualifying

interests of Mudflats and sandflats not covered by sea water at low tide (1140) and Estuaries (1130) (Figure 5-3).

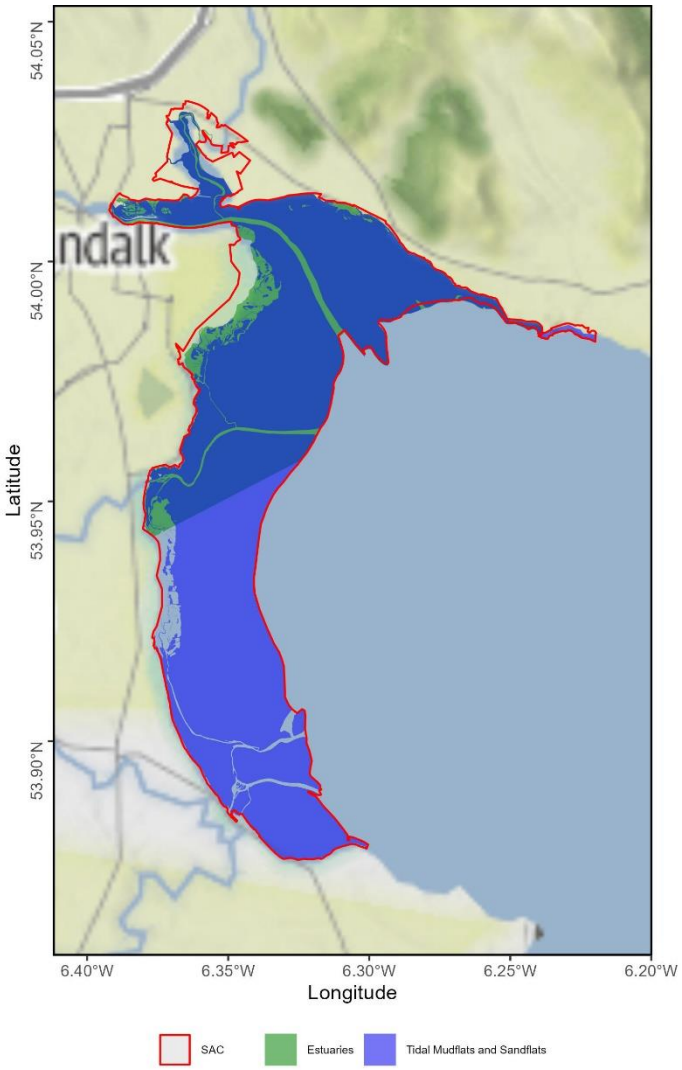


Figure 5-3 Marine Qualifying interests for Dundalk Bay SAC.

5.1.1.1 Conservation Objectives for Dundalk Bay SAC [29],[30]

The Conservation Objectives for the Dundalk Bay SAC are identified in NPWS (2011a). The natural condition of the designated features should be preserved with respect to their area, distribution, extent and community distribution. Habitat availability should be maintained for designated species and human disturbance should not adversely affect such species. The area and community distribution of the biota of qualifying interest habitats must be conserved (NPWS, 2011b).

More specifically, the likely area occupied by the constituent communities of Habitats 1130 and 1140 should be stable or increasing with overall target areas of 2799ha and 4375ha, respectively. In addition, the constituent

[29] NPWS 2011a. Conservation Objectives for Dundalk Bay SAC and SPA - Version 1.0 - July 2011).
[30] NPWS 2011b Dundalk Bay SAC (site code: 00455) Conservation objectives supporting document- Marine Habitats Version 1 March 2011.

communities of habitats 1130 and 1140 should be stable in distribution and species composition. The QIs, features, objectives and targets for each within the Dundalk Bay are listed in Table 5-3.

Table 5-3: COs and Targets for the QIs in Dundalk Bay SAC (Site Code 000455) (NPWS 2011a, b). Annex I and II features listed in bold.

QIs and Conservation Features	Objective	Target(s)
Estuaries [1130]	Restore favourable conservation condition	2,799ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining habitat area as well as structure and function of marine communities.
(Fine sand community complex)	Maintain favourable conservation condition	1867ha; Maintained in a natural condition
(Muddy fine sand community)	Maintain favourable conservation condition	733ha; Maintained in a natural condition
Mudflats and sandflats not covered by seawater at low tide [1140]	Restore favourable conservation condition	4,375ha; The distribution and permanent area is stable or increasing, subject to natural processes.
(Muddy fine sand community)	Maintain favourable conservation condition	853ha; Maintained in a natural condition
(Fine sand community complex)	Maintain favourable conservation condition	3520ha; Maintained in a natural condition
Salicornia and other annuals colonising mud and sand [1310]	Maintain favourable conservation condition	35ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
Perennial vegetation of stony banks [1220]	Maintain favourable conservation condition	Area unknown; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330]	Maintain favourable conservation condition	380ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Mediterranean salt meadows (*Juncetalia maritimi*) [1410]	Maintain favourable conservation condition	0.045ha;Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species

Dundalk Bay SAC failed to meet Favourable conservation status due to changes in the sediment composition in one marine community type (MCT) within the site[31,32]. An increase in the proportion of fine sediment grain size classes was recorded. Further to this, it was communicated that run-off from terrestrial agriculture, maintenance dredging into Dundalk Port and urbanisation were considered to be the most likely contributing factors to the increased sediment input and resulting changes recorded in MCTs. With the exception of maintenance dredging, the sources of the majority of these impacts are outside of the SAC network.

5.1.2 Adjacent SAC sites

As outlined above. The effects of the proposed extensive aquaculture activities must be assessed beyond the boundaries of the application site and typically a 15km buffer applies for SAC sites. To this end, a list of SAC sites with the accompanying QIs within 15km of the aquaculture application sites in Dundalk Bay was generated and is provided in Table 5-4.

*Table 5-**4**. Natura 2000 SAC sites with 15km of proposed extensive aquaculture operations in Dundalk Bay.*

	QIs and Conservation Features	Objective	Target(s)
Carlingford Mountain SAC [00453]	Northern Atlantic wet heaths with Erica tetralix [4010]	Restore favourable conservation condition	283.1ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
	European dry heaths [4030]	Restore favourable conservation condition	1073ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
	Alpine and Boreal heaths [4060]	Restore favourable conservation condition	28.8ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
	Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230]	Restore favourable conservation condition	13.3ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
	Blanket bogs (* if active bog) [7130]	Restore favourable conservation condition	96.2ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
	Transition mires and quaking bogs [7140]	Maintain favourable Conservation status	1.6ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
	Alkaline fens [7230]	Maintain favourable Conservation status	45.3ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of

[31] NPWS (2019). The Status of EU Protected Habitats and Species in Ireland. Volume 2: Habitat Assessments. Unpublished NPWS report. Edited by: Deirdre Lynn and Fionnuala O'Neill

[32] Scally, L., Pfeiffer, N. and Hewitt, E. (2020) The monitoring and assessment of six EU Habitats Directive Annex I Marine Habitats. Irish Wildlife Manuals, No. 118. National Parks and Wildlife Service, Department of Culture, Heritage and the Gaeltacht, Ireland.

	QIs and Conservation Features	Objective	Target(s)
			maintaining function and diversity of favourable species and managing levels of negative species
	Siliceous scree of the montane to snow levels (Androsacetalia alpinae and Galeopsietalia ladani) [8110]	Maintain favourable Conservation status	14.2ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
	Calcareous rocky slopes with chasmophytic vegetation [8210]	Maintain favourable Conservation status	Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
	Siliceous rocky slopes with chasmophytic vegetation [8220]	Maintain favourable Conservation status	84.7ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
Carlingford Shore SAC 002306	Annual vegetation of drift lines [1210]	Maintain favourable Conservation status	Targets are identified that focus on a number of attributes with the ultimate goal of maintaining physical structure as well as function and diversity of favourable species and managing levels of negative species as well as ensuring sufficient sediment supply
	Perennial vegetation of stony banks [1220]	Maintain favourable Conservation status	Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining a continuous supply of shingle sediment, the function and diversity of favourable species and managing levels of negative species
Clogher Head SAC 001459	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	Maintain favourable Conservation status	Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species and minimizing interference mediated by humans, (e.g., grazing, fires, erosion).
	European dry heaths [4030]	Maintain favourable Conservation status	Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species
Boyne Coast and Estuary SAC 001957	Estuaries [1130]	Maintain favourable Conservation status	403ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining habitat area as well as structure and function of marine communities.
	Mudflats and sandflats not covered by seawater at low tide [1140]	Maintain favourable Conservation status	403ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining habitat area as well as structure and function of marine communities.
	Annual vegetation of drift lines [1210]	Restore favourable Conservation status	Targets are identified that focus on a number of attributes with the ultimate goal of maintaining physical structure as well as function and diversity of favourable species and managing levels of negative species.
	Salicornia and other annuals colonising mud and sand [1310]	Restore favourable Conservation status	4.05ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining physical structure as well as function

