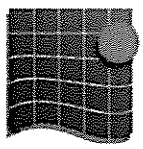

Marine Institute
Foras na Mara

Report supporting Appropriate Assessment of Aquaculture in Gweedore Bay & Islands SAC (Site Code: 001141)

Marine Institute

Rinville

Oranmore, Co. Galway

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1 PREFACE

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

Fisheries, other than oyster fisheries, and aquaculture activities are licenced by the Department of Agriculture, Food and Marine (DAFM). Oyster fisheries (in fishery order areas) are licenced by the Department of Communications Energy and Natural Resources (DCENR). The Habitats Directive is transposed in Ireland in the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). Appropriate assessments (AA) of aquaculture against the conservation objectives (COs), and more specifically on the version of the COs that are available at the time of the Assessment, for designated ecological features, within the site, as defined by the National Parks and Wildlife Service (NPWS). NPWS are the competent authority for the management of Natura 2000 sites in Ireland. Obviously, aquaculture and fishing operations existed in coastal areas prior to the designation of such areas under the Directives. Ireland is thereby assessing both existing and proposed aquaculture and fishing activities in such sites. This is an incremental process, as agreed with the EU Commission in 2009, and will eventually cover all fishing and aquaculture activities in all Natura 2000 sites.

The process of identifying existing and proposed activities and submitting these for assessment is, in the case of fisheries projects and plans, outlined in S.I. 290 of 2013. Fisheries projects or plans are taken to mean those fisheries that are subject to annual secondary licencing or authorization. Here, the industry or the Minister may bring forward fishing proposals or plans which become subject to assessment. These Fishery Natura Plans (FNPs) may simply be descriptions of existing activities or may also include modifications to activities that mitigate, prior to the assessment, perceived effects to the ecology of a designated feature in the site. In the case of other fisheries, that are not projects or plans, data on activity are collated and subject to a risk assessment against the COs. Oyster fisheries, managed by DCENR, do not come under the remit of S.I. 290 of 2013 but are defined as projects or plans as they are authorized annually and are therefore should be subject to AA.

In the case of aquaculture, DAFM receives applications to undertake such activity and submits a set of applications, at a defined point in time, for assessment. The FNPs and aquaculture applications are then subject to AA. If the AA process finds that the possibility of significant effects cannot be discounted or that there is a likelihood of negative consequence for designated features then such activities will need to be mitigated further if they are to continue. The assessments are not explicit on how this mitigation should be achieved but rather indicate whether mitigation is required or not and what results should be achieved.

This report considers aquaculture activities occurring within the Gweedore Bay and Islands SAC and was based upon an original draft prepared by RPS Group Limited which has been edited for content.

2 EXECUTIVE SUMMARY

2.1 THE SAC

The Gweedore Bay & Islands SAC is situated on the west Donegal coast and is designated as a Special Area of Conservation (SAC) under the Habitats Directive. The marine area is designated for Reefs (1170) which support a two reef community types namely; *Laminaria*-dominated community complex and Reef community complex. The area is also designated for otter and a range of coastal habitats including saltmarshes and sand dunes, lakes, rivers and heath. Conservation Objectives for marine habitats and constituent communities (within the Gweedore Bay & Islands SAC) were identified by NPWS (2015a) and relate primarily to the requirement to maintain habitat distribution, structure and function, as defined by characterizing (dominant) species in these habitats. For designated species the objective is to maintain various attributes of the populations including population size, habitats quality and the distribution of the species.

2.2 ACTIVITIES IN THE SAC

Current aquaculture activities within the Gweedore Bay & Islands SAC occur at Gweedore Bay and focus on the cultivation of the Pacific oyster *Crassostrea gigas* on trestles in intertidal areas. There are also a number of new (oyster) applicants at Gweedore and Kincasslagh Bay. In addition there is a single application to culture clams/cockles (*Ruditapes philippinarum/Cerastoderma edule*) intertidally on the seafloor in Kincasslagh Bay. The profile of the aquaculture industry in the Bay, used in this assessment, was prepared by BIM and is derived from the list of licence applications received by DAFM and provided to the MI for assessment in February 2015.

2.3 THE APPROPRIATE ASSESSMENT PROCESS

The function of an appropriate assessment is to determine if the ongoing and proposed aquaculture are consistent with the Conservation Objectives for the Natura site or if such activities will lead to deterioration in the attributes of the habitats and species over time and in relation to the scale, frequency and intensity of the activities. NPWS (2015a) provide guidance on interpretation of the Conservation Objectives which are, in effect, management targets for habitats and species in the SAC. This guidance is scaled relative to the anticipated sensitivity of habitats and species to disturbance by the proposed activities. Some activities are deemed to be wholly inconsistent with long term maintenance of certain sensitive habitats while other habitats can tolerate a range of activities. For the practical purpose of management of sedimentary habitats a 15% threshold of overlap between a disturbing activity and a habitat is given in the NPWS guidance. Below this threshold disturbance is deemed to be non-significant. Disturbance is defined as that which leads to a change in the characterizing species of the habitat (which may also indicate change in structure and function). Such disturbance may be temporary or persistent in the sense that change in characterizing species may recover to pre-disturbed state or may persist and accumulate over time.

