Report supporting Appropriate Assessment Screening of Extensive Aquaculture in Carlingford Shore SAC and Carlingford Lough SPA, Co. Louth

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1 Introduction

1.1 Overview of this Assessment

This is an Appropriate Assessment Screening document supporting the Appropriate Assessment of extensive aquaculture activities in Carlingford Lough, Co. Louth. The report assesses the potential for the proposed aquaculture activities to have likely significant effects on the Qualifying Interests (QIs) or Special Conservation Interests (SCIs) of connected or adjacent Natura 2000 sites, individually or in combination with existing or planned aquaculture activities.

Extensive aquaculture is defined in Regulation 3(iii) of the Aquaculture (Licence Application) Regulations, 1998 (as amended[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 1.1. 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.

This report applies specifically to the proposed activities described in this document in Section 2. It does not constitute a full assessment of the potential environmental effects of all aquaculture activities on conservation features as defined by Natura 2000 designations, as any live aquaculture applications and active finfish operations are only considered in the instance that they have the potential to have in-combination or cumulative effects with aspects of the existing extensive aquaculture, and other likely 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. The spatial extent of aquaculture licences is derived from a database managed by the DAFM[2].

1.2 Structure of AA Reports

This screening report provides:

- **Introduction -** an outline of the legislative context and the processes.
- **Appropriate Assessment Screening -** providing details of the AA screening undertaken.
- **Stage I Conclusions** - provides an outline of the findings from the screening process.

[1] Aquaculture (Licence Applications) (Amendment) Regulations 2018 Regulation 3(iii) https://www.irishstatutebook.ie/eli/2018/si/240/made/en/print

[2] DAFM - Aquaculture viewer – AquaMIS Link

1.3 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**[3]) 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[4].

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*[5], 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**).

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[6]. The specific named habitats and/or (non-bird) species for which an SAC or SPA are selected are called the Qualifying Interests (**QI**), of the site. The specific named bird species for which a SPA is selected 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)*[7] 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)[8]. They determine applications for new, renewal or review of, aquaculture and foreshore licences. They are also the competent authority responsible for undertaking 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

[3] https://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm
[4] https://ec.europa.eu/environment/nature/natura2000/index_en.htm
[5] https://www.irishstatutebook.ie/eli/2011/si/477/made/en/print
[6] https://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm
[7] Fisheries (Amendment) Act, 1997 Lawreform.ie
[8] Foreshore Act 1933 Revised Acts (lawreform.ie)

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.

If the AA process finds that the possibility of significant adverse effect cannot be discounted or that there is a likelihood of negative consequence for the conservation features for which a site is designated, then such activities will need to be mitigated further if they are allowed to continue. The assessment reports are not always explicit on how this mitigation might be achieved but rather indicate whether mitigation is required or not and what results should be achieved.

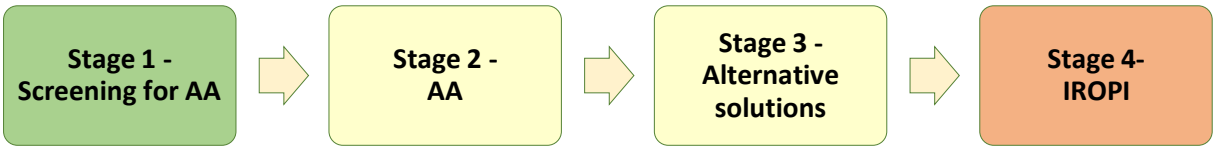
This report supporting the AA, informs part of the assessment process – Stage 1 Screening.

1.4 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 [9].

The *Guidance on Appropriate Assessment of Plans and Projects in Ireland* document[10] published by the Department of Environment, Heritage and Local Government (DEHLG) in 2009, sets out how an AA of plans 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[11], 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.

1.4.1 Stage 1: Appropriate Assessment Screening

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

[9] EC. 2018. Guidance on Aquaculture and Natura 2000 Sustainable aquaculture activities in the context of the Natura 2000 Network Link

[10] DEHLG, 2009. Appropriate Assessment of Plans and Projects in Ireland Guidance for Planning Authorities. Link

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

occurring and not on certainty. This test is based on the precautionary principle[12]. 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.

1.4.2 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.

1.5 Data sources

This process and report rely on data and information from a broad and diverse range of 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
- Site specific BIM profiling
- 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
- The Irish Wetland Bird Survey (I-WeBS)
- NPWS Status of EU Protected Habitats and Species in Ireland – Article 17 (Habitats & species

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

- 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.
- 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, Navionics, and Bing aerial photography

1.6 Assumptions made for Appropriate Assessment Reports

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

- Aquaculture sites considered in this assessment report are assumed to be fully operational and that the operations (as well as environmental impacts) are occurring across the entire area of the site.
- Any aquaculture applications which were submitted prior to those being considered here, but still pending decisions (e.g., in process, under appeal, etc.), are also assumed to be fully operational across the entire area of the relevant sites. This ensures a conservative approach

and that it assumes these activities will be operational to the maximum extent possible when considering cumulative effects.

- 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 (e.g. where it is proposing to culture mussels and seaweed at a site and detail on the exact size of each species production is not provided, the assessment assumes that mussels will be the primary species produced across the entire area of the site).
- Other assumptions may be identified on a case-by-case basis and are clearly communicated in any AA report.

2 Appropriate Assessment Screening

2.1 Assessment of Aquaculture Activities

This section identifies the proposed aquaculture activities to be considered as part of the screening exercise in this report, and then to consider whether the proposed activities are likely to significantly affect the QIs of the Natura 2000 sites. This is achieved by following a Screening Process as outlined below. If there is potential for the activities considered to have likely significant effects on the QI and their conservation features, they will be carried forward for full assessment in a Natura Impact Statement (NIS). These activities are considered in-combination with similar aquaculture practices and on a cumulative basis with other aquaculture activities and other potentially impacting activities.

2.1.1 Overview of Existing Aquaculture Activities

There are currently 37 licenced aquaculture sites in Carlingford Lough. All sites are licenced for shellfish, 13 of these grow blue mussel (*Mytilus edulis*), all using bottom culture and 24 are licensed for oyster (*Magallana gigas* & *Ostrea edulis*) on bags and trestles, baskets or roll 'n' bags (Table 1; Figure 1).

Table 1 Currently licensed aquaculture which are not being considered for renewal in Carlingford Lough.

License No.	Status	Aquaculture Type	Culture Type	Species	Area (ha)
T01-020	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	6.18
T01-021	Licensed	Shellfish	Bag and Trestle, Floating Bags	Pacific Oyster	12.25
T01-019	Licensed	Shellfish	Bag and Trestle, Floating Bags	Pacific Oyster	11.35
T01-029B	Licensed	Shellfish	Bottom	Blue Mussel	13.32
T01-050C	Licensed	Shellfish	Bottom	Blue Mussel	64.28
T01-018A	Licensed	Shellfish	Bag and Trestle, Floating Bags	Pacific Oyster	10.00
T01-018B	Licensed	Shellfish	Bag and Trestle, Floating Bags	Pacific Oyster	2.00
T01-025A	Licensed	Shellfish	Bag and Trestle, Floating Bags, Basket	Pacific Oyster	2.14
T01-025C	Licensed	Shellfish	Bag and Trestle, Floating Bags, Basket	Pacific Oyster	0.27
T01-008A	Licensed	Shellfish	Bag and Trestle, Floating Bags, Basket	Pacific Oyster	4.14
T01-044A	Licensed	Shellfish	Bag and Trestle, Floating Bags plus SEAPA bags	Pacific Oyster	2.95
T01-044B	Licensed	Shellfish	Bag and Trestle, Floating Bags plus SEAPA bags	Pacific Oyster	1.63

License No.	Status	Aquaculture Type	Culture Type	Species	Area (ha)
T01-043A	Licensed	Shellfish	Bag and Trestle, Basket plus Floating Bags and Trestles	Pacific Oyster	3.29
T01-023A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	6.20
T01-024	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	6.43
T01-026A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	13.11
T01-009	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	1.55
T01-012	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	1.60
T01-071A	Licensed	Shellfish	Bottom	Blue Mussel	65.10
T01-066A	Licensed	Shellfish	Bottom	Blue Mussel	31.73
T01-061A1	Licensed	Shellfish	Bottom	Blue Mussel	15.83
T01-060A1	Licensed	Shellfish	Bottom	Blue Mussel	48.72
T01-072B1	Licensed	Shellfish	Bottom	Blue Mussel	27.08
T01-074A2	Licensed	Shellfish	Bottom	Blue Mussel	16.73
T01-090A	Licensed	Shellfish	Bottom	Blue Mussel	13.28
T01-089A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	2.06
T01-100A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	1.70
T01-101A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	6.12
T01-102A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	1.51
T01-103A	Licensed	Shellfish	Bottom	Blue Mussel	95.09
T01-105A	Licensed	Shellfish	Bottom	Blue Mussel	49.23
T01-117A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	1.08
T01-120A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	0.92
T01-121A	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	1.64
T01-050A1	Licensed	Shellfish	Bottom	Blue Mussel	61.05
T01-070A1	Licensed	Shellfish	Bottom	Blue Mussel	57.73
T01-004	Licensed	Shellfish	Bag and Trestle	Pacific Oyster	2.45