	QIs and Conservation Features	Objective	Target(s)
			and diversity of favourable species and managing levels of negative species.
	Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]	Maintain favourable Conservation status	26.43ha; Targets are identified that focus on maintaining the function and diversity of favourable species and managing levels of negative species.
	Embryonic shifting dunes [2110]	Restore favourable Conservation status	3.18ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining physical structure as well as function and diversity of favourable species and managing levels of negative species as well as ensuring sufficient sediment supply
	Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120]	Restore favourable Conservation status	4.97ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining physical structure as well as function and diversity of favourable species and managing levels of negative species as well as ensuring sufficient sediment supply
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	Restore favourable Conservation status	46.87ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining physical structure as well as function and diversity of favourable species and managing levels of negative species as well as ensuring sufficient sediment supply
Rostrevor Wood SAC UK0030268	Old sessile oak woods with Ilex and Blechnum in the British Isles	To maintain favourable conservation condition	

5.1.3 Dundalk Bay SPA [33]

The Dundalk Bay SPA is considerably larger in area than the SAC. The proposed extensive aquaculture activities occur entirely within this SPA. Dundalk Bay is an important site for over-wintering birds. The extensive intertidal flats are used by wildfowl and waders and extensive sheltered subtidal waters are important for diving species. The site has 23 listed SCIs for marine birds. It is also classified as a good example of wetland and waterbird habitat [A999]. Table 5-5 shows the SCI features for which Dundalk Bay SPA is designated along with the *objectives, targets and baseline numbers of the site.*

Table 5-5 Qualifying Interests of Dundalk Bay SPA

Feature	Objective	Target
Great crested grebe (*Podiceps cristatus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 303 Distribution: No significant decrease in the number and range of areas used
Greylag goose (*Anser anser*) – wintering	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 435 Distribution: No significant decrease in the number and range of areas used

[33] NPWS 2011b Dundalk Bay SPA (site code: 004026) Conservation objectives supporting document - Version 1 March 2011.

Feature	Objective	Target
Light-bellied brent goose (*Branta bernicla hrota*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 3708 Distribution: No significant decrease in the number and range of areas used
Shelduck (*Tadorna tadorna*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 552 Distribution: No significant decrease in the number and range of areas used
Teal (*Anas crecca*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 538 Distribution: No significant decrease in the number and range of areas used
Mallard (*Anas platyrhynchos*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 765 Distribution: No significant decrease in the number and range of areas used
Pintail (*Anas acuta*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 117 Distribution: No significant decrease in the number and range of areas used
Common scoter (*Melanitta nigra*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 581 Distribution: No significant decrease in the number and range of areas used
Red-breasted merganser (*Mergus serrator*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 121 Distribution: No significant decrease in the number and range of areas used
Oystercatcher (*Haematopus ostralegus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 8746 Distribution: No significant decrease in the number and range of areas used
Ringed plover (*Charadrius hiaticula*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 151 Distribution: No significant decrease in the number and range of areas used
Golden plover (*Pluvialis apricaria*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 5967 Distribution: No significant decrease in the number and range of areas used
Grey plover (*Pluvialis squatarola*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 204 Distribution: No significant decrease in the number and range of areas used
Lapwing (*Vanellus vanellus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 4892 Distribution: No significant decrease in the number and range of areas used
Knot (*Calidris canutus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 9710 Distribution: No significant decrease in the number and range of areas used
Dunlin (*Calidris alpina*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 11518 Distribution: No significant decrease in the number and range of areas used
Black-tailed godwit (*Limosa limosa*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 1100

Feature	Objective	Target
		Distribution: No significant decrease in the number and range of areas used
Bar-tailed godwit (*Limosa lapponica*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 1950 Distribution: No significant decrease in the number and range of areas used
Curlew (*Numenius arquata*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 1264 Distribution: No significant decrease in the number and range of areas used
Redshank (*Tringa totanus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 1659 Distribution: No significant decrease in the number and range of areas used
Black-headed gull (*Chroicocephalus ridibundus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 6643 Distribution: No significant decrease in the number and range of areas used
Common gull (*Larus canus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 551 Distribution: No significant decrease in the number and range of areas used
Herring gull (*Larus argentatus*)	To maintain favourable conservation condition	Population trend: percentage change compared to baseline 754 Distribution: No significant decrease in the number and range of areas used
Wetlands and waterbirds	To maintain favourable conservation condition	Habitat area is stable for subtidal (8136ha), intertidal (4374ha) and supratidal (649ha).

5.1.4 Adjacent SPA sites

As with the SAC sites, a list of SPA sites considered adjacent to the proposed extensive aquaculture operations has been generated. The features of the sites (Figure 4-3) are listed in the paragraphs below.

5.1.4.1 North-West Irish Sea SPA [004236]

This SPA extends offshore along the coasts of counties Louth, Meath and Dublin, and is approximately 2,333km^2 in area. This SPA is ecologically connected to several existing SPAs in this area. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Common Scoter, Red-throated Diver, Great Northern Diver, Fulmar, Manx Shearwater, Shag, Cormorant, Little Gull, Kittiwake, Black-headed Gull, Common Gull, Lesser Black-backed Gull, Herring Gull, Great Black-backed Gull, Little Tern, Roseate Tern, Common Tern, Arctic Tern, Puffin, Razorbill and Guillemot.

5.1.4.2 Stabannan-Braganstown SPA [004091]

This SPA is situated approximately 4 km inland from Dundalk Bay in Co. Louth. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Greylag Goose.

5.1.4.3 Carlingford Lough SPA [004078]

Carlingford Lough SPA comprises parts of the south side of Carlingford Lough, Co. Louth, between Carlingford Harbour and Ballagan Point. The predominant habitats present are intertidal sand and mud flats. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for Light-bellied Brent Goose.

5.1.4.4 Carlingford Lough SPA (NI) [UK9020160]

Carlingford Lough ASSI extends from Cranfield Point to the limit of main inter-tidal mudflats upstream towards Newry. The SPA extends from Soldiers Point to Killowen Point. The offshore islands at Blockhouse, Green Island and off Greencastle Point fall within both designations. Habitat is almost exclusively inter-tidal with the exception of the islands mentioned and coastal saltmarsh and wet grasslands in Mill Bay. The site is designated for breeding populations of Common and Sandwich Tern and overwintering Light-bellied Brent Goose.

5.1.5 Long Ranging Species SPAs

5.1.5.1 Lambay Island SPA

Lambay Island lies approximately 4 km off the north Co. Dublin coastline and is separated from it by a channel of 10-13 m in depth. East of Lambay Island the water deepens rapidly into the Irish Sea basin. On the western side of the island the land rises gently from a bedrock shoreline. Cobble storm beaches are associated with this shore and at low tide sandflats are exposed within the harbour and below a section of the rocky shore. The northern, eastern and most of the southern shorelines consist of steep cliffs varying from about 15 m to 50 m high. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Fulmar, Cormorant, Shag, Greylag Goose, Lesser Black-backed Gull, Herring Gull, Kittiwake, Guillemot, Razorbill and Puffin. The site is also of special conservation interest for holding and assemblage of over 20,000 breeding seabirds. Given this SPA is approx. 45km from the closest proposed aquaculture site in Dundalk Bay the species of particular interest with regard to Dundalk Bay Aquaculture sites, on the basis of foraging range (in parentheses) are, Fulmar (2,736km), Cormorant, Shag (46km), Lesser Black-backed Gull (533km), Herring Gull (92km), Razorbill (313km) and Puffin (62.4km)

5.1.5.2 Skerries Islands SPA

The Skerries Islands are a group of three small uninhabited islands situated between 0.5 km and 1.5 km off the north Co. Dublin coast. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Cormorant, Shag, Light-bellied Brent Goose, Purple Sandpiper, Turnstone and Herring Gull, in addition to wetlands, of which Cormorant, shag and herring gull are of relevance to proposed aquaculture sites in Dundalk Bay.

5.1.5.3 Stags of Broad Haven SPA

The Stags of Broad Haven are a group of four precipitous rocky islets, totaling 4 ha, rising to almost 100 m, located about 2 km north of Benwee Head, Co. Mayo. The surrounding seas to a distance of 500 m are included in the site. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation

interest for the following species: Storm Petrel and Leach's Petrel. The distance from this SPA to the closest proposed aquaculture site in Dundalk Bay is 231km. Both species potentially overlap with proposed aquaculture activities in Dundalk Bay on the basis of foraging ranges, i.e., Leach's Storm Petrel (657km) and Storm Petrel (227.7km).

5.1.5.4 Saltee Islands SPA

The Saltee Islands SPA is situated some 4-5 km off the coast of south Co. Wexford and comprises the two islands, Great Saltee and Little Saltee, and the surrounding seas both between them and to a distance of 500 m from them. The bedrock of the islands is of Precambrian gneiss and granite. Both islands have exposed rocky cliffs on their south and east – those on Great Saltee being mostly c. 30 m high, those on Little Saltee about half this height. The northern and western sides of both islands are fringed with shingle and boulder shores, backed by boulder clay cliffs, as well as small areas of intertidal sandflats.