The appropriate assessment process is divided into a number of stages consisting of a preliminary risk identification, and subsequent assessment (allied with mitigation measures if necessary) which are covered in this report. The first stage of the process is an initial screening wherein activities which cannot have, because they do not spatially overlap with a given habitat or have a clear pathway for interaction, any impact on the conservation features and are therefore excluded from further consideration. The next phase is the Natura Impact Statement (NIS) where interactions (or

risk of) are identified. Further to this, an assessment on the significance of the likely interactions between activities and conservation features is conducted. Mitigation measures (if necessary) will be introduced in situations where the risk of significant disturbance is identified. In situations where there is no obvious mitigation to reduce the risk of significant impact, it is advised that caution should be applied in licencing decisions. Overall the Appropriate Assessment is both the process and the assessment undertaken by the competent authority to effectively validate this Screening Report and/or NIS. It is important to note that the screening process is considered conservative in that other activities which may overlap with habitats but which may have very benign effects are retained for full assessment.

2.4 DATA SUPPORTS

Distribution of habitats and species population data are provided by NPWS[1]. Scientific reports on the potential effects of various activities on habitats and species have been compiled by the MI and provide the evidence base for the findings. The profile of aquaculture activities was provided by BIM[2]. The data supporting the assessment of individual activities vary and provides for varying degrees of confidence in the findings.

2.5 FINDINGS

2.5.1 Aquaculture and Habitats/Species:

In the Gweedore Bay & Islands SAC, of the 25 aquaculture sites (licenced and applications) considered within the SAC, there are 4 shellfish culture licenced sites with a further 5 newly applied for sites that have spatial overlap with the habitat conservation feature (Reef 1170). The likely interaction between aquaculture activities in these sites and these conservation features (habitats and species) of the site was considered.

An initial screening exercise resulted in a number of habitat features and species being excluded from further consideration. None of the aquaculture activities (existing and/or proposed) overlaps or likely interacts with the following features or species, and therefore these 15 habitats and 2 species were excluded from further consideration in the assessment:

- 1150 Coastal lagoons*
- 1220 Perennial vegetation of stony banks
- 1395 Petalwort *Petalophyllum ralfsii*
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

[1] NPWS Geodatabase Ver: June 2015 - http://www.npws.ie/mapsanddata/habitatspeciesdata/

[2] BIM (2015). APPROPRIATE ASSESSMENT PROFILING-**KINCASSLAGH BAY,** CO. DONEGAL. July 2015. 2 pages
BIM (2015) APPROPRIATE ASSESSMENT PROFILING-**GWEEDORE BAY,** CO. DONEGAL. BIM July 2015. 3 pages

- 1833 Slender Naiad *Najas flexilis*
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophilia arenaria* (white dunes)
- 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)
- 2140 Decalcified fixed dunes with *Empetrum nigrum**
- 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)*
- 2170 Dunes with *Salix repen* ssp. *argentea* (*Salicion arenariae*)
- 2190 Humid dune slacks
- 21A0 Machairs (* in Ireland)
- 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
- 4030 European dry heaths
- 4060 Alpine and Boreal heaths
- 5130 *Juniperus communis* formations on heaths or calcareous grasslands

A full assessment was carried out on the likely interactions between current and proposed aquaculture operations and the feature Annex 1 habitat Reef (1170). The likely effects of existing and proposed aquaculture activities were considered in light of the sensitivity of the constituent communities of the Annex 1 habitat. Of the two constituent community types recorded within the qualifying interest of Reefs (1170) one (*Laminaria*-dominated community complex) was shown to have no overlap with aquaculture activities and were excluded from further analysis.

The assessment report finds that existing and proposed oyster culture activities do not pose a risk of significant disturbance to the conservation of the designated habitat feature of Reefs (1170) or constituent community of and Reef community complex. Furthermore, the risk posed by intertidal clam/cockle culture can be discounted, due to lack of spatial overlap with conservation features. For both non-native species in culture (*C. gigas* and *R. philippinarum*) the risk of establishment is considered low given a number of factors, including lack of suitable habitat, intertidal culture and short residence times.

Finally, the aquaculture activities did not present a barrier to migration and on the (freshwater) attributes for the Otter (*Lutra lutra*).

3 INTRODUCTION

This document assesses the potential ecological interactions of aquaculture activities within Gweedore Bay & Islands SAC (Site code: 001141) on the Conservation Objectives (COs) of the site. 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 Marine (DAFM) and forwarded to the Marine Institute as of May 2015; as well as aquaculture and fishery profiling information provided on behalf of the operators by Bord Iascaigh Mara (BIM). The spatial extent of aquaculture licences is derived from a database managed by the DAFM[3] and shared with the Marine Institute.

4 CONSERVATION OBJECTIVES FOR GWEEDORE BAY & ISLANDS SAC

The appropriate assessment of aquaculture in relation to the Conservation Objectives for Gweedore Bay & Islands SAC is based on Version 1.0 of the objectives (NPWS 2015a - Version 1 March 2015) and supporting documentation (NPWS 2015b - Version 1 February 2015; NPWS 2015c - Version 1 February 2015; NPWS 2015d - Version 1 February 2015;). The spatial data for conservation features was provided by NPWS[4].

4.1 THE SAC EXTENT

The Gweedore Bay & Islands SAC is an extensive coastal site situated on the northwest coast. It extends from Burtonport in the south to Bloody Foreland in the north. It includes a large stretch of coastline, many islands (including Inishsirrer, Inishmeane, Gola, Umfin, Inishfree Lower and parts of Cruit Island) and areas of marine water between the islands and the coast. Gweedore Bay & Islands SAC is designated for a range of Annex I coastal habitats including coastal lagoons, reefs, heaths, vegetated shingle, saltmarsh and sand dunes. The SAC is also designated for the marine Annex I