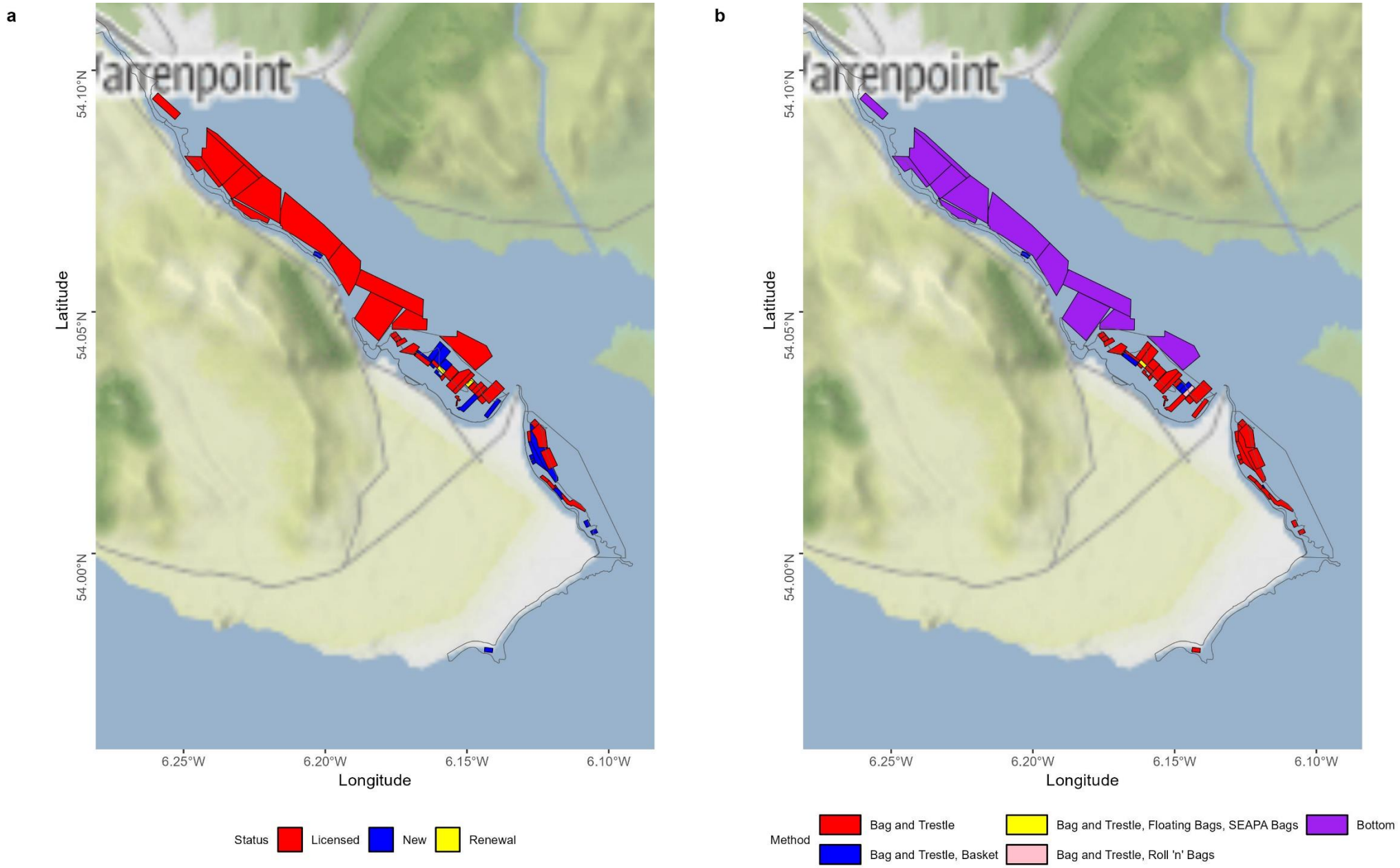


Figure 1 a) Licenced and renewal aquaculture sites in Carlingford Lough; b) Primary culture type at each licenced site in Carlingford Lough. The grey outlines indicate the boundary of the SAC and SPA.

Aquaculture activities within the Carlingford Shore SAC focus on the subtidal (bottom culture) of the blue mussel, *M. edulis* and the intertidal (bags and trestle) cultivation of the Pacific oyster, *M. gigas.*

2.1.2 Bottom Mussel Cultivation

Current activity

Mussel operators are licensed to relay mussel seed on aquaculture sites in Carlingford Lough. Sites to the south of the channel are licenced by DAFM and sites to the North of the channel are licenced by DAERA. In the case of the mussel industry there are strong North-South company linkages and vessels operate on multiple sites. All operators are members of the Carlingford Lough CLAMS group.

At maximum usage (seed relaying) it is estimated that 5 large mussel dredgers (>15m) would represent the total mussel fleet in the Lough. During harvesting it is estimated that 5 aquaculture vessels (4 large and 1 smaller vessel) would represent maximum activity in any 24 hour period.

Dredges typically have a 'mouth' width of between 2 and 4m. Mussel dredges have a flat bar at their leading edge where they interact with the seabed that is designed to skim the surface of the substrate without digging into it. This bar in effect 'peels' the overlying seed mussel 'mat' away from the underlying substrate and in doing so removes the mussel seed which is caught in a bag which follows the bar.

Depending on size, vessels may deploy two or a maximum of four dredges at a time. The iron frame of the dredge (depending on vessel size) has a maximum weight of 300 kg. The dredge is composed of a fixed bar (of between 2 and 4m in length, known as the 'mud bar', which is without teeth) and a frame with a net bag attached, which is 2-3m in length to retain the seed mussel catches. The bottom part of the bag is a made up of either a chain link matrix or a nylon mesh. The upper part of the bag is made of nylon mesh. In the case where a chain link matrix is used on the lower part of the bag it is common practice for a rubber mat or rope dollies (bits of chafed ropes) to be attached to the belly of the dredge to minimise disturbance of the substrate. In addition, some operators use steel bars across the mouth of the dredge to prevent large rocks or other non-target material from entering the dredge.

Husbandry activities

Seed mussel is fished from the sub-tidal seed areas in ROI, NI and UK waters (Only to NI sites) and transferred to licensed sub-tidal sites in Carlingford for on-growing until harvest. The seed mussel fishing itself is considered a fishing activity and is assessed in a separate Appropriate Assessment process (FishingNET - Irish Sea - including Mussel Seed Fishery). This report considers the on-growing phase only. On-growing duration generally varies between 12- 36 months depending on the growth rates and the size of the initial seed input. During on-growing there are a range of husbandry activities undertaken in the Lough such as predator control and transfer of mussel stocks between licensed sites, these practices are necessary to maximise the ultimate return ratio.

Relaying seed

The location, timing and volume of *Mytilus edulis* seed relaying in Carlingford Lough is dictated by the available seed fishing tides, as specified in the annual seed fishing licences. The seed is relayed on licensed aquaculture sites with the dates and volume specified in the seed fishing licences and allocations issued by DAFM and DAERA and dependent on the vessel registration. The allocation system effectively sets down a maximum allowable catch for the fishery.

Current seed allocations were calculated using a range of criteria by the Seed Mussel Advisory Committee (SMAC) in 2005. SMAC was tasked with assessing industry allocation applications and making recommendations to the Department and to the Minister.

The SMAC assesses all applications by applying the criteria outlined below;

- Historical mussel fishing activity
- Percentage fished of requirement
- Average ratio return
- Average selling price per tonne
- Distance from zone to reseeding area
- Verified survey history
- Efficiency of seed operation
- Associated employment local coastal communities
- Percentage seed fished sourced from zone over last 10 years.

In addition to the criteria listed above the SMAC also considers:

- The seed tonnage applied for by the individual operators
- The capacity of the relay area (Allocations were capped on the basis of area of the site times 40 tonnes per hectare for a three-year growing cycle)
- The overall capacity of the bay to support the total amount of relayed mussel. (An upper limit was placed on the allocations to each individual relay bay in order to support growth and productivity of the target and non-target species within the bays).

The capacity of the relay area in the allocation system (30-40t rule) effectively caps the stocking density which is a measure of the quantity of mussels occupying a known area of ground (both the size and number of mussels are important). Correct stocking densities are critical to the eventual production of a quality product. Too high a stocking density will result in a variable sized crop with poor meat condition particularly from the centre of the farm. Too low a stocking density and the full potential of the area is not realised causing an increase in the cost of production. Higher stocking densities are generally preferred for bottom culture of mussels, with local variations between sites. The capping of the stocking density at 30-40t per hectare is precautionary in the context of international standards[13].

Total seed allocations for Carlingford Lough – IE and NI is approximately 6000t however this is subject to seed availability and this level has not been reached in the last number of years, the average seed

[13] http://www.thefishsite.com/articles/894/#sthash.A51lFQDI.dpuf
Sea Fish Industry Authority (2002) Epsilon Aquaculture Limited 2002 The Seabed Cultivated Mussel Hyperbook
Dolmer et al., (2012) Area-intensive bottom culture of blue mussels Mytilus edulis in a micro-tidal estuary. Aquaculture Environment Interactions 3:81-91
Gascoigne et al., (2005) Density dependence, spatial scale and patterning in sessile biota. Oecologia 145:371-381
Kaiser et al., Seed Mussel Ecology (2006) Project Code FC1015
Beadman et al., (2004) Changes in species richness with stocking density in marine bivalves. Journal of Applied Ecology 41:464-475
BIM (2007) UISCE
Capelle et al., (2016) The role of shore crabs and mussel density in mussel losses at a commercial intertidal mussel plot after seeding
Capelle (2017) Production efficiency of mussel bottom Culture. Phd Thesis

input to the lough from 2010-2016 is approximately 2200t with a maximum of 4468 t in 2010. Note that all figures are net tonnages.

Fishing takes place on suitable neap tides (≤7m as predicted in the Llanelli tide tables) subject to seed availability, allocation and suitable weather conditions. Carlingford Lough is managed in line with seed fisheries elsewhere on the Island of Ireland, i.e. a spring and autumn fishery subject to seed availability. Also in line with the management of other seed areas on the Island, the force majeure clause may be initiated and a seed area opened at any time if the bed is subject to high predation pressure.

Seed is relayed by pumping the seed mixed with seawater from the boat's hold onto the licensed sites. This pattern of relaying is characterised by the vessels moving across the plots during pumping to achieve an even distribution of mussel on each plot in order to maximise survival and growth.

In Carlingford, relaying is generally at a density of 20-40t per hectare depending on seed size. Return rates of 1:1 are expected and the final product is harvested to order by vessels, from the licensed sites. Seed size generally varies from 1000-2000 pieces per kilo.

Grow out

Predator control and stock movements both within and between licensed sites is an integral part of the mussel production process in Carlingford Lough. Stock is moved to maximise growth rates and to prevent excessive settlement of barnacles or sea squirts on the stock which negatively affect growth rates and market value.

Predator control mainly focuses on the control of starfish and green crab. Stars are generally fished with the standard dredge or via "mops" and pots are deployed by operators to control green crab

Harvesting

All harvesting and sales activity is monitored by a variety of mechanisms; registration documents, VMS plotting, and annual returns. No waste is generated as the harvested product is placed directly into one tonne bags for export, via refrigerated truck from Warrenpoint Harbour.

Bycatch

As part of the Marine Stewardship Council certification BIM and industry, members have adopted a bycatch monitoring scheme in Carlingford Lough. Surveys in 2016 and 2017 detected no bycatch species exceeded 5% of the catch. Species detected are associated with shell fouling and those that predate on mussels – green crab and starfish. No Endangered Threatened or Protected species were detected in the samples collected on the harvest beds in Carlingford Lough.

Invasive Alien Species (IAS)

The issue of IAS species is one that has been identified as a risk to the bottom grown mussel sector and thus BIM have been working with operators in Carlingford to manage the risks posed.

A number of Carlingford Lough Skippers have undertaken training in IAS species identification and a seed bed screening process was trialled in the 2017 Seed Season.

Activity levels

The activity levels for a standard vessel are provided in Table 2 below

- The activity level for a standard mussel vessel is approximately 220 days per year

- Days of activity are not all within Carlingford Lough as vessels are typically involved in about 40 days seed fishing, transiting, maintenance and surveying per year.
- Subtracting activity outside the Lough provides 180 days activity per vessel per year.
- Maximum time vessels would spend on site is 6 hours per day
- Maximum activity per vessel is 1080 hrs per year
- Please note that as the operators in Carlingford are on a broadly similar production cycle, it is inappropriate to multiply 1080hrs per year by 5 vessels as there will be significant overlap in times of activity.