The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Fulmar, Gannet, Cormorant, Shag, Lesser Black-backed Gull, Herring Gull, Kittiwake, Guillemot, Razorbill and Puffin. The site is also of special conservation interest for holding an assemblage of over 20,000 breeding seabirds. The species of particular interest given the foraging range of 709km is Northern gannet. This range exceeds the distance between this SPA site and the proposed aquaculture site in Dundalk Bay of approx. 193km.

5.1.5.5 Illanmaster SPA

Illanmaster is a steep, rocky island situated just off the north Co. Mayo coast. It rises to 107 m and is topped with a maritime grassy sward. The surrounding seas to a distance of 500 m are included in the site. The southern boundary of the site adjoins the mainland shoreline. The site is a Special Protection Area (SPA) under the E.U. Birds Directive, of special conservation interest for the following species: Storm Petrel. The distance from this SPA to the closest proposed aquaculture site in Dundalk Bay is 221km which is less than the foraging range for this species of 227km.

5.2 Screening of QIs in Dundalk Bay SAC

5.2.1 Terrestrial and Coastal Habitats and Species

The proposed activities considered in this report are located in the intertidal and subtidal marine environment, and sites and likely access points do not spatially overlap with the coastal and terrestrial habitats and species and therefore, there are no likely direct impacts. In addition, there are no indirect impacts likely on the basis that there are no emissions arising from travel to and from the sites associated with the culture of shellfish or seaweed that will likely interact with these terrestrial habitats in a significant manner. It is concluded there are no apparent S-P-R links between the proposed extensive aquaculture activities and the qualifying interests listed below. The following qualifying interests are, therefore, screened out from further consideration:

- ***Salicornia and other annuals colonising mud and sand [1310]***
- ***Perennial vegetation of stony banks [1220]***
- ***Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]***
- ***Mediterranean salt meadows (Juncetalia maritimi) [1410]***

5.2.2 Marine Habitat Features 1130 and 1140 and Constituent Communities

Aquaculture pressures on a given habitat are related to its vulnerability to the pressures induced by culture activities. Vulnerabilities consider the likely interactions measured by spatial overlap or exposure of the habitat to the equipment (including trestles and AtoNs), activities or culture organism, combined with the sensitivity of the habitat. To this end, the location and orientation of structures associated with the culture organism, the density of culture organisms, the duration of the culture activity, and the type of activity are all important considerations when considering risk of disturbance to habitat features and species. Of relevance is the organic enrichment likely to build-up on foot of faecal and pseudo-faeces buildup beneath trestles and impedance of current to cause sedimentation beneath the bags and trestles. The physical footprint of intertidal AtoNs is very small and therefore, unlikely to impact on the conservation objectives of marine features 1130 and 1140.

The constituent communities identified in the Annex 1 features (Figure 5-4), Estuaries (1130) and Mudflats and sandflats not covered by seawater at low tide (1140) are:

- Muddy fine sand community
- Fine sand community complex

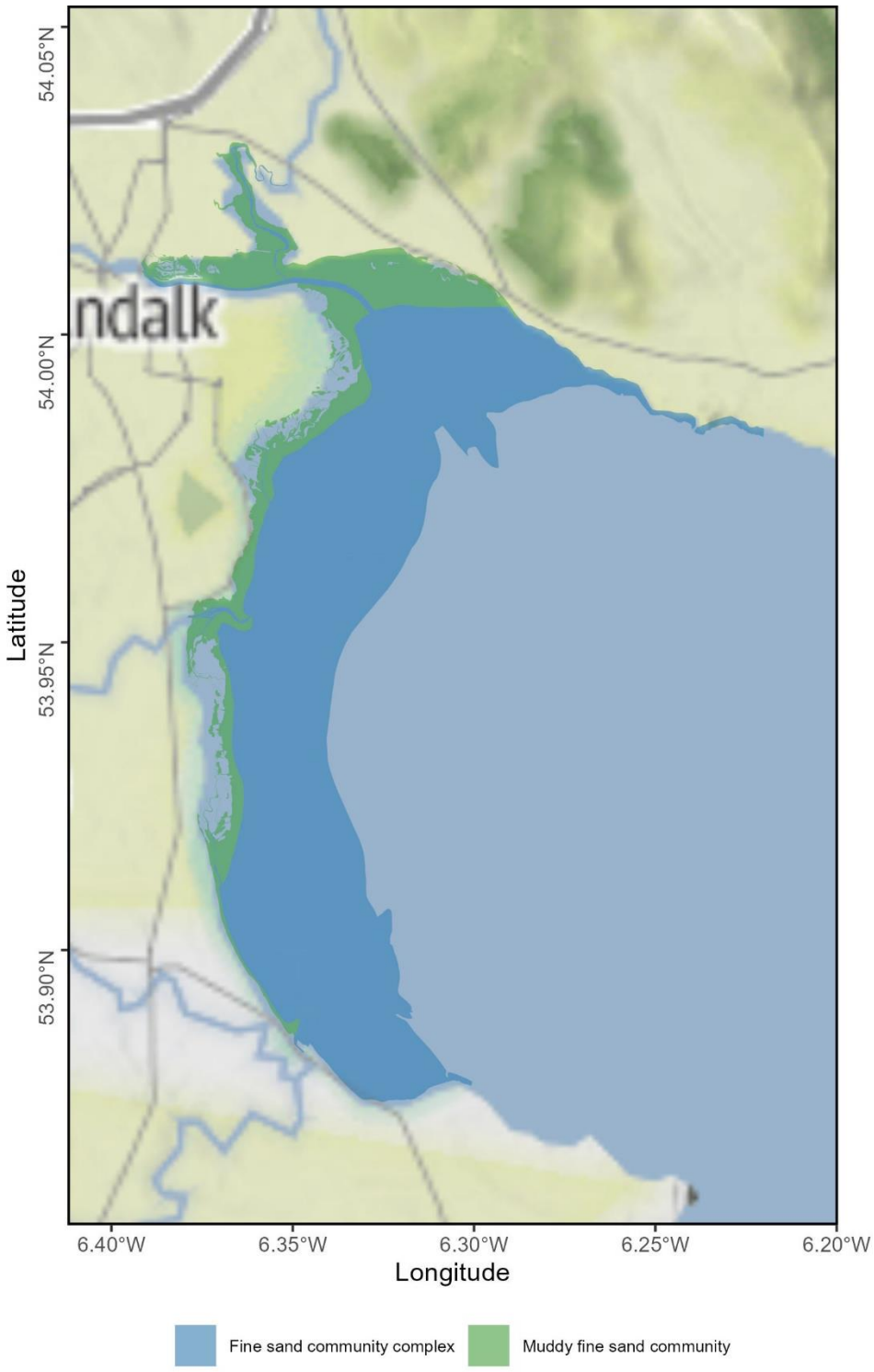


Figure 5-4 Dundalk Bay SAC habitat qualifying interests and Marine Community Types.

Table 5-6 presents the proportion of spatial overlap between proposed aquaculture activities and the QIs, Mudflats and sandflats not covered by seawater at low tide (1140), Estuaries (1130). Table 5-7 provides an overview of overlap of all aquaculture activities (including those applications considered for this report) and specific marine community types within QIs 1140, 1160 and 1170, respectively.

Table 5-6. Overlap of proposed Aquaculture Activities with QIs 1130 and 1140 in Dundalk Bay SAC.

Site No.	Status	Species	Site Area (ha)	1130 – Estuaries (2,779ha[15])		1140-Mudflat and Sandflat (4,375ha[34])	
				Area within QI (ha)	% Feature	Area within QI (ha)	% Feature
T01-122A	Application	Pacific Oyster	13.1	**7.66**	**0.3%**	**7.64**	**0.2%**
T01-099A	Application	Pacific Oyster	25.71	-	-	**25.68**	**0.6%**
T01-123A	Application	Pacific Oyster	14.46	-	-	**4.91**	**0.1%**
T01-097A	Application	Pacific Oyster	1.9	-	-	-	-
T01-1001	Application	Blue mussel	72.03	-	-	-	-
T01-1002	Application	Blue mussel	72.05	-	-	-	-
Access Routes				**1.2**	**0.043%**	**3.28**	**0.07%**

Table 5-7. Summary of Spatial Overlap Between the Community Type Fine sand community complex of Habitat 1140 Mudflats and sandflats not covered by seawater at low tide and 1130 Estuaries and all Aquaculture Activities

Site No.	Status	Species	Site Area (ha)	Fine sand community complex			
				QI 1140 (3505ha)		QI 1130 (1859ha)	
				Area overlapping MCT (ha)	% MCT	Area overlapping MCT (ha)	% MCT
T01-122A	Application	Pacific Oyster	13.1	7.64	0.21	7.66	0.41
T01-099A	Application	Pacific Oyster	25.71	25.7	0.73	-	-
T01-123A	Application	Pacific Oyster	14.46	4.91	0.14	-	-
T01-097A	Application	Pacific Oyster	1.9	-	-	-	-
T01-1001	Application	Blue mussel	72.03	-	-	-	-
T01-1002	Application	Blue mussel	72.05	-	-	-	-
Access Routes				3.28	0.09	1.2	0.06

It is concluded that those QI habitats and marine community types (MCT) that are not subject to overlap or close proximity to the licence applications area will be screened out from further consideration. There is no spatial overlap between the following marine community types within QIs 1130 and 1140 any proposed aquaculture activities:

- Muddy fine sand community

[34] NPWS 2011. Conservation Objectives – Dundalk Bay SAC/Dundalk Bay SPA. 36pp

Furthermore, two aquaculture applications, (T01- 1001 and T01-1002), for the suspended culture of mussels are located, at their closest point, 4.4km from the Dundalk Bay SAC. To this end and given the likely localised nature of effect on the seafloor of suspended mussel culture the interaction between the biological (organic enrichment and shading) and physical effects (Anchors for culture lines and AtoNs) of the two mussel culture applications (T01-1001, T01-1002) and Dundalk Bay SAC are not considered further, given there is no likely S-P-R connectivity to qualify interests of Dundalk Bay SAC.