Access

Historically vessels would access sites from Warrenpoint Harbour, Greer's Quay and Carlingford Harbour. However, due to vessel size and siltation in Carlingford, all vessels now moor in Warrenpoint

Table 2 Seasonal, daily and tidal profile of activities undertaken by standard mussel vessel in Carlingford Lough

	Tide			Time		Month											
Activity	Low	High	Slack	Day	Night	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Seed Fishing (Outside lough)			X	X						L			L	H	H	L	L
Relaying of Seed (Inside Lough)	X	X	X	X						L			L	H	H	L	L
Maintenance (General Husbandry)	X	X	X	X		L	L	H	L	L	L	H	L	L	L	L	L
Harvesting	X	X	X	X		H	H	L	L	L		H	H	H	H	H	H
Max number of working hours on water per day						6	6	6	6	6	6	6	6	6	6	6	6
Max Number of working days per month						20	20	20	15	15	10	20	20	20	20	20	20

2.1.3 Intertidal Oyster Cultivation

Current activity

Oyster farming within Carlingford Lough is a form of extensive culture which has been taking place since the early 1970s. Cultivation of the Pacific oyster (*Magallana gigas*) is carried out by growing oysters in bags placed on a variety of trestle designs. The trestle type used in the Lough varies depending on location. The most common trestle type typically measure 3m x 1m and stand 0.4 – 1.2m in height, holding 6 bags each. Bags are made of a plastic (HDPE) mesh and are fastened to trestles using rubber straps and hooks. Bags vary in mesh size depending on oyster stock grade (6mm, 9mm, and 14mm).

Higher trestles, trestles with enclosed bags (frames) and trestles with hanging baskets have been used by a number of operators for over 30 years to maximise return and to minimise man hours on the shore. On some sites these systems enhance shell shape and meat content and have allowed growers to achieve the highly rated quality classification of 'Speciales' which achieve a market price of twice that of standard quality oysters. From a sales point of view, bulk producers of 'Speciales' have huge demand for their product, whereas bulk producers of 'Standards' are competing with a large volume of this product from Ireland and in France and may be unable to sell all their product in a given year.

One grower uses the enclosed trestles (frames) to overcome the turbulence on his site which causes bags to break loose from their bindings.

In recent years, some growers have concentrated their entire production of 'Speciales' using improved husbandry practices and a combination of the culture systems described above and have been able to reduce the growth cycle to only 2 summers thus making their operations more viable and sustainable.

Husbandry activities

The production cycle begins in the Lough when G4 – G6 seed (6-10mm) is introduced from UK or French hatcheries beginning in spring and/or autumn of each year. The timing of introductions has changed significantly in the last 10 years because of oyster mortalities not previously observed.

Hatcheries used from both the UK and France, some producers have also used remote settlement and Irish hatcheries. Occasionally wild seed is also brought in from France. Mixed stocks of Diploid and Triploid oysters are currently grown in Carlingford Lough. In response to large seed mortalities, from 2010-2015 operators purchased extra seed to ensure that production levels were maintained. This practice has now largely ceased because of reduced mortalities through the use of improved broodstock at the hatcheries and better husbandry practices principally the correct positioning of seed on the shore. The balance of oysters not affected by mortalities were grown to half size and sold for on growing elsewhere or have been gradually sold off since then. Producers are now focusing on high value markets rather than bulk sales with 2 large operators selling a portion of their stock into Asia.

All trestle lines and blocks are labelled for traceability. As well as mixed stocking by oyster type, oyster grades are also mixed. All stocking and movement activities are recorded by date and location so that a full record of stock distribution is maintained on an ongoing basis. In general, the upper shore areas are used for seed and for final hardening of stock. Some of the growers employ the use of a dedicated holding area on the upper shore close to the land base for finishing stock and to allow for ready access for grading or final harvesting during slack tides. New seed can also be placed in this area to allow for ongoing observation of its condition. Oysters are kept in the holding area for periods of up to 6 weeks.

Growth cycle, depending on seed intake size ranges from 2.5 to 3 years. Market size is approximately 100g, by which stage they are around 120 -160 shells in each bag.

Activity levels

The intertidal area is typically accessed during mean and spring tides. Preparatory work is always conducted in the packing areas in the intervening periods, including grading and packing, depuration, preparation of bags and trestles and general maintenance. Sites are accessed by tractor and trailer. Each operator observes one or 2 dedicated access routes to the sites.

Oysters are thinned out and graded as the oysters grow. Through the on-growing period, they are taken to the handling / sorting facility twice per year for grading and re-packing, and subsequently returned to the trestles. In the final stage they will be 'hardened' and stored in the upper intertidal area, before removal, grading, depurated (if required), packed and shipped for distribution.

The programme of work is continuous over all suitable low tide periods. The farms are positioned between mean Low Water Spring and mean Low Water Neap, allowing on average 3 hours exposure depending on tidal and prevailing weather conditions. Carlingford low tides are early morning and late evening.

As a rule, growers access the growing areas 6 days per fortnight – 156 days per year. When packing, daily access is required to the hardening/storage areas further up the shore - 250-300 days per year.

Maintenance activities on-site include shaking and turning of bags, removal of fouling and seaweed by hand and movement of stocks as necessary. Three operators have land-based facilities directly on the shore at the access point. A fourth currently uses a nearby land base approximately 200m from the shore.

Harvest periods for oysters are typically between October and April but with the culture of triploids in the Lough, year-round harvesting can and does also take place. Harvesting from the half-grown market takes place between March and April and again between September and October. Three of the operators have depuration facilities at their land base.

Access Routes

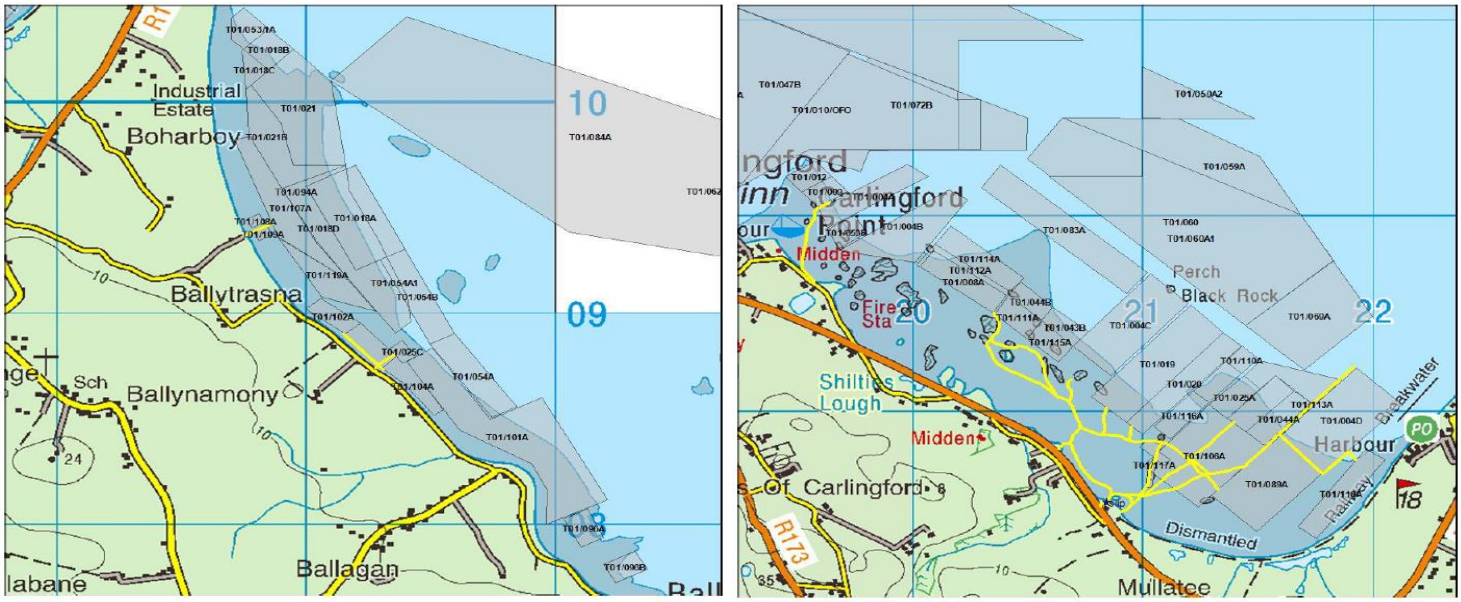


Figure 2 Access routes to Carlingford Shore SAC oyster trestle licensed sites for a) north of Greenore and b) south of Greenore. Yellow lines denote the access routes.

Access Routes have been established over many years and occur in areas where the ground is suitable to support the weight of a tractor and trailer. Between all the operators a maximum of 10 tractors (2 at Ballagan, 8 in inner Carlingford) are used to access the sites from five main access points (Figure 2).

2.1.4 Details of Proposed Aquaculture Activities

The MI has been requested to assess 19 applications for either renewal, or new licences for extensive aquaculture activities within the Carlingford Shore SAC and Carlingford Lough SPA (Table3). Two of these, T01-043B and T01-043C are renewal applications of existing sites for the culture of pacific oyster using bags and trestles. The remaining 17 are all new applications. All sites are all applying for culturing pacific oyster using bags and trestles.

Table 3 Application sites currently in progress within Carlingford Lough.

License No.	Status	Aquaculture Type	Culture Type	Species	Area (ha)
T01-094A	New	Shellfish	Bag and Trestle	Pacific Oyster	15.04
T01-097A	New	Shellfish	Bag and Trestle	Pacific Oyster	1.90

Figure 3 Yellow lines in marine areas indicate access routes for nearby intertidal licences. Licenced sites are grey.

License No.	Status	Aquaculture Type	Culture Type	Species	Area (ha)
T01-107A	New	Shellfish	Bag and Trestle	Pacific Oyster	6.24
T01-108A	New	Shellfish	Bag and Trestle	Pacific Oyster	0.89
T01-109A	New	Shellfish	Bag and Trestle	Pacific Oyster	0.69
T01-118A	New	Shellfish	Bag and Trestle	Pacific Oyster	5.00
T01-125A	New	Shellfish	Bag and Trestle	Pacific Oyster	4.18
T01-126A	New	Shellfish	Bag and Trestle, Basket	Pacific Oyster	1.99
T01-043B	Renewal	Shellfish	Bag and Trestle	Pacific Oyster	1.81
T01-043C	Renewal	Shellfish	Bag and Trestle	Pacific Oyster	1.89
T01-1012	New	Shellfish	Bag and Trestle	Pacific Oyster	1.55
T01-1013	New	Shellfish	Bag and Trestle; Floating bags	Pacific Oyster	1.41
T01-1014	New	Shellfish	Bag and Trestle, Other	Pacific Oyster	2.46
T01-1020	New	Shellfish	Bag and Trestle	Pacific Oyster	1.03
T01-1019	New	Shellfish	Bag and Trestle; Floating bags	Pacific Oyster	8.29
T01-1018	New	Shellfish	Bag and Trestle; Floating bags	Pacific Oyster	5.72
T01-1017	New	Shellfish	Bag and Trestle; Floating bags	Pacific Oyster	2.28
T01-1016	New	Shellfish	Bag and Trestle; Floating bags	Pacific Oyster	6.29
T01-1015	New	Shellfish	Bag and Trestle; Floating bags	Pacific Oyster	0.78

Application details

All sites are primarily culturing Pacific Oyster in traditional bag and trestles. Some single and some double height. Sites T01-1013, T01-1015, T01-1016, T01-1017, T01-1018, T01-1019 are additionally applying to use floating bag systems which are similar to the bag and trestles except that bags are fitted with a float to the trestle structure and they turn themselves as the tide rises and falls. Environmental impacts of these systems are thought to be similar to bag and trestles therefore, they will be considered together under intertidal aquaculture.

The sites using bag and trestle range from using between 400 and 4560 trestles, proportional to the size of the site. Most trestles hold 6 bags per trestles. Sites are accessed using tractor and trailer by local roads R175 and/or R176. Site T01-126A access route is through a local field and across the Carlingford Lough Greenway. Some sites will also use work barges or punts but the greatest environmental impact will come from tractor and trailer therefore, this will be the main type of vehicle considered in the following assessment (Table 4).

Table 4 Details of the new and renewal applications including access routes in Carlingford Lough.

Licence	No. of trestles	No. of bags	Seed source	Access via	Access and harvest method

T01-094A	1200	7200	France	Off the R175 at Ballytrasna	Tractor and trailer
T01-097A	Not known	Not known	Holding site	No site access information given in licence.	Not known
T01-107A	1200	7200	France	Off the R175 at Ballytrasna	Tractor and trailer
T01-108A	500	3000	France – Hardening site	Off the R175 at Ballytrasna	Tractor and trailer
T01-109A	400	2500	France – Hardening site	Off the R175 at Ballytrasna	Tractor and trailer
T01-118A	4560	22800	French hatcheries (France Naissain and Sodabo)	R176	Tractor and trailer
T01-125A	2200	Not provided	Hatchery: France, UK, Ireland Wild: France	Site access route not provided.	Tractor and trailer
T01-126A	Not provided	Not provided	Hatchery: UK and France	Access appears to be via a local field and through the Carlingford Lough Greenway.	Tractor or punt
T01-043B	1350	Not provided	Hatchery: France, UK, Ireland Wild: France	R176	Tractor and trailer
T01-043C	1350	8100	Hatchery: France, UK, Ireland Wild: France	R176	Tractor and trailer
T01-1012	1200	7200	Hatchery: France, UK, Ireland Wild: France	Local road of the R175 near Ballagan Bay Beach	Tractor and trailer
T01-1013	1000	6000	Hatchery: France, UK, Ireland Wild: France	Local road of the R175 near Ballagan Bay Beach	Tractor and trailer
T01-1014	1860	Not provided	Hatchery: France, UK, Ireland Wild: France	Local road of the R175 near Ballagan Bay Beach	Tractor and trailer
T01-1020	1000	Not provided	Hatchery: France Naessain, Marinove, Satmar, Grand Ocean	R176	Tractor and trailer
T01-1019	4000	2400	Hatchery: France, UK, Ireland Wild: France	R176	Tractor and trailer; Work barge
T01-1018	2400	14400	Hatchery: France, UK, Ireland Wild: France	R176	Tractor and trailer; Work barge
T01-1017	1526	9156	Hatchery: France, UK, Ireland Wild: France	R176	Tractor and trailer; Work barge
T01-1016	4200	25200	Hatchery: France, UK, Ireland Wild: France – Storage and conditioning site	R176	Tractor and trailer; Work barge
T01-1015	544	3264	Hatchery: France, UK, Ireland Wild: France	R176	Tractor and trailer; Work barge

2.2 Identification of Relevant Natura 2000 Sites and QIs

A key consideration as to whether an activity is likely to significantly affect Natura 2000 QIs is if there is a pathway of connectivity between the QI and the sources of potential impacts associated with the activity. The proposed licenced sites either overlap with or are in close proximity to Carlingford Shore SAC and Carlingford Lough SPA and is within 15km from number of other Natura sites (Table 5; Figure 3 and Figure 4).

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. Additionally, we also assess SACs and SPAs that have QIs from a list of 22 bird species and 2 seal species with wide foraging ranges and which the proposed activities may be within foraging range of. The screening assessment of aquaculture in relation to the Conservation Objectives for Carlingford Shore SAC [002306] and Carlingford Lough SPA [004078] is based on Version 1.0 of the objectives[14],[15] and supporting documentation[16],[17]. The spatial data for conservation features was provided by NPWS.

Table 5 The area (Ha), URL and distance to proposed activities (km) of all SACs and SPAs which are within 15km from the proposed activities.

Site Code.	Site Name	SAC area (Ha)	URL	Distance (Km)
002306	Carlingford Shore SAC	524.39	https://www.npws.ie/protected-sites/sac/002306	0.00
000455	Dundalk Bay SAC	5,195.57	https://www.npws.ie/protected-sites/sac/000455	6.57
000453	Carlingford Mountain SAC	3,085.21	https://www.npws.ie/protected-sites/sac/000453	2.17
UK0016615	Eastern Mournes	7,507.03	https://www.daera-ni.gov.uk/articles/special-areas-conservation	13.14
UK0030268	Rostrevor Wood	16.63	https://www.daera-ni.gov.uk/articles/special-areas-conservation	6.11
004026	Dundalk Bay SPA	13,237.90	https://www.npws.ie/protected-sites/spa/004026	7.61
004078	Carlingford Lough SPA	595.12	https://www.npws.ie/protected-sites/spa/004078	0.00

[14] NPWS (2013) Conservation Objectives: Carlingford Shore SAC 002306. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
[15] NPWS (2013) Conservation Objectives: Carlingford Lough SPA 004078. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.
[16] NPWS (2013) Carlingford Shore SAC (site code 2306) Conservation objectives supporting document – coastal habitats. May 2013. Version 1
[17] NPWS (2013) Carlingford Lough SPA (site code 4078) Conservation objectives supporting document. August 2013. Version 1

Site Code.	Site Name	SAC area (Ha)	URL	Distance (Km)
UK9020161	Carlingford Lough	827.12	https://www.daera-ni.gov.uk/publications/special-protection-area-carlingford-lough	1.56

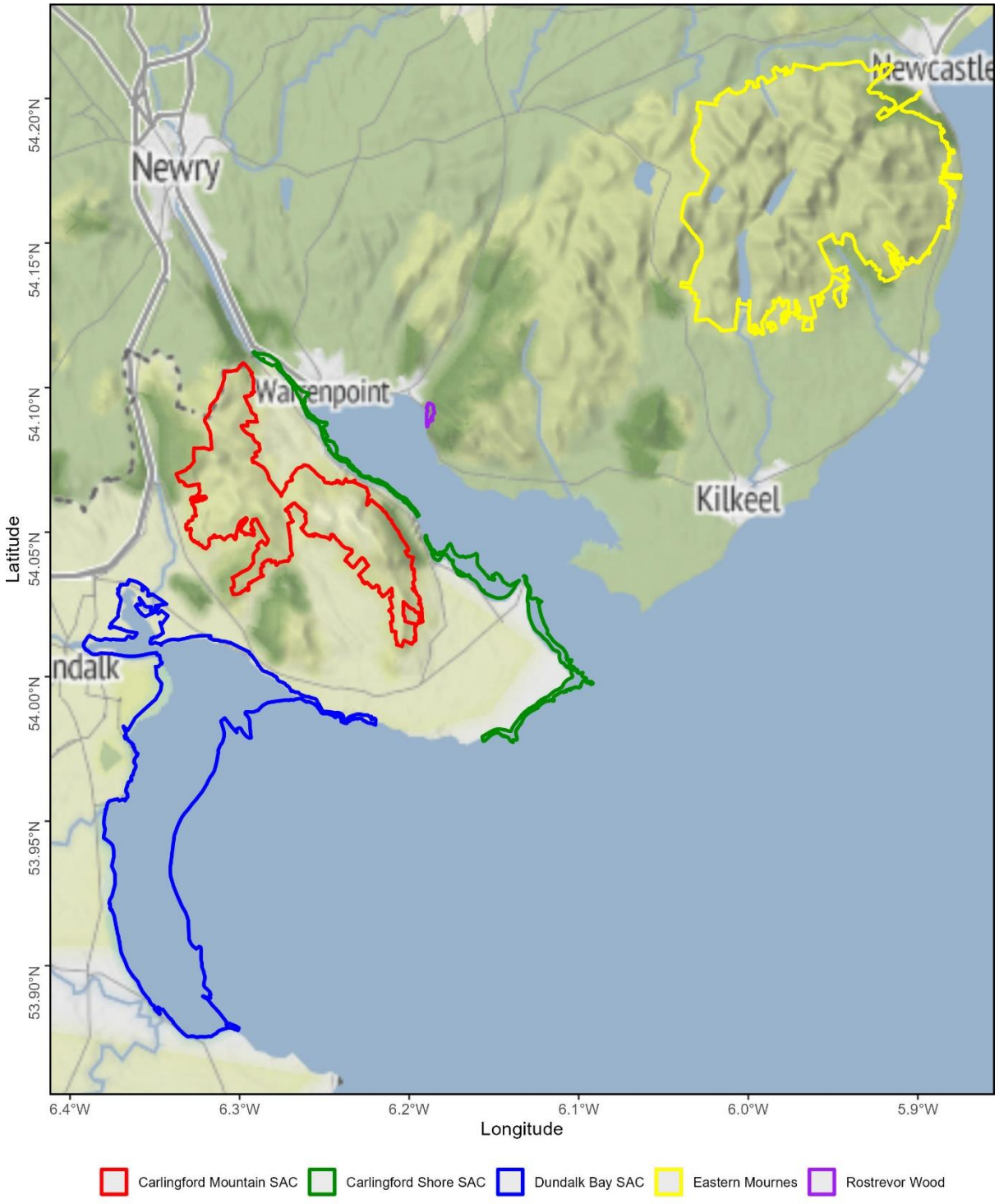


Figure 3 Special Areas of Conservation (SACs) within 15km of the proposed activities.