The following QI habitats in Dundalk Bay SAC and one Marine Community Type (MCT) is carried forward for further consideration given the direct overlap with proposed intertidal aquaculture activities and access routes.

- Annex I Habitat 1140 - Mudflats and sandflats not covered by seawater at low tide
    - MCT: Fine sand community complex
- Annex I Habitat 1130 - Estuaries;
    - MCT: Fine sand community complex

5.3 Screening of QIs of adjacent Natura 2000 SAC sites

The screening of adjacent Natura sites is carried out to determine if the proposed activity is likely to impact on the QIs of these sites. The characteristic features of these sites are identified below where a screening assessment is carried out on the likely interaction with aquaculture activities based primarily upon the likelihood of spatial overlap and/or the existence of and S-P-R link and those QIs. Table 5-8 identifies the relevant QIs and their conservation objectives for adjacent SACs, along with their screening outcome.

Table 5-8 Screening outcome of QIs in SAC sites within 15km of the proposed aquaculture activities in Dundalk Bay

SAC	QIs and Conservation Features	Screening outcome
Carlingford Mountain SAC [00453]	Northern Atlantic wet heaths with *Erica tetralix* [4010] European dry heaths [4030] Alpine and Boreal heaths [4060] Species-rich Nardus grasslands, on siliceous substrates in mountain areas (and submountain areas, in Continental Europe) [6230] Blanket bogs (* if active bog) [7130] Transition mires and quaking bogs [7140] Alkaline fens [7230] Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*) [8110] Calcareous rocky slopes with chasmophytic vegetation [8210] Siliceous rocky slopes with chasmophytic vegetation [8220]	These QIs in Carlingford Mountain SAC are terrestrial in nature and therefore, have no spatial overlap with the proposed aquaculture activities in Dundalk Bay. In addition, there are no other pathways of interaction. **These QIs can be screened out.**
Carlingford Shore SAC 002306	Annual vegetation of drift lines [1210] Perennial vegetation of stony banks [1220]	These QIs in Carlingford Shore SAC, while coastal in nature, have no spatial overlap with the proposed aquaculture activities in Dundalk Bay. In addition, there is no pathway of interaction between the aquaculture sites considered and these QIs for this SAC. **These QIs can be screened out.**
Clogher Head SAC 001459	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230] European dry heaths [4030]	These QIs in Clogher Head SAC, are both coastal and terrestrial in nature and have no spatial overlap with the proposed aquaculture activities in Dundalk Bay. In addition, there is no pathway of interaction between the aquaculture sites considered and these QIs for this SAC. **These QIs can be screened out.**
Boyne Coast and Estuary SAC 001957	Estuaries [1130] Mudflats and sandflats not covered by seawater at low tide [1140]	Maintain favourable Conservation status 403ha; Targets are identified that focus on a number of attributes with the ultimate goal of maintaining habitat area as well as structure and function of marine communities.

SAC	QIs and Conservation Features	Screening outcome
	Annual vegetation of drift lines [1210] Salicornia and other annuals colonising mud and sand [1310] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Embryonic shifting dunes [2110] Shifting dunes along the shoreline with Ammophila arenaria (white dunes) [2120] Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	These QIs in Boyne Coast and Estuary SAC are coastal and terrestrial in nature and therefore, have no spatial overlap with the proposed aquaculture activities in Dundalk Bay. In addition, there are no other pathways of interaction. **These QIs can be screened out.**
Rostrevor Wood SAC UK0030268	Old sessile oak woods with Ilex and Blechnum in the British Isles	To maintain favourable conservation condition These QIs are terrestrial in nature and therefore have no spatial overlap with the proposed aquaculture activities in Dundalk Bay. In addition, there are no other pathways of interaction. **These QIs can be screened out.**

5.4 Screening of SCIs of Dundalk Bay SPA

A Screening of proposed aquaculture activities in Dundalk Bay on Special Protection Areas (SPAs) is necessary to determine if the activities are, in the first instance likely to have a significant effect on the conservation features within Dundalk Bay SPA and other adjacent SPA sites as well as a number of longer ranging species with the potential to overlap with activities in Dundalk Bay on the basis of their extensive foraging ranges.

The potential ecological effects of activities of extensive shellfish on the Conservation Objectives relate to the physical and biological effects of aquaculture cultivation structures and activities on designated species.

The species summaries and screening outcome for Dundalk Bay SPA are presented in Table 5-9.

Table 5-9 Dundalk Bay SPA SCI screening outcome.

Feature Name	Screening Outcome	Rationale
Bar-tailed godwit	In	Winter visitor to coastal estuaries from October to April from Russia and Scandinavia. Feed along the tidal edge, or in shallow water (up to 15 cm depth). Polychaete worms, particularly lugworms, form a large proportion of their diet. On the muddier estuaries, where lugworms may be absent, they take ragworms and bivalves. There is possibility of spatial overlap between the foraging habitat and the proposed activities[35]. There is the possibility of disturbance and exclusion from the proposed activities.

[35] Spatial overlap of foraging habitat with proposed activities refer to overlap with structures (trestles and AtoNs), for this qualifying interest and others following.

Feature Name	Screening Outcome	Rationale
Black-headed Gull	In	Resident along all Irish coasts they feed on a wide variety of habitats. There is spatial overlap between potential foraging habitats and the proposed activities. There is possibility of disturbance and displacement pressures on this SCI.
Black-tailed godwit	In	Winter visitor which feeds on invertebrates including bivalves, polychaete worms and shore crabs in muddy estuaries. The foraging range for this species is unknown and there are low numbers of sightings of this species within Carlingford Lough SPA. They are listed as having high site fidelity (NPWS, 2011) and therefore, there is the possibility of spatial overlap with Black-tailed Godwit in Dundalk Bay SPA and the proposed extensive aquaculture activities.
Light-bellied Brent goose	In	Winter migrant from high-Arctic Canada. Most occur in Ireland between October and April. During the winter, it feeds mostly on eel-grass, which grows on muddy estuaries, and also on grasslands, usually when coastal supplies have been depleted at estuarine sites. There is potential for spatial overlap between the winter foraging habitat of this species and the proposed activities. There is the possibility of exclusions from sites and disturbance from the proposed activities.
Common Gull	In	Resident and winter visitor to all Irish coasts. Feeding on a wide range of terrestrial and aquatic invertebrates and fish. There is the possibility of overlap between Common Gull in Dundalk Bay SPA and the proposed activities. Possible pressures include displacement and disturbance.
Ringed plover	In	A resident and winter visitor which feeds on a variety of invertebrates particularly polychaete worms and crustaceans. Mostly found on sandy beaches. They have high site fidelity (NPWS, 2011). There is the possibility of overlap between Common ringed plover in Dundalk Bay SPA and the proposed activities. Possible pressures include displacement and disturbance.
Common scoter	In	Resident and winter visitor to all Irish coasts. Forage in water less than 20m depth with sandy substrates. Feed predominantly on benthic bivalves. Foraging range and site fidelity is unknown, but the Irish Sea is an important area of this species particularly in winter[36]. The species is known to be highly sensitive to disturbance from vessels. Therefore, there is a possibility of overlap with Common scoter from Dundalk Bay SPA and the proposed activities. There is the possibility of displacement, disturbance and prey competition for this SCI.
Curlew	In	Winter visitor to wetlands throughout Ireland they feed mostly on invertebrates particularly ragworms, crabs and molluscs. Foraging range is small with home range sizes of

[36] Breen, Patricia, Sarah Clarke, and Oliver Tully. "Modelling essential habitat for common scoter (Melanitta nigra) in a disturbed environment." *Estuarine, Coastal and Shelf Science* 276 (2022): 108007.