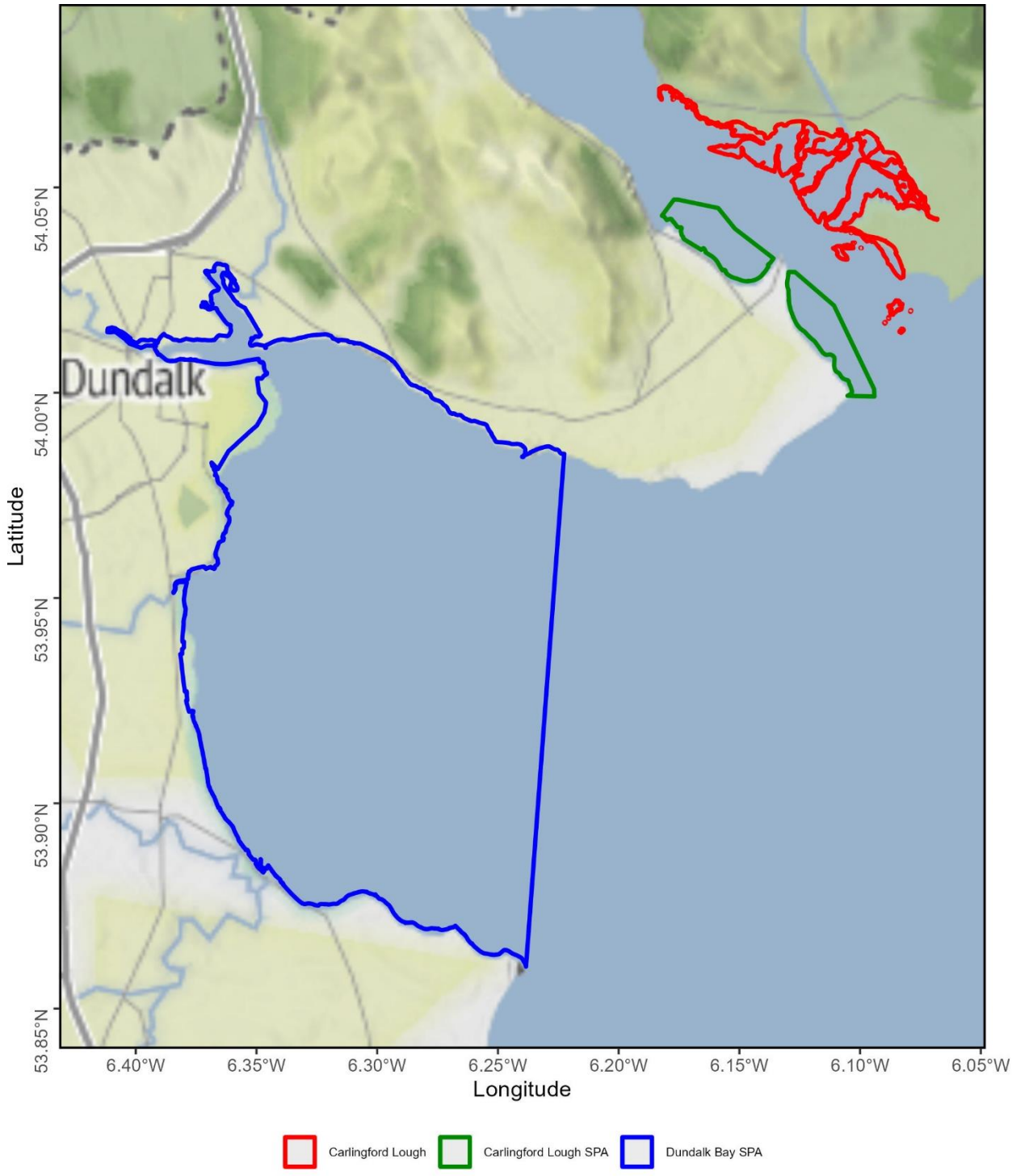


Figure 4 Special Protection Areas (SPAs) within 15km of the proposed activities.

2.2.1 Carlingford Shore SAC

The Carlingford Shore SAC site comprises the entire southern shoreline of Carlingford Lough and continues round the tip of the Cooley Peninsula to just west of Cooley Point (Figure 3). While the principal conservation interests lie in the perennial vegetation of shingle banks and the annual vegetation of drift lines, the site also has intertidal sand and mudflats, patches of saltmarsh, some areas of dry grassland, and an area of mixed deciduous woodland. A relatively extensive expanse of

intertidal flats (more sand than mud) occur, particularly between Greenore Point and Carlingford Harbour. The flats in this area are broken by outcropping reefs and some shingle deposits and saltmarsh on the drier higher rocks. These flats are very important feeding grounds for wildfowl and waders. Approximately 25-30 Grey Seals haul out on reefs between Greenore and Carlingford.

There are two QIs listed under Carlingford Shore SAC the objectives and targets of which are listed in Table 6:

- Annual vegetation of drift lines [1201]
- Perennial vegetation of stony banks [1220]

Table 6 Conservation objectives and targets for marine habitats and species in Carlingford Shore SAC (NPWS, 2013).

Feature (Community Type)	Objective	Target
Annual vegetation of drift lines [1210]	To maintain favourable conservation condition	Area is stable or increasing. The area is unknown. No decline in habitat distribution. Maintain the natural circulation of sediments and organic matter. Maintain the range of coastal habitats. Maintain the presence of species-poor communities. Negative indicator species to represent less than 5% cover.
Perennial vegetation of stony banks [1220]	To maintain favourable conservation condition	Area is stable or increasing. The area is unknown. No decline or change in habitat distribution. Maintain the natural circulation of sediments and organic matter. Maintain the range of coastal habitats. Maintain the typical vegetated shingle flora. Negative indicator species to represent less than 5% cover.

2.2.2 Carlingford Lough SPA

Carlingford Lough SPA contains an extensive expanse of intertidal flats between Greenore Point and Carlingford Harbour (Figure 4). The flats contain more sand than mud and are an important site for waterfowl particularly in autumn and winter. The threshold for internationally important numbers of birds within the site has been exceeded in single years, by some species such as Pale-bellied Brent Goose in the 1980s and 1994/95. The site is nationally important for a number of species such as Great Crested Grebe, Cormorant, Ringed Plover and Red-Breasted Merganser. There are a number of bird species recorded, including Golden Plover and Bar-tailed Godwit, which are listed under Annex I of the E.U. Birds Directive. Black Guillemots (6) were recorded in pairs nesting in wooden breakwater in Greenore and 8 birds were seen at the breakwater. A colony of Terns in Northern Ireland feed in the SPA, particularly Sandwich Tern with some Common Tern. The SPA itself has only two listed SCIs, Brent Goose (*Branta bernicla hrota*) [A046] and wetlands [A999]. The objectives and targets of these species are listed in Table 7.

Table 7 Species of Conservation Interest, their objectives, targets and baseline numbers within Carlingford Lough SPA.

Feature	Objective	Target
Brent Goose (*Branta bernicla hrota*) [A046]	To maintain favourable conservation condition	Long tern population trend stable or increasing. The baseline population is 253 individuals. No significant decrease in the range, timing or intensity of use of areas.
Wetlands [A999]	To maintain favourable conservation condition	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 595 ha.

2.2.3 Dundalk Bay SAC [000455]

Dundalk Bay, Co. Louth, is a very 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. Saltmarsh vegetation occurs in four main areas: at Lurgangreen, Marsh South, Dundalk Harbour and Bellurgan. Shingle beaches are particularly well represented in Dundalk Bay, occurring more or less continuously from Salterstown to Lurgan White House in the south bay, and from Jenkinstown to east of Giles Quay in the north bay. The extensive sandflats and mudflats (over 4,000 ha) occur and are comprised of ecological communities such as muddy fine sand communities and fine sand community complexes. In the centre of Dundalk Bay there is a gravel community dominated by polychaetes. These habitats host a rich fauna of bivalves molluscs, marine worms and crustaceans and are the main food resource of the tens of thousands of waterfowl (including waders and gulls) which feed in the intertidal area of Dundalk Bay.

2.2.3 Carlingford Mountain SAC [000453]

The only upland area in Co. Louth, the Carlingford Mountain range consists of an inverted 'Y' shaped ridge of dolerite forming the rugged backbone of the Carlingford Peninsula. There are no marine features listed as QIs in Carlingford Mountain SAC.

2.2.4 Eastern Mournes [UK0016615]

The Eastern Mournes is one of the largest and most natural areas of both wet and dry heathland in Northern Ireland. Although much of the vegetation consists of European dry heaths, the site also represents one of the largest areas of Northern Atlantic wet heaths with *Erica tetralix* in Northern Ireland. *Scirpus cespitosus – Erica tetralix* wet heath predominates, and this community, together with the dry heaths and other mire communities, forms part of a well-defined altitudinal sequence between 70 m and 800 m. Transitions between the wet and dry heaths occur as a consequence of altitude, aspect and slope, with the wet heaths tending to be best developed on lower north-facing slopes. The site has no marine features listed as QIs.

2.2.5 Rostrevor Wood [UK0030268]

Rostrevor Wood occurs on the lower slopes of the Mourne Mountains in the south-east of Northern Ireland. As a result, it has a drier climate than most of the other examples of **old sessile oak woods** in

Northern Ireland. The wood has a diverse structure with a tall and mature canopy dominated by oak *Quercus* spp., and a well-developed understorey of hazel *Corylus avellana* with occasional holly *Ilex aquifolium* and rowan *Sorbus aucuparia*. The site has no marine features listed as QIs.

2.2.6 Dundalk Bay SPA [004026]

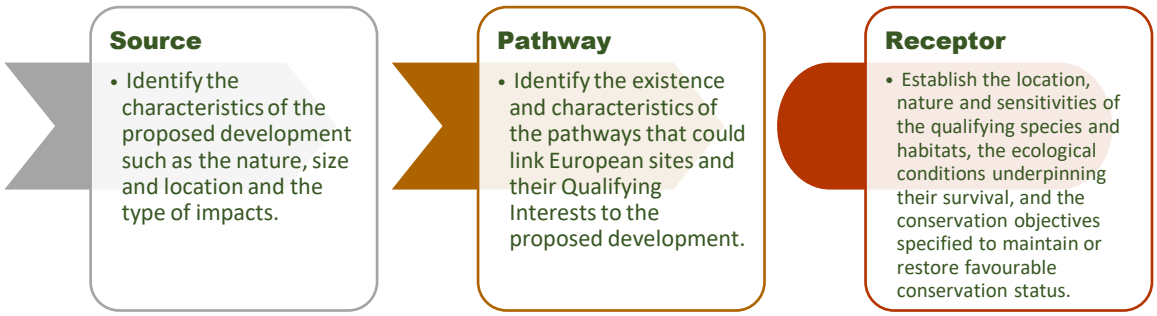
Dundalk Bay, Co. Louth, is a very large open, shallow sea bay with extensive saltmarshes and intertidal sand/mudflats. The saltmarshes are used as high-tide roosts by all of these species, while the grazing birds (notably Brent Goose and Wigeon) feed on the saltmarsh grasses, areas of Zostera and other grassland vegetation. Brent Goose also feed on the mats of green algae on the mudflats. At night the wintering Greylag and Greenland White-fronted Goose, and Whooper Swans, from Stabannan/Braganstown (inland from Castlebellingham) roost in Dundalk Bay. The site is internationally important for waterfowl (numbers in brackets refers to the average maximum over the period 1994/95 to 1997/98) because it regularly holds over 20,000 birds (up to 57,000 have been recorded) and supports over 1% of the North-West European/East Atlantic Flyway populations of Brent Goose (366), Bartailed Godwit (2,312) and Knot (11,948). Additionally, it is nationally important for Golden Plover (4,266), Great Crested Grebe (193), Greylag Goose (312), Shelduck (463), Mallard (657), Pintail (100), Red-breasted Merganser (148), Oystercatcher (6,940), Grey Plover (218), Ringed Plover (133), Wigeon (565), Dunlin (9,112), Blacktailed Godwit (754), Curlew (1,593), Lapwing (4,822), Greenshank (20) and Redshank (1,455).

2.2.7 Carlingford Lough [UK9020161]

Carlingford Lough (SPA) lies between Killowen Point and Soldiers Point on the northern shores of Carlingford Lough and the landward boundary is entirely coincident with that of the Carlingford Lough Area of Special Scientific Interest (ASSI). The SPA boundary is also entirely coincident with that of the Carlingford Lough Ramsar Site. The SPA includes all lands and intertidal areas seawards to the limits of territorial waters. Marine areas below mean low water are not included. The site forms part of an extended cross-border site which supports internationally important numbers of overwintering light-bellied brent geese. The extended site also supports nationally important numbers of the following wader species oystercatcher, ringed plover, grey plover, dunlin and redshank.

2.3 Screening of QIs

A key consideration as to whether or not 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 S-P-R model considers potential ecological links between the proposed activity and the qualifying interest of Natura 2000 site. The link can be direct and facilitated by terrestrial, aquatic and airborne transfer of a particular pressure, 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[18].

The screening for the presence of a S-P-R link and any potential adverse effects of the proposed aquaculture activities on the QIs of the Natura will be presented in this Section. 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. In this assessment, screening of the QIs against the proposed activities is, in the first instance, considered on the basis of direct spatial overlap. Indirect effects are also considered whereby the likely impact of the activity on behaviour or resources required by mobile species (mammals and birds, among others) is considered. Also considered are indirect effects facilitated by hydrological or other potential links (e.g. foraging range).

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, 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.

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 NWPS. 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-R-P pathway for interaction, and the SCI is therefore screened out. If it is deemed that

[18] OPR, 2021. Appropriate Assessment Screening for Development Management. March 2021; Office of Planning Regulator.

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.

Additionally, screening is carried out for long-ranging species. In total a list of twenty-two bird species and two seal species which are considered to have a foraging range greater than 15km was created. Foraging ranges for these species (mean global for breeding birds and mean maximum for wintering birds) were taken from existing literature[19,20,21]. If an SPA with an QI on the long-ranging species list is within the foraging range of the species that QI and SPA is considered for screening. Furthermore, we could not establish population specific foraging ranges for the two Annex II cetacean species Harbour Porpoise and Bottlenose Dolphin. Therefore, these two species will be included in all screening assessments.

Where there is spatial overlap and reasonable potential for likely significant effects on QIs to arise, a full assessment (Stage 2) 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 potential 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.

2.3.1 Screening of QIs in Carlingford Shore SAC

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, 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.

Coastal Habitats

The following qualifying interests would be considered primarily coastal and/or terrestrial habitats:

- Annual vegetation of drift lines [1210]
- Perennial vegetation of stony banks [1220]

[19] Woodward, I. D., Thaxter, C. B., Owen, E., Bolton, M., Ward, R. M., & Cook, A. S. (2024). The value of seabird foraging ranges as a tool to investigate potential interactions with offshore wind farms. *Ocean & Coastal Management*, *254*, 107192.

[20] Sharples, R. J., Moss, S. E., Patterson, T. A., & Hammond, P. S. (2012). Spatial variation in foraging behaviour of a marine top predator (Phoca vitulina) determined by a large-scale satellite tagging program. *PLoS one*, *7*(5), e37216.

[21] Cronin, M., Pomeroy, P., & Jessopp, M. (2013). Size and seasonal influences on the foraging range of female grey seals in the northeast Atlantic. *Marine biology*, *160*, 531-539.

Perennial vegetation of stony banks is found at or above the mean high waters spring tide mark on shingle beaches. Annual vegetation of drift lines is bound on beaches along the high tide mark where tidal litter accumulates[22]. NPWS have plotted as points areas where these habitats occur (Figure 5). Polygons of their distribution is not available.

The proposed and existing activities considered in this report are licensed within the intertidal and subtidal marine environment - sites themselves do not spatially overlap with these coastal habitats. Access routes to intertidal aquaculture sites do not overlap with the distribution of either QI. Therefore, there are no likely impacts from aquaculture activities on these habitat QIs.

[22] NPWS (2013) Carlingford Shore SAC (site code 2306). Conservation objectives supporting document – coastal habitats. NPWS. Version 1. May 2013

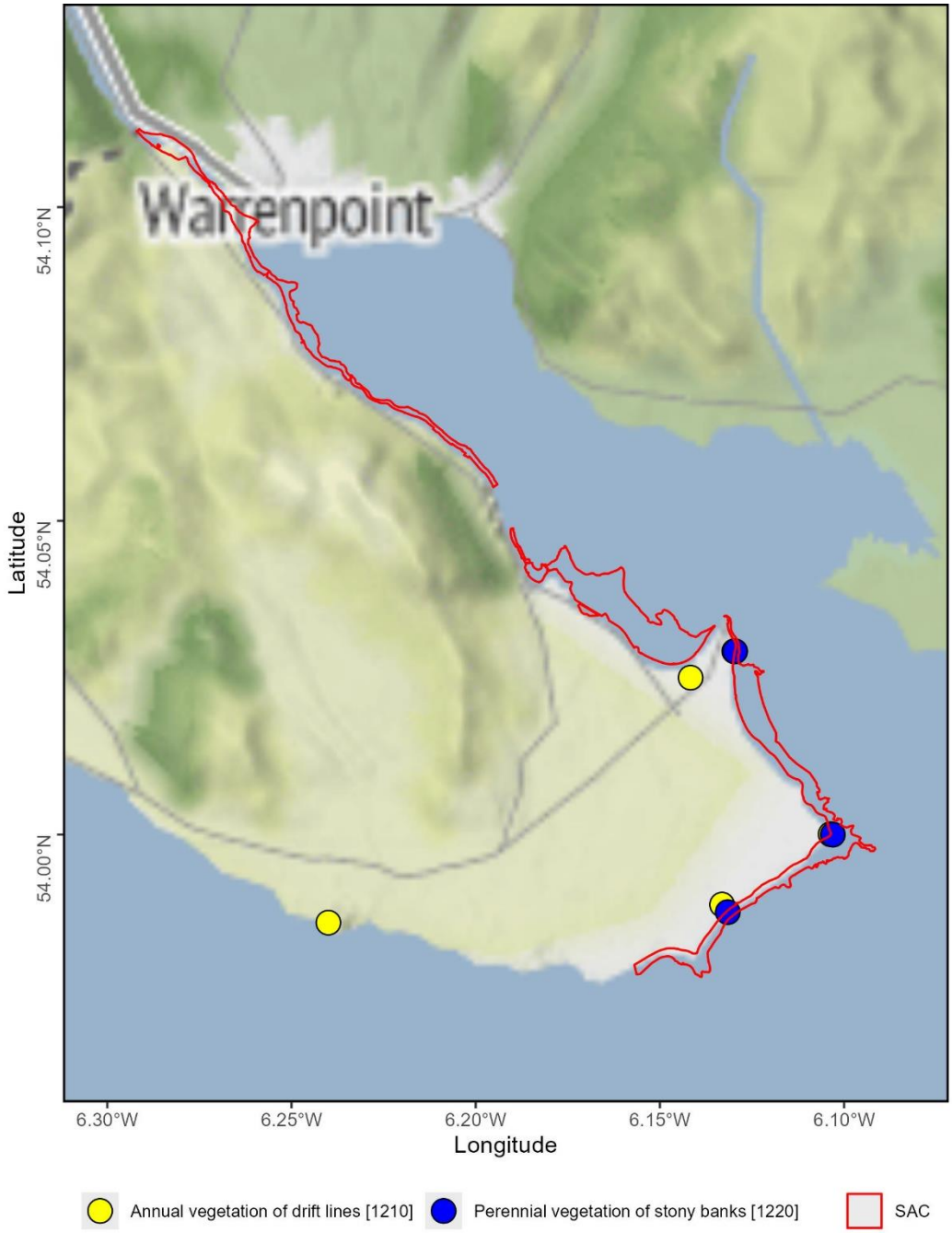


Figure 5 Location of coastal habitats which are QIs within Carlingford Shore SAC taken from NPWS surveys.

2.3.2 Screening of SCIs in Carlingford Lough SPA

There are 2 SCIs within the Carlingford Lough SPA; Brent goose [A046] and Wetlands and Waterbirds [A999]. The main pressures which are likely to be exerted on bird species from the proposed activities are **disturbance, exclusion from foraging or nesting habitats and prey competition**. The presence and activity of harvesting boats, access to trestle sites on foot or using tractors all cause birds to be flushed from the area. Persistent levels of disturbance can cause population level effects on bird species[23]. Some species are more sensitive to disturbance than others. The exclusions from foraging or nesting

[23] 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.

habitats decreases the available suitable habitat for that species. It leads to increases in intraspecific competition for resources and has population level effects. Direct prey competition such as for blue mussel leads to the reduction of prey availability for individuals and populations and directly affects individual survivability.

The species summaries and screening outcomes are presented in Table 8.

Table 8 SCI screening outcome and rationale for Carlingford Lough SPA and the proposed and existing aquaculture activities.

Feature Name	Screening Outcome	Comments
Light-bellied Brent goose (*Branta bernicla hrota)* [A046]	In	A winter migrant from Arctic Canada between October and April. Feeds mostly on eel grass in muddy estuaries and on grasslands when coastal supplies are depleted at estuarine sites. There is a high degree of overlap between foraging habitats and the proposed and existing activities. There is the possibility of displacement from foraging grounds and disturbance from vessels or machinery at the site.
Wetlands and Waterbirds [A999]	In	There is overlap between the proposed and existing activities which could affect permanent area of the SCI.

2.4 Screening of QIs of Adjacent Natura 2000 Sites or for ex-situ effects

2.4.1 Screening of SACs within 15km of Carlingford Shore SAC

The screening of adjacent Natura sites is carried out to determine if the proposed activity is likely to impact on the QIs of nearby sites. It is primarily based upon indirect links between the proposed activity and those QIs. Guidance has indicated that a screening exercise might consider the likely interactions between the QIs of Natura 2000 sites within a standard distance of 15km from the proposed activity[24].