Feature Name	Screening Outcome	Rationale
		533ha and 555ha described in the literature[37],[38]. They also show winter site fidelity (Mander et al. 2022, Donnez et al. 2023). There is likely to be spatial overlap of Curlew in Dundalk Bay SPA with the proposed activities.
Dunlin	In	Summer visitor that feeds on small invertebrates on estuarine mudflats close to the tide edge. Foraging range is 15km in other parts of the world[39] and they have moderate site fidelity (NPWS, 2011). There is the likely spatial overlap between Dunlin in Dundalk SPA and the proposed activities. There is the possibility of disturbance and displacement.
Golden plover	In	Year-round visitor. They are found in dense flocks both coastal and inland. Foraging range during the breeding season is 6-7km and they do not move far from breeding sites in wintertime[40]. There is likely spatial overlap with Golden plover in Dundalk Bay SPA and the proposed activities. There is the possibility of displacement and disturbance.
Great Crested Grebe	In	A resident species along all Irish coasts, that feeds mainly on fish, sometimes supplemented with aquatic invertebrates. Great Crested Grebe breed on large shallow eutrophic loughs, along canals and slow-flowing rivers, nesting in reeds. They winter mainly in the north midlands and northeast. There is spatial overlap between the proposed activities and great crested grebe foraging habitat. There is no permanent exclusion from foraging grounds nor is there prey competition between the activities and the great crested grebe. There is the possibility of disturbance from vessel activity. There is likely to be spatial overlap with Great Crested Grebe in Dundalk Bay SPA and the proposed suspended culture activities.
Grey plover	In	Winter visitor that feeds on a wide variety of burrowing intertidal invertebrates particularly polychaete worms, molluscs and crustaceans. There is likely to be spatial overlap with Grey Plover in Dundalk Bay SPA and the proposed activities. This species has shown an aversion to intertidal aquaculture structures.
Greylag Goose	Out	A winter migrant between November and April. Feed on grasslands in wintering areas. Feed mostly on cereal stubble and grassland in their wintering areas. There is no possibility of spatial overlap or likely interactions between the proposed activities and the foraging habitat of Greylag Goose.

[37] Mander, L., Nicholson, I., Green, R. M., Dodd, S. G., Forster, R. M., & Burton, N. H. (2022). Individual, sexual and temporal variation in the winter home range sizes of GPS-tagged Eurasian Curlews Numenius arquata. Bird Study, 69(1-2), 39-52.

[38] Donnez, M., Schwemmer, P., Fort, J., Garthe, S., Boschert, M., Düttmann, H., & Bocher, P. (2023). Small space but high diversity: Spatial and temporal habitat use by endangered Eurasian Curlew at wintering sites throughout Europe. Wetlands, 43(7), 80.

[39] Choi, C., Gan, X., Hua, N., Wang, Y., & Ma, Z. (2014). The habitat use and home range analysis of Dunlin (Calidris alpina) in Chongming Dongtan, China and their conservation implications. Wetlands, 34, 255-266.

[40] Wiersma, P., G. M. Kirwan, and P. F. D. Boesman (2020). European Golden-Plover (Pluvialis apricaria), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA.

Feature Name	Screening Outcome	Rationale
Herring gull	In	Resident species which feeds and scavenges on the coast on a wide variety of prey. The mean maximum foraging ranges is 58.8 km. There is the possibility of spatial overlap with Herring Gull in Dundalk Bay SPA and the proposed activities. There is the possibility of displacement and disturbance.
Knot	In	Winter visitor during November and February. Feed predominantly on bivalves and crustaceans. Foraging range is reported as vastly different in different areas. Mostly likely between 2-16km[41]. Moderate site fidelity (NPWS, 2011). The proposed activities are within the foraging range of this species. There is the possibility of prey competition, disturbance and displacement. Knot has been shown in other sites in Ireland to have low resilience to exclusion and disturbance from aquaculture activities[42]
Mallard	Out	A resident and winter migrant with a variable diet but plant material predominates. Average foraging range of 4.1km but moderate site fidelity. Both a resident and winter migrant, with a variable diet, which plant material (particularly seeds) predominates, but includes molluscs and crustaceans. Nest sites vary, mostly in ground were hidden in vegetation. They occur in almost all available wetland habitats in Ireland. The proposed activities overlap with the distribution of mallard however the species is widespread and utilises a varied habitat. Disturbance from foraging habitat is possible during vessel activities. There is no direct prey competition with the proposed activities. Given the generalist nature of this species habitat and food requirements, there is unlikely to be a significant interaction with the proposed activities.
Lapwing	In	Resident and winter visitor that feeds on terrestrial and wetland invertebrates. Foraging range is unknown, but moderate site fidelity is recorded (NPWS, 2011). There is therefore the possibility of overlap between this SCI and the proposed activities. There is the possibility of displacement and disturbance.
Pintail	In	Winter visitor to wetlands throughout Ireland between October and March. Feeds mainly on plant material. Usually seen in large flocks in winter. Winter foraging range in the USA is recorded as averaging 6.8km[43]. Also recorded by NPWS (2011) as having weak site fidelity. Since Carlingford Lough SPA is on the edge of its foraging range we cannot rule out that birds from Dundalk are not foraging in Carlingford. There could therefore be spatial overlap with Northern Pintail in Dundalk Bay SPA and the proposed activities which may cause displacement and disturbance.

[41] Leyrer, J., Spaans, B., Camara, M., Piersma, T., & Bairlein, F. (Ed.) (2006). Small home ranges and high site fidelity in red knots (Calidris c. canutus) wintering on the Banc d'Arguin, Mauritania. Journal of Ornithology, 147(2), 376-384

[42] Stillman, R. A., Biermann, L. K. & Morris, S. E. (2023) Intertidal oyster cultivation and shorebirds in Dungarvan Harbour: predictions from an individual-based model. BU Global Environmental Solutions report BUG2889 to WS Atkins Ireland Limited. 74 pp.

[43] Clark, R. G., J. P. Fleskes, K. L. Guyn, D. A. Haukos, J. E. Austin, and M. R. Miller (2020). Northern Pintail (Anas acuta), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.norpin.01

Feature Name	Screening Outcome	Rationale
Oystercatcher	In	Resident and winter visitor to Ireland feeds on larger invertebrates particularly bivalves (cockles) in the intertidal zone. Foraging range in winter is a maximum of 10.4km per day. Main foraging sites were 7km from the main roosting site in the UK[44]. There is the possibility of overlap of Oystercatcher within Dundalk Bay SPA with the proposed activities. There is the possibility of prey competition, disturbance and displacement.
Red-breasted Merganser	In	A resident and winter visitor to Ireland they mainly consume small fish species. The foraging range and site fidelity of this species is currently unknown. There is likely be spatial overlap with Red-breasted Merganser in Dundalk Bay SPA and the proposed activities. There is the possibility of displacement and disturbance.
Redshank	In	Resident and winter visitor to wetlands. They feed on snails, worms and amphipods in the upper shore. Although foraging range is unknown, they do display strong winter site fidelity[45]. Individuals from Dundalk Bay SPA are therefore likely to overlap with proposed activities. The possible pressures are displacement and disturbance.
Shelduck	In	A resident and winter migrant which feeds predominantly on Hydrobia snails. The median foraging range for individuals was 23km[46]. Therefore, there is likely to be spatial overlap with Shelduck from Dundalk Bay SPA and the proposed activities. There is the possibility of displacement and disturbance.
Teal	Out	Feed on small seeds, Enteromorpha and molluscs and insect larvae. In winter can be found on wetlands with good cover. Foraging range is short ~2.6km[47] but they show weak site fidelity. There is unlikely to be overlap between individuals from Dundalk Bay SPA and the proposed activities. They winter widespread on wetlands with good cover, such as reedbeds, in a wide variety of habitats, both coastal and inland. There is no likely spatial overlap between the proposed activities on mudflats and this species.
Wetlands and Waterbirds	In	There is spatial overlap between the proposed activities and the wetland and waterbird habitat, particularly in the intertidal and subtidal areas. There is potential for compaction and smothering pressures to be exerted on this habitat.

[44] Morten, J. M., Burrell, R. A., Frayling, T. D., Hoodless, A. N., Thurston, W., & Hawkes, L. A. (2022). Variety in responses of wintering oystercatchers Haematopus ostralegus to near-collapse of their prey in the Exe Estuary, UK. Ecology and Evolution, 12(11), e9526.

[45] Burton, N. H. (2000). Winter site-fidelity and survival of Redshank Tringa totanus at Cardiff, south Wales. Bird Study, 47(1), 102-112.

[46] Carboneras, C. and G. M. Kirwan (2020). Common Shelduck (*Tadorna tadorna*), version 1.0. In Birds of the World (J. del Hoyo, A. Elliott, J. Sargatal, D. A. Christie, and E. de Juana, Editors). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.comshe.01

[47] Johnson, W. P., Schmidt, P. M., & Taylor, D. P. (2014). Foraging flight distances of wintering ducks and geese: a review. Avian Conservation and Ecology, 9(2), 2.

5.5 Screening of SCIs of adjacent Natura 2000 SPA sites

Table 5-10 below provides a screening of the qualifying interests of the adjacent SPA qualifying interests and the rationale for the decision.

Table 5-10 SCIs from SPAs within 15km of Dundalk Bay SPA.