Screening outcomes in relation to QIs of adjacent Natura 2000 SAC sites by the proposed activities are outlined in Table 9, which highlights the QIs and conservation objectives for each of the adjacent SACs.

Table 9 Screening outcomes and rationale for QIs of Natura SACs within 15km of the Carlingford Shore SAC

Site Name	Feature Code	Feature Name	Screening Outcome
Carlingford Mountain SAC	4010	Northern Atlantic wet heaths with *Erica tetralix*	These QIs in Carlingford Mountain SAC are terrestrial in nature and therefore have no spatial overlap with the proposed or existing activities. **These QIs can be screened out.**
	4030	European dry heaths	
	4060	Alpine and Boreal heaths	
	6230	Species-rich Nardus grasslands, on silicious substrates in mountain areas (and submountain areas in Continental Europe)	
	7130	Blanket bogs (* if active bog)	
	7140	Transition mires and quaking bogs	
	7230	Alkaline fens	
	8110	Siliceous scree of the montane to snow levels (*Androsacetalia alpinae* and *Galeopsietalia ladani*)	
	8210	Calcareous rocky slopes with chasmophytic vegetation	
	8220	Siliceous rocky slopes with chasmophytic vegetation	
Dundalk Bay SAC	1130	Estuaries	These habitats are intertidal or subtidal however have no spatial overlap with the proposed and existing activities. Dundalk Bay SAC is around 7km from Carlingford Shore SAC. **These QIs can be screened out.**
	1140	Mudflats and sandflats not covered by seawater at low tide	
	1220	Perennial vegetation of stony banks	These habitats are considered coastal and have no spatial overlap with the proposed or existing activities. **These QIs can be screened out.**
	1310	Salicornia and other annuals colonizing mud and sand	
	1330	Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*)	

[24] NPWS. 2009 Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

Site Name	Feature Code	Feature Name	Screening Outcome
	1410	Mediterranean salt meadows (*Juncetalia maritimi*)	
Eastern Mournes SAC	NA	European dry heaths	These QIs are terrestrial in nature and therefore have no spatial overlap with the proposed or existing activities. **These QIs can be screened out.**
		Northern Atlantic wet heaths with *Erica tetralix*	
		Active blanket bogs	
		Siliceous alpine and boreal grasslands	
		Siliceous rocky slopes with chasmophytic vegetation	
		Siliceous scree of the montane to snow levels	
Rostrevor Wood SAC	NA	Old sessile oak woods with *Ilex* and *Blechnum* in the British Islands	This QI is terrestrial in nature and therefore has no spatial overlap with the proposed or existing activities. **This QI can be screened out.**

2.4.2 Screening of SPAs within 15km of Carlingford Lough SPA

Table 10 Screening outcome and rationale for SPAs within 15km of Carlingford Lough SPA

Feature Name	Site Names	Screening Outcome	Rationale
Bar-tailed godwit (*Limosa lapponica*) [A157]	Dundalk Bay SPA	In	Feeds along the tidal edge in coastal estuaries or in shallow water for polychaete worm or bivalves. The species is recorded as being present at the site although foraging range is unknown. Site fidelity is listed as moderate[25] so there is the possibility that birds from Dundalk SAC are using the wetland in Carlingford. Therefore, there is the possibility of spatial overlap between Bar-tailed Godwit in Dundalk Bay SPA and the proposed and existing activities. There is the possibility of displacement and disturbance.
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	Dundalk Bay SPA	In	Resident along all Irish coasts they feed on a wide variety of habitats. Mean max foraging range is 18.5km[26]. Dundalk Bay is 6.57km from Carlingford Lough SPA. Therefore, there the possibility of overlap between birds foraging in Dundalk Bay and the proposed activities. There is possibility of disturbance and displacement pressures on this SCI.

[25] NPWS (2011) Dundalk Bay SPA (Site Code 4026) Conservation Objectives Supporting Document. Version 1. March 2011

[26] 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	Site Names	Screening Outcome	Rationale
Black-tailed godwit (*Limosa limosa*) [A156]	Dundalk Bay SPA	Out	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). Therefore, there is unlikely to be significant spatial overlap with Black-tailed Godwit in Dundalk Bay SPA and the proposed and existing activities.
Brent goose (*Branta bernicla hrota*) [A046]	Dundalk Bay SPA	In	Brent geese are known to roost in Dundalk and use Carlingford Lough to forage[27]. There is therefore spatial overlap between the proposed and existing activities and this SCI. There is the possibility of displacement and disturbance from these activities.
Common Gull (*Larus canus*) [A182]	Dundalk Bay SPA	In	Winter visitor to all Irish coasts. Feeding on a wide range of terrestrial and aquatic invertebrates and fish. Mean Max foraging range is 50km. Therefore, there is the possibility of overlap between Common Gull in Dundalk Bay SPA and the proposed and existing activities. Possible pressures include displacement and disturbance.
Common ringed plover (*Charadrius hiaticula*) [A137]	Dundalk Bay SPA	Out	A resident and winter visitor which feeds on a variety of invertebrates particularly polychaete works and crustaceans. Mostly found on sandy beaches. They have high site fidelity (NPWS, 2011).
Common scoter (*Melanitta nigra*) [A065]	Dundalk Bay 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[28]. Therefore, there is a possibility of overlap with Common scoter from Dundalk Bay SPA and the proposed and existing activities. There is the possibility of displacement, disturbance and prey competition for this SCI.
Curlew *(Numenius arquata*) [A160]	Dundalk Bay SPA	Out	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 533ha and 555ha described in the literature[29],[30]. They also show winter site fidelity (Mander et al. 2022, Donnez et al. 2023). Therefore, there is unlikely to be significant spatial overlap of Curlew in Dundalk Bay SPA with the proposed and existing activities.

[27] INIS (2020) Carlingford Lough Waterbird and Disturbance Surveys. Winter 2019-2020. Bird Survey Report. Prepared for the Marine Institute. July 2020.

[28] 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.

[29] 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.

[30] 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.

Feature Name	Site Names	Screening Outcome	Rationale
Dunlin (*Calidris alpina*) [A149]	Dundalk Bay SPA	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[31] and they have moderate site fidelity (NPWS, 2011). There is the possibility therefore of overlap between Dunlin in Dundalk SPA and the proposed and existing activities. There is the possibility of disturbance and displacement.
European golden plover (*Pluvialis apricaria*) [A140]	Dundalk Bay SPA	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[32]. Carlingford Lough is at the edge of the range of this species but given the winter foraging range is unknown and tends to be larger than the feeding range we can assume that it might be larger than 7km. Therefore, there is the possibility of spatial overlap with Golden plover in Dundalk Bay SPA and the existing and proposed activities. There is the possibility of displacement and disturbance.
Great Crested Grebe *(Podiceps cristatus*) [A005]	Dundalk Bay SPA	Out	A resident along all Irish coasts that feeds mainly on fish. Foraging range is up to 3km from roost site and is limited to waters less than 5m depth. Therefore, there is unlikely to be spatial overlap with Great Crested Grebe in Dundalk Bay SPA and the proposed and existing activities.
Grey plover (*Pluvialis squatarola*) [A141]	Dundalk Bay SPA	Out	Winter visitor that feeds on a wide variety of burrowing intertidal invertebrates particularly polychaete worms, molluscs and crustaceans. Foraging range is unknown but is listed as having high site fidelity (NPWS, 2011). Therefore, there is unlikely to be spatial overlap with Grey Plover in Dundalk Bay SPA and the proposed and existing activities.
Greylag Goose (*Anser anser*) [A043]	Dundalk Bay SPA	Out	A winter migrant between November and April. Feed on grasslands in wintering areas. Therefore, there will be no overlap with Greylag Goose in Dundalk Bay SPA and the existing or proposed activities.
Herring gull (*Larus argentatus*) [A184]	Dundalk Bay 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 Dundalk Bay SPA and the proposed activities. There is the possibility of displacement and disturbance.
Knot (*Calidris canutus*) [A143]	Dundalk Bay SPA	In	Winter visitor during November and February. Feed predominantly on bivalves and crustaceans. Foraging range is reported as vastly different in different areas. Most likely between 2-16km[33]. Moderate site fidelity (NPWS, 2011). The existing and proposed activities are within the foraging

[31] 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.

[32] 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.

[33] 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

Feature Name	Site Names	Screening Outcome	Rationale
			range of this species. There is the possibility of prey competition, disturbance and displacement.
Mallard (*Anas platyrhynchos*) [A053]	Dundalk Bay SPA	Out	A resident and winter migrant with a variable diet but plant material predominates. Average foraging range of 4.1km but moderate site fidelity. There are records of this species within Carlingford Lough (I-WEBS) but given the foraging range and the 7km distance therefore there is unlikely to be overlap between the Dundalk Bay SPA individuals and the proposed and existing activities.
Northern lapwing (*Vanellus vanellus*) [A142]	Dundalk Bay SPA	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 and existing activities. There is the possibility of displacement and disturbance.
Northern pintail (*Anas acuta*) [A054]	Dundalk Bay SPA	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[34]. 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 and existing activities which may cause displacement and disturbance.
Oystercatcher (*Haematopus ostralegus*) [A130]	Dundalk Bay SPA	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[35]. It is possible therefore that some birds in Dundalk are also feeding in Carlingford Lough and therefore there is the possibility of overlap of Oystercatcher within Dundalk Bay SPA with the proposed and existing activities. There is the possibility of prey competition, disturbance and displacement.
Red-breasted Merganser (*Mergus serrator*) [A069]	Dundalk Bay SPA	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. Since they winter in secluded bays or estuaries it is possible that Carlingford Lough provides suitable habitat for this species. Therefore, as a precautionary approach we will assume that there could be spatial overlap with Red-breasted Merganser from Dundalk Bay SPA and the proposed and existing activities. There is the possibility of displacement and disturbance.

[34] 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

[35] 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.

Feature Name	Site Names	Screening Outcome	Rationale
Redshank (*Tringa totanus*) [A162]	Dundalk Bay SPA	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[36]. Individuals from Dundalk Bay SPA are therefore unlikely to utilise Carlingford Lough SPA. Redshank have however been recorded in Carlingford Lough SPA, NPWS recorded 108 individuals as a baseline population[37]. They are not a designated species of this SPA though. As a precautionary approach and because there would certainly be overlap between Carlingford individuals and the proposed and existing activities they have been screened in. The possible pressures are displacement and disturbance.
Shelduck (*Tadorna tadorna*) [A048]	Dundalk Bay SPA	In	A resident and winter migrant which feeds predominantly on Hydrobia snails. The median foraging range for individuals was 23km[38]. 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 (*Anas crecca*) [A052]	Dundalk Bay SPA	Out	Feed on small seeds, entromorpha and mollusecs and insect larvae. In winter can be found on wetlands with good cover. Foraging range is short ~2.6km[39] but they show weak site fidelity. There is unlikely to be overlap between individuals from Dundalk Bay SPA foraging within Carlingford Lough SPA.
Wetlands and Waterbirds (Wetlands and Waterbirds) [A999]	Dundalk Bay SPA	Out	There is no spatial overlap between the SCI and the existing or proposed activities.
Sandwich Tern (*Sterna sandvicensis)* [A191]	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)[40]. 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.