Feature Name	Natura Site(s)	Screen-ing Result	Rationale
Light-bellied Brent goose	Carlingford Lough SPA, Skerries Island SPA, Carlingford Lough SPA (NI)	In	Brent geese are known to move between Carlingford Lough and Dundalk Bay. There is, as a consequence, a likely spatial overlap with the proposed activities.
Sandwich Tern	Carlingford Lough SPA NI	In	A summer visitor to all Irish coasts. Usually seen over open sea diving for fish. They nest colonially on the ground, on islands, the coast, sand, shingle and sand dunes. The breeding population are protected in Carlingford Lough SAC NI. The foraging range of Sandwich Tern is 9km (Global mean)[48]. The proposed activities are less than 5km away from this SPA and are therefore within the foraging range of this species and overlap may occur. There is the possibility of disturbance and displacement on these species.
Common Tern	Carlingford Lough SPA NI, NW Irish Sea SPA	In	A summer visitor, usually seen over the sea or over large inland lakes. They nest colonially on the ground, on the coast. They do not winter in Ireland. They feed chiefly on fish by plunging. They have a foraging range of 30 km, with a mean max of 18.0±8.9 km and mean of 6.4±4.5 km. Therefore, the proposed activities are within the foraging range of this species and overlap might occur. There is the possibility of disturbance and displacement.
Common Scoter	NW Irish Sea SPA	In	Resident and winter visitor to all Irish coasts. Forage in water less than 20m depth with sandy substrates. Feed predominantly on benthic bivalves. Foraging range and site fidelity is unknown, but the Irish Sea is an important area of this species particularly in winter. Therefore, there is a possibility of overlap with Common scoter and the proposed activities. There is the possibility of displacement, disturbance and prey competition for this SCI.
Red-throated Diver	NW Irish Sea SPA	In	There is a potential for the feeding habitat of this species to overlap with suspended aquaculture structures in Dundalk Bay. There is the possibility of displacement and disturbance.
Great Northern Diver	NW Irish Sea SPA	In	There is a potential for the feeding habitat of this species to overlap with suspended aquaculture structures in Dundalk Bay. There is the possibility of displacement and disturbance.

[48] Woodward, Ian D., Chris B. Thaxter, Ellie Owen, Mark Bolton, Robin M. Ward, and Aonghais SCP Cook. "The value of seabird foraging ranges as a tool to investigate potential interactions with offshore wind farms." Ocean & Coastal Management 254 (2024): 107192.

Feature Name	Natura Site(s)	Screen-ing Result	Rationale
Fulmar	NW Irish Sea SPA	In	Resident along all Irish coasts. A great variety of food taken including fish, discards from trawlers, crustaceans and whale flesh. Comes to land in the day. Mainly breeds on sea cliffs, but will nest on level ground, on buildings and in burrows and crevasses. Will use both steep rocky cliffs, grassy cliffs and steep slopes above cliffs. Winters at sea but can be seen in Irish waters throughout the year. It is possible there is spatial overlap between the proposed activities. There is the possibility of displacement and disturbance.
Manx Shearwater	NW Irish Sea SPA	In	There is a potential for the feeding habitat of this species to overlap with suspended aquaculture structures in Dundalk Bay. There is the possibility of displacement and disturbance.
Shag	NW Irish Sea SPA	In	A resident species along all Irish coasts, that feeds on a wide range of small fish. Their average foraging range is 7 km. They nest on ledges, in crevasses, in caves or under boulders, on cliffs all around the coast. Whilst young birds will disperse widely, most adults will winter in the vicinity of their breeding colonies. There is potential for spatial overlap between the proposed activities and the foraging habitat of Shag. There is no likelihood of exclusion nor prey competition but there is the possibility of disturbance from the proposed activities.
Cormorant	NW Irish Sea SPA	In	A Resident species, with some immigration during the winter. They feed on fish. Breeds in colonies mainly around the coast of Ireland, with some birds breeding inland. Birds on the coast breed on cliffs whilst those inland, in trees. They winter at sea and inland. They have a mean of 7km but a maximum of 35km has been recorded. There is potential for spatial overlap between the proposed activities and the foraging habitat of cormorant. There is no likelihood of exclusion nor prey competition but there is the possibility of disturbance from the proposed activities. Great cormorant is therefore screened in.
Little Gull	NW Irish Sea SPA	In	While this species predominantly forages over water and during winter takes small marine fish and invertebrates. Daytime roosts (loafing areas) noted on beaches, mudflats, lawns, often with other gulls[49]. Given the proximity of the proposed aquaculture sites to the NW Irish Sea SPA, Little Gull is screened in.
Kittiwake	NW Irish Sea SPA	In	Summer visitor to steep coastal cliffs along all Irish coasts. Disperses to the open ocean in winter and less frequently seen. Feeds on fish, waste from commercial fishing and invertebrates. Forms colonies, often with other seabirds. Breeds on steep sea cliffs where it builds a nesting platform on the most vertical and sometimes improbably steep areas.

[49] Ewins, P. J. and D. V. Weseloh (2020). Little Gull (Hydrocoloeus minutus), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.litgul.01

Feature Name	Natura Site(s)	Screen-ing Result	Rationale
			There is possible spatial overlap between the proposed aquaculture activities and the foraging or breeding habitats of kittiwake The possible pressures are displacement and disturbance.
Black-headed Gull	NW Irish Sea SPA	In	There is spatial overlap between potential foraging habitats and the proposed activities. The maximum foraging distance of black-headed gull is 18km which is greater than the 5km distance between the closest proposed aquaculture site and the NW Irish Sea SPA.
Common Gull	NW Irish Sea SPA	In	Local species breeding on islands in larger lakes in western Ireland. Winter visitor to all Irish coasts, with significant numbers arriving. They feed on terrestrial and aquatic insects and invertebrates, fish. They nest on the ground in a wide variety of situations, including, islands, cliffs and shingle banks. Breeds in wetlands, meadows, and beaches; winters in waterside habitats and fields, especially near the coast. Given the proximity of the NW Irish Sea to the proposed aquaculture there is potential overlap with this species.
Lesser Black-backed Gull	NW Irish Sea SPA	In	A year-round resident in Ireland with numerous breeding sites identified. Opportunistic feeders over water and inshore. Given the proximity of the NW Irish Sea to the proposed aquaculture there is potential overlap with this species.
Herring Gull	NW Irish Sea SPA	In	Resident species which feeds and scavenges on the coast on a wide variety of prey. The mean maximum foraging ranges is 58.8 km. There is the possibility of spatial overlap with Herring Gull in NW Irish Sea SPA and the proposed activities. There is the possibility of displacement and disturbance.
Great Black-backed Gull	NW Irish Sea SPA	In	Resident species which feeds and scavenges on the coast on a wide variety of prey. The mean maximum foraging range is very large. There is a strong possibility of spatial overlap in NW Irish Sea SPA and the proposed activities. There is the possibility of displacement and disturbance.
Little Tern	NW Irish Sea SPA	In	The Little tern will forage in inshore and shallow subtidal areas over sandy habitat. There is a potential overlap and risk of disturbance to this species from the proposed aquaculture operations.
Roseate Tern	NW Irish Sea SPA	In	The Irish Sea is an important area generally for breeding Roseate Terns. By association the area is important for feeding. The Roseate tern will forage in inshore and shallow subtidal areas over sandy habitat. There is a potential overlap and risk of disturbance to this species from the proposed aquaculture operations.
Common Tern	NW Irish Sea SPA	In	A summer visitor, usually seen over the sea or over large inland lakes. They feed chiefly on fish by plunging. They nest colonially on the ground, on the coast. They do not

Feature Name	Natura Site(s)	Screen-ing Result	Rationale
			winter in Ireland. They have a foraging range of 30 km, with a mean max of 18.0±8.9 km and mean of 6.4±4.5 km. The breeding population of Common Tern is protected in Lough Swilly SPA. There is no overlap between the proposed activities and the nest areas of common tern. There is potential for overlap within their foraging range. Disturbance from vessels is possible.
Arctic Tern	NW Irish Sea SPA	In	A summer visitor to all Irish coasts, usually seen over the sea. Their diet is comprised mainly of marine fish and invertebrates. The Arctic Tern feed mostly inshore, in shallow water, with an average foraging range of 7 km. They are mainly a coastal breeding bird, but in Ireland the species also breeds inland on some freshwater lakes. The maximum foraging range for Arctic tern is 46km. There is therefore the possibility of spatial overlap between foraging habitat and the proposed activity. There is possibility of disturbance from the proposed activity.
Puffin	NW Irish Sea SPA	In	Summer visitor from March to September to sea stacks and cliffs, mainly along the west coast of Ireland. Feed on marine fish and crustaceans with a large foraging range. Nests in colonies in burrows, or sometimes in boulder screes and in cracks in steep cliffs. Usually nests in areas that are safe from mammalian predators, for which reason it prefers off- shore islands. Winters far out to sea and not often seen outside of the breeding season. There is possible spatial overlap between the proposed aquaculture activities and the foraging or breeding habitats of puffin The possible pressures are displacement and disturbance.
Razorbill	NW Irish Sea SPA	In	Resident, though occur inshore/ land during the breeding season, March/April to August/September. Feeds mainly on small fish, and some invertebrates, caught by surface diving. Nests on sea cliffs in mixed colonies. They winter at sea. There is possible spatial overlap between the proposed aquaculture activities and the foraging or breeding habitats of razorbill The possible pressures are displacement and disturbance.
Guillemot	NW Irish Sea SPA	In	Resident, though occur inshore/ land during the breeding season, March/April to August/September. Comes ashore to nest from May onwards, colonies deserted by the first week in August. Nests on cliff ledges, often in large colonies, defends the smallest nest territory, sometimes only 5cm square. Restricted to cliffs with suitable ledges. Lays egg directly on to rock. Prey on mainly small fish, some invertebrates, caught by surface diving. There is possible spatial overlap between the proposed aquaculture activities and the foraging or breeding habitats of guillemot The possible pressures are displacement and disturbance.

5.6 Screening of long-ranging QIs

As noted above, the guide value of 15km range can inform habitats and species with defined ranges, they may not apply to migratory species (e.g. some fishes or mammals) or those with large foraging ranges (e.g. birds and mammals). Such species may interact with the proposed activity as a result of the structures along their migratory route or impacting on their foraging behaviour. The screening is, therefore, extended to a defined list of 22 birds and 2 seal species with large foraging ranges. A search was carried out for any SAC or SPA which had one of these species listed as a protected feature for which Dundalk Bay was likely within its foraging range (Table 5-11). Furthermore, Harbour Porpoise and Bottlenose Dolphin have been added to the screening as they are both wide ranging species but for which a specific foraging range in Ireland could not be established.

5.6.1 Harbour Porpoise (Phocoena phocoena) [1351]

Harbour Porpoise is included in the screening as it is deemed to have a wide foraging range which has yet to be documented in the literature within Irish waters. Data from The Biodiversity Data Centre[50] indicates very few harbour porpoise sightings in the vicinity of Dundalk Bay. This species is unlikely to interact with intertidal culture activities (Structures and AtoNs) given the shallow nature of locations, even at high water. Harbour porpoise, however, may interact with subtidal suspended mussel culture sites. **The QI Harbour Porpoise is therefore screened in for likely significant effects.**

5.6.2 Bottlenose Dolphin (Tursiops truncatus) [1349]

Bottlenose dolphin is included in the screening as it is deemed to have a wide foraging range which has yet to be documented in the literature within Irish waters. Data from The Biodiversity Data Centre[51] indicates that bottlenose dolphin have been sighted within Dundalk Bay itself with sporadic sightings between 2010 and 2012. This species is unlikely to interact with intertidal culture activities given the shallow nature of locations, even at high water. Although there is little overlap with the SAC or the proposed licensed activities, bottlenose dolphins are highly mobile and therefore the possibility of overlap with the proposed suspended mussel culture activities cannot be ruled out. **The QI Bottlenose Dolphin is therefore screened in as likely significant effects could not be ruled out.**

5.6.3 Grey Seal (Halichoerus Grypus) [1364]

Grey seal is a qualifying interest at Lambay Island SAC, which is approximately 42km from Dundalk Bay. This is within any foraging range of this species. In addition, intertidal sites within Dundalk Bay, which are proximate to the proposed aquaculture sites (Figure 5-5), have been identified as repeated haul-out locations for Grey Seal[52], [53] . On the basis that the aquaculture activities pose a risk of displacement and disturbance the Grey Seal is **screened in** for likely significant effects.

[50] Maps - Biodiversity Maps
[51] Maps - Biodiversity Maps
[52] Maps - Biodiversity Maps
[53] IWM111.pdf

5.6.4 Harbour Seal (Phoca vitulina) [1365]

As with Grey Seal, the Harbour seal is also a qualifying interest in Lambay Island SAC and has also been observed at a number of haul out locations within Dundalk Bay (Figure 5-5). On this basis, the risk of significant impact on this seal species cannot be discounted. **Harbour Seal is screened in.**

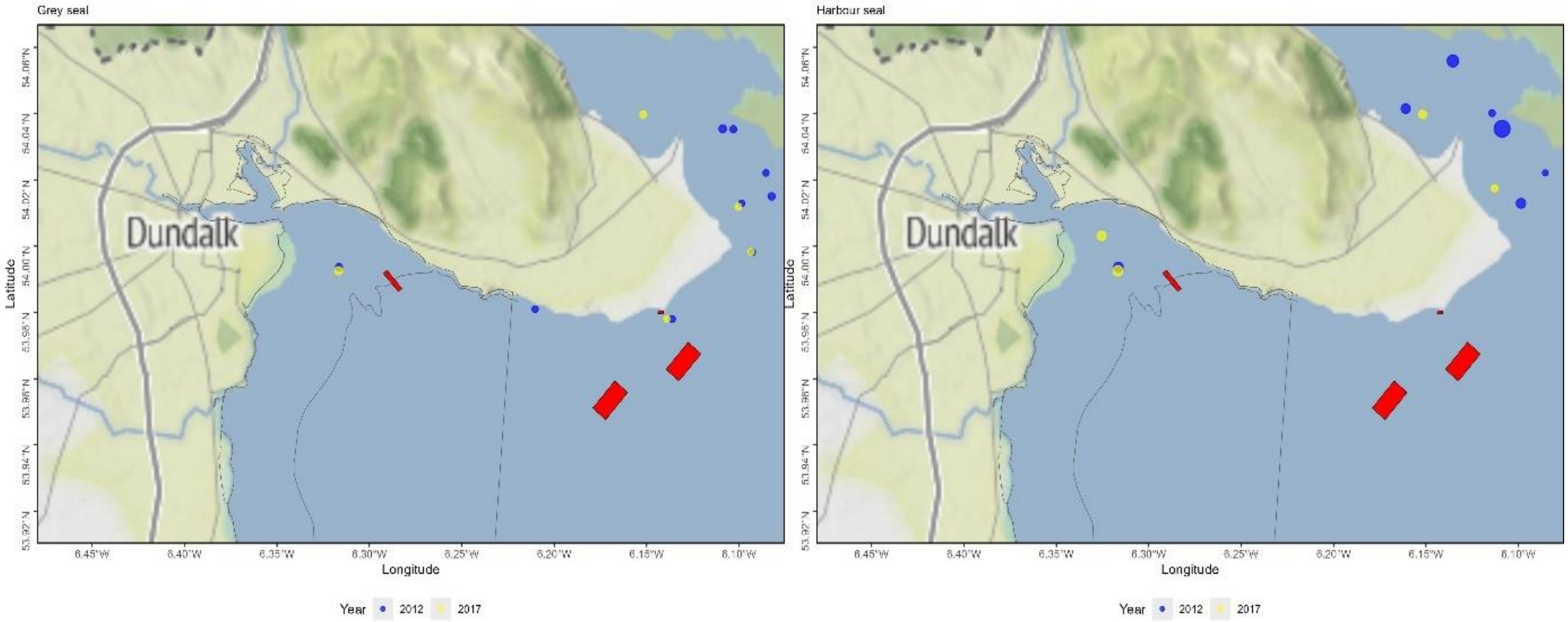


Figure 5-5 Seal species (Harbour and Grey Seal) haul-out locations identified in Dundalk Bay.

Table 5-11 Long ranging bird species considered in Screening of aquaculture activities in Dundalk Bay. Note: these species included here reflect those not already considered in Table 3-3, above.

Species	Range used for screening	Site Name	Distance to nearest SPA (km)	Screening Outcome	Rationale
Leach's storm petrel (*Oceanodroma leucorhoa*)	657.0	Stags of Broad Haven SPA [004072]	224	Out	Summer visitor to the northwest coast. Forages at sea on small fish, plankton, molluscs and crustaceans. Feed well offshore at the continental shelf edge. Therefore, there will be no overlap between the foraging areas of this species and the proposed activities in Dundalk Bay.
Storm Petrel (*Hydrobates pelagicus*)	227.7	Stags of Broad Haven SPA [004072], Illanmaster SPA [004074]	219	Out	Forages at sea on small fish, plankton, molluscs and crustaceans. Feed well offshore at the continental shelf edge. Therefore, there will be no overlap between the foraging areas of this species and the proposed activities in Dundalk Bay.
Northern gannet (*Morus bassanus*)	709.0	Saltee Islands SPA [004002]	191	In	Resident along all Irish coasts, feeding on fish. Breeds on colonies on Islands. Winters at sea but frequents Irish waters throughout the year. The breeding population is protected on Saltee Islands SPA. Breeders range up to 180km from colonies to forage[54]. Therefore, there is likely to be overlap with the current and proposed activities.

5.7 Screening of Introduction of Non-native Species on Natura 2000 sites

The establishment of non-native species as a wild population in an area can be a potential risk associated with aquaculture. This may occur if the culture organism[s] become established as a wild, non-native population, or, if non-native species 'hitch-hike' along with the cultured organisms and then become established as a wild population. The primary risk of the proposed activities to the QIs of the Dundalk Bay SAC is the potential introduction and establishment of the culture organism *Magallana gigas* as a wild, non-native, population.

The habitat conditions in Dundalk Bay SAC may be suitable for the settlement and subsequent establishment of *M. gigas*. Out of an abundance of caution, the potential for the establishment of wild populations of *M. gigas* the likely significant effect on QIs cannot be dismissed at this stage. **Therefore, this potential effect is screened in and is carried forward for further consideration.**

[54] Mowbray, T. B. (2020). Northern Gannet (*Morus bassanus*), version 1.0. In Birds of the World (S. M. Billerman, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.norgan.01

6 In-combination effects of aquaculture, fisheries and other activities

It is important to consider, for those QIs that may screen out during the initial AA screening exercise, if the pressures deriving from the proposed activities acts in-combination with other activities such that additive or synergistic effects are realised on the QIs. It is possible that such combined effect may cause the QI, therefore, to screen in and be considered further in the AA process. It should be noted that, interactions are additive when their combined effect is the sum of each independently, synergistic when the combined effect is greater than the sum of each independently, and antagonistic when the combined effect is less than the sum of each independently.

Other aquaculture

There are no existing aquaculture activities within Dundalk Bay. There are a number of existing extensive intertidal culture activities in Carlingford Lough. The main pressures on habitats from aquaculture activities are smothering, habitat loss, organic enrichment and eutrophication. On this basis, the activities in Carlingford are unlikely to impact on Habitat QIs in Dundalk Bay SAC.

Pressures on species include disturbance and potential displacement from Carlingford lough into Dundalk Bay. **On this basis, in-combination effects with aquaculture will be brought forward to stage 2 assessment.**

Fishing

Fishing activities in Dundalk Bay include dredging for cockles and razor clams. The cockle fishery is restricted to the inshore waters of Dundalk Bay. Razor clam dredging occurs from North Dundalk Bay down the entire coast to Dublin. Hydraulic dredging for cockles and razor clam causes sub-surface abrasion, disturbance, exclusion from fishing grounds and possibly direct and indirect prey competition. Some netting areas have been identified from the MI Marine Atlas from outside Carlingford Lough to the North to Dundrum Bay and south down to Dublin. Further offshore but in the vicinity of Carlingford Lough there is Irish bottom otter trawling effort, pelagic trawling, limited distribution of potting and seine netting (Irelands Marine Atlas). Fishing activities occur in subtidal waters, the only exception to this is the intertidal cockle fishery in Dundalk Bay. All of these activities will overlap with the habitat features of Dundalk Bay SAC. **Therefore, in-combination effects on habitats cannot be ruled out.**

The presence of fishing vessels in an area can cause disturbance and displacement on bird and marine mammal SCIs. The intensity of this pressure is a result of the number of vessels active and the number of days and hours per day that those vessels are in operation. The impact also depends on the distribution of vessels throughout the area used by the species and the size of the foraging area available to the species. **Considering the significant number of fisheries occurring within and adjacent to the proposed activities, further effects of displacement and disturbance on birds and species also is screened in.**

Shipping

The Irish Marine Atlas indicates that there is significant shipping density of passenger, cargo and tanker vessels in Carlingford Lough. The only pressure which shipping exerts which might act in-combination with

aquaculture is disturbance on marine birds and species. The shipping routes are well defined over a limited spatial area. However, they do overlap with or are in very close proximity to the SPA and to the proposed aquaculture activities. **Therefore, shipping is screened in for stage 2 Appropriate Assessment.**

Offshore renewable energy

There are several licences or potential for licences for offshore renewable in the Irish Sea. Of particular note is the Oriel windfarm which is the closest to Carlingford and is currently seeking planning approval. The proposed cable route travels south to Dunany Point and will therefore not overlap with any of the Dundalk Bay SAC habitat features. Therefore, effects on habitats can be screened out. The construction phase will see an increase in the number of vessels operating in the area whilst service vessels will also be present during the operating phase. These have the potential to act in-combination with vessels being used in the proposed suspended culture activities. **Therefore, in-combination effects of disturbance on marine birds and species is screened in for Stage 2 assessment.**

The major threat to birds from renewable energy projects is mortality at the farm itself, however mortality risk from aquaculture activities is considered very low **therefore, there will be no in-combination effects on SPA features from this pressure.**

Other activities

Existing and proposed licensing activities in the vicinity of the proposed extensive shellfish culture activities have been reviewed. The sources reviewed are:

- MARA Marine Usage Licences (Applications/Determinations - accessed 19/02/2025)
- EPA pressures maps (www. https://gis.epa.ie/EPAMaps/Water - accessed 19/02/2025)

Based on these searches there were no additional activities above those listed and considered above which will interact with aquaculture such that there would be in-combination effects on the SAC or SPA features.

7 Conclusions

This screening exercise for Dundalk Bay SAC and SPA and surrounding Natura 2000 sites, has indicated that likely significant effects of the proposed aquaculture activities cannot be discounted for a number of habitat and species within and in the surrounding area of Dundalk Bay. It is recommended, therefore, that the proposed activities are carried forward for a Stage 2 appropriate assessment for consideration of interactions with a number of qualifying interests and conservation features, as outlined below.

The following QI habitats in Dundalk Bay SAC and one Marine Community Type (MCT) is carried forward for further consideration given the direct overlap with proposed intertidal aquaculture activities and access routes.

- Annex I Habitat 1140 - Mudflats and sandflats not covered by seawater at low tide
  MCT: Fine sand community complex
- Annex I Habitat 1130 - Estuaries;
  MCT: Fine sand community complex

By virtue of the fact that the following species are wide ranging, and their distribution may overlap with the proposed suspended culture activities, it is proposed that the following mammal species;

- Bottlenose dolphin (*Tursiops truncatus*) [1349],
- Harbour Porpoise (*Phocoena phocoena*) [1351],
- Grey Seal *(Halichoerus grypus)* [1364],
- Harbour Seal (*Phoca vitulina)* [1365],

be brought forward to Stage 2 Appropriate Assessment.

The initial screening for Dundalk Bay SPA has highlighted a number of bird SCIs which have been screened in for possible (S-P-R) interactions such as disturbance, exclusion from foraging habitat by structures (e.g., trestles, AtoNs)) and indirect prey competition with the proposed activities. Furthermore, several species which are features of surrounding SPAs, either because the SPA is within 15km of the proposed aquaculture activities or because their foraging range may overlap with the proposed aquaculture activities were considered. The following species are screened in for Stage 2 Appropriate Assessment.

- Light-bellied Brent goose (*Branta bernicla hrota*) [A046]
- Sandwich Tern (*Sterna sandvicensis*) [A191]
- Common Tern (*Sterna Hirundo*) [A193]
- Common Scoter (*Melanitta nigra*) [A065]
- Red-throated Diver (*Gavia stellata*) [A001]
- Great Northern Diver (*Gavia immer*) [A003]
- Manx Shearwater (*Puffinus puffinus*) [A013]
- Shag (*Phalacrocorax aristotelis*) [A018]
- Cormorant (*Phalacrocorax carbo*) [A017]
- Little Gull (*Larus minutus*) [A177]
- Herring Gull (*Larus argentatus*) [A184]
- Great Black-backed Gull (*Larus marinus*) [A187]
- Roseate Tern (*Sterna dougallii*) [A192]
- Arctic Tern (*Sterna paradisaea*) [A194]
- Little Tern (*Sterna albifrons*) [A195]
- Bar tailed godwit (*Limosa lapponica)* [A157]
- Black headed gull (*Chroicocephalus ridibundus)* [179]
- Black-tailed godwit (*Limosa limosa*) [A156]
- Common gull (*Larus canus*) [A182]
- Curlew (Numenius arquata) [A160]

- Dunlin (*Calidris alpina)* [A149]
- Golden plover (*Pluvialis apricaria)* [A140]
- Ringed plover (*Charadrius hiaticula*) [A137]
- Great Crested Grebe (*Podiceps cristatus*) [A005]
- Grey plover (*Pluvialis squatarola*) [A141]
- Herring gull (*Larus argentatus*) [A184]
- Knot (*Calidris canutus*) [A143]
- Lapwing (*Vanellus vanellus*) [A142]
- Pintail (*Anas acuta*) [A054]
- Oystercatcher (*Haematopus ostralegus*) [A130]
- Red-breasted merganser (*Mergus serrator*) [A069]
- Redshank (*Tringa totanus*) [A162]
- Shelduck (*Tadorna tadorna*) [A048]
- Sandwich Tern (*Sterna sandvicensis*) [A191]
- Common Tern (*Sterna hirundo*) [A193]
- Lesser black-backed gull (*Larus fuscus*) [A183]
- Northern Fulmar (*Fulmarus glacialis*) [A009]
- Kittiwake (*Rissa tridactyla*) [A188]
- Razorbill (*Alca torda*) [A200]
- Guillemot (*Uria aalge*) [A887]
- Atlantic Puffin (*Fratercula arctica*) [A204]
- Northern Gannet (*Morus bassanus*) [A016]
- Wetlands and waterbirds [A999]

In addition, the risk of naturalisation posed by the culture of the non-native species, the Pacific oyster (*Magallana gigas*) will be brought forward to Stage 2 Appropriate Assessment.

Finally, in-combination effects of disturbance on marine birds and species for rope mussel aquaculture, fishing activity, shipping and activity related to offshore renewable energy will also be brought forward to Stage 2 Appropriate Assessment.