[36] Burton, N. H. (2000). Winter site-fidelity and survival of Redshank Tringa totanus at Cardiff, south Wales. Bird Study, 47(1), 102-112.
[37] NPWS (2011) Carlingford Lough Site synopsis. Site code: 004078. 14.11.2011
[38] 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
[39] 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.
[40] 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	Site Names	Screening Outcome	Rationale
Common Tern (*Sterna Hirundo*) [A193]	Carlingford Lough SPA NI	In	A summer visitor usually seen over the sea or over large inland lakes. Feed primarily on fish by plunging. They nest colonially on the ground or on the coast. The breeding are protected in Carlingford Lough SAC NI. The foraging range for this species is 6.4km as a global mean (Woodward et al. 2024). Therefore, the proposed and existing activities are within the foraging range of this species and overlap might occur. There is the possibility of disturbance and displacement.
Light-bellied Brent Goose (*Branta bernicla hrota)*	Carlingford Lough SPA NI	In	A winter migrant from Arctic Canada between October and April. Feeds mostly on eel grass in muddy estuaries and on grasslands when coastal supplies are depleted at estuarine sites. There is the possibility of overlap between foraging habitat of Light-bellied Brent Goose from Carlingford Lough SPA NI and the proposed and existing activities. There is the possibility of displacement from foraging grounds and disturbance from vessels or machinery at the site.
Habitat	Carlingford Lough SPA NI	Out	Habitat extent and number of roost site locations are the objectives for habitats in this SAC. There is no overlap between the habitat extent or roost sites within Carlingford Lough SPA NI.

2.4.3 Screening of long-ranging species QIs Carlingford Shore SAC and Carlingford Lough SPA

While 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. We have therefore extended this screening 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 Carlingford Lough was within its foraging range. Furthermore, we have added Harbour Porpoise and Bottlenose Dolphin to the screening as they are both wide ranging species but for which a specific foraging range in Ireland could not be established.

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[41] indicates very few harbour porpoise sightings in the vicinity of Carlingford Shore SAC. There are occasional sightings at the mouth of the Lough but none within the area where the existing or proposed activities will be occurring. **The QI Harbour Porpoise is therefore screened out for likely significant effects.**

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[42] indicates that bottlenose dolphin have been sighted within Carlingford Lough itself with sporadic sightings between 2010 and 2020. Although there is little overlap with the SAC or the proposed or existing licensed activities, bottlenose dolphins are highly mobile and therefore the possibility of overlap with the proposed activities cannot be ruled out. **The QI Bottlenose Dolphin is therefore screened in as likely significant effects could not be ruled out.**

Long-ranging birds

Table 11 Screening outcome and rationale for long ranging birds.

Species	Range used for screening	Site Name	Distance to nearest SPA (km)	Screening Outcome	Rationale
Atlantic puffin (Fratercula arctica)	62.4	Lambay Island SPA [004069]	59.72374	Out	Summer visitor from March to September to nest on sea stacks and cliffs. Feed on marine fish and crustaceans. Most feed within a short distance of the colony. Between 3 and 7km recorded[43]. Foraging range of this species during the breeding

[41] Maps - Biodiversity Maps
[42] Maps - Biodiversity Maps
[43] Lowther, P. E., A. W. Diamond, S. W. Kress, G. J. Robertson, K. Russell, D. N. Nettleship, G. M. Kirwan, D. A. Christie, C. J. Sharpe, E. Garcia, and P. F. D. Boesman (2020). Atlantic Puffin (*Fratercula arctica*), 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.atlpuf.01

Species	Range used for screening	Site Name	Distance to nearest SPA (km)	Screening Outcome	Rationale
					stage is unlikely to overlap with existing or proposed activities.
Common guillemot (Uria aalge)	338.0	Lambay Island SPA [004069]	59.72374	Out	Highly marine, only comes to land during the breeding season. Breeds on cliff ledges, sloping surfaces or flat areas on rocky headlands and islands. Protected during the breeding season in Lambay Island SPA. During breeding season, forages on continental shelf and slope waters. Rarely seen from shore. Therefore, there is unlikely to be overlap between breeding guillemot and the proposed and existing activities.
Leach's storm petrel (Oceanodroma leucorhoa)	657.0	Stags of Broad Haven SPA [004072]	238.83926	Out	Summer visitor to the north west 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 existing and proposed activities.
Lesser black-backed gull (Larus fuscus)	533.0	Lambay Island SPA [004069]	59.72374	In	Summer visitor to lakes and coasts between March and September. Occasionally seen in winter in small numbers along eastern and southern coasts. Feeds on a wide variety of prey including fish, discards, rubbish, insects and other young birds. Listed as breeding on Lambay Island SPA. Given the foraging range and the wide variety of habitats it utilizes there is the possibility of overlap with proposed and existing activities. There is the possibility of disturbance and displacement. Number of breeding pairs at the site has seen significant increase in recent years[44].
Northern fulmar (Fulmarus glacialis)	2,736.0	Lambay Island SPA [004069]	59.72374	In	Resident along Irish coasts and feed on a variety of food including fish, discards and crustaceans. Breeds on sea cliffs and winters at sea but occasionally utilizes colonies during winter as well. The conservation objective for Fulmar is to restore the conservation condition of the breeding colony at Lambay Island SPA. Given its extremely wide foraging range it is possible there is spatial overlap between the proposed and existing activities. There is the possibility of displacement and disturbance.
Northern gannet (Morus bassanus)	709.0	Saltee Islands SPA [004002]	211.67084	Out	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[45]. Therefore, there is unlikely to be overlap with the current and proposed activities during the breeding season.

[44] NPWS (2024). Conservation Objectives. Lambay Island SPA (004069). Version 1

[45] 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

Species	Range used for screening	Site Name	Distance to nearest SPA (km)	Screening Outcome	Rationale
Razorbill (Alca torda)	313.0	Lambay Island SPA [004069]	59.72374	Out	Resident and occur inshore during the breeding season. Feeds mainly on small fish and some invertebrates. Breeding population is protected at Lambay Island SPA. Breeding population size appears to have decreased in recent years (NPWS, 2024). Have been recorded feeding 20km from breeding colonies in Irish waters[46]. Therefore, there is unlikely to be overlap with proposed or existing activities.

2.4.4 Screening of Potential Effects of Introduction of Non-native Species

The establishment of non-native species as a wild population in an area can be a potential risk associated with aquaculture and can occur due to the moving of stock (seed, juvenile or adults) into aquaculture sites. 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 owing to favourable environmental conditions. The presence of feral pacific oyster have been confirmed in Carlingford Lough (NBDC). The primary risk of the proposed activities to the QIs of Carlingford Shore SAC is the potential for the proposed trestle oyster aquaculture of Pacific Oyster (*Magallana gigas*) to establish a problematic, wild, non-native, population. This is considered a particularly high risk, as BIM state that operators are currently utilising a mixture of diploid and triploid seed at the site. As a result, the likely significant effect resulting from the culture of the Pacific oyster, *Magallana gigas*, on the Qis of the SAC cannot be dismissed. **This risk factor, therefore, should be carried forward for further consideration in a Stage 2 AA.**

[46] Lavers, J., J. M. Hipfner, and G. Chapdelaine (2020). Razorbill (*Alca torda*), 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.razorb.01

3 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

All aquaculture activities will have an in-combination effect on all features by virtue of the extent of the activity. There are two new rope mussel licences currently under consideration outside Carlingford Lough within Dundalk Bay but they are a close distance to Carlingford Lough itself. The access points for both sites are from Carlingford which will mean vessel disturbance when accessing the sites. The main pressures on habitats from aquaculture activities are smothering, habitat loss, organic enrichment and eutrophication. Pressures on species include disturbance and introduction of non-indigenous species, habitat loss, mortality and indirect habitat loss. **The rope mussel sites are well outside Carlingford Lough therefore, there is no overlap with any of the habitat features so in-combination effects can be screened out.**

There is the possibility of disturbance on marine birds and species from vessels commuting to and from the site and during operation at the site itself. **Therefore, in-combination effects with aquaculture will be brought forward to stage 2 assessment.**

Fishing

Fishing activities in the Lough and surrounding areas 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[47] 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. None of these activities will overlap with the habitat features of Carlingford Shore SAC (Annual vegetation of drift lines and Perennial vegetation of stony banks) nor with the proposed or existing activities. **Therefore, in-combination effects on habitats can 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. **There are no recorded fisheries occurring within Carlingford Lough itself but**

[47] Ireland's Marine Atlas Accessed November 2024

considering the significant number of fisheries occurring adjacent to the existing and proposed activities, further effects of displacement and disturbance on birds and species 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 and existing 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 Carlingford Shore 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 and existing activities, particularly bottom mussel culture. **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 for 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 Foreshore Licencing (Foreshore Applications - accessed 08/01/2025)
- EPA pressures maps (www. https://gis.epa.ie/EPAMaps/Water - accessed 27/07/2023)

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.

4 Conclusions

This screening exercise for Carlingford Shore SAC, Carlingford Lough SPA and surrounding SACs and SPAs have indicated that the current and proposed activities may cause likely significant effects on several of the species and bird features within and in the surrounding area of Carlingford Lough. We recommend therefore that these activities are carried forward for a stage 2 appropriate assessment for a number of features, as outlined below.

By virtue of the fact that this species is wide ranging and its distribution may overlap with the proposed and existing activities **Bottlenose dolphin (*Tursiops trancatus*) [1349]** will be brought forward to Stage 2 Appropriate Assessment.

The initial screening for Carlingford Lough 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 and indirect prey competition with the proposed activities.

- **Brent goose (*Branta bernicla hrota)* [A046]**
- **Wetlands and waterbirds [A999]**

Furthermore, several species which are features of surrounding SPAs, either because the SPA is within 15km of the proposed and existing activities or because their foraging range may overlap with the existing or proposed activities were considered. The following species are screened in for stage 2 Appropriate Assessment.

- **Bar tailed godwit (*Limosa lapponica)* [A157]**
- **Black headed gull (*Chroicocephalus ridibundus)* [179]**
- **Common gull (*Larus canus*) [A182]**
- **Common scoter (*Melanitta nigra*) [A065]**
- **Dunlin (*Calidris alpina)* [A149]**
- **Golden plover (*Pluvialis apricaria)* [A140]**
- **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]**

In addition, the risk of naturalisation posed by the culture of the **non-native species**, the Pacific oyster (*Magallana gigas*) will be brough 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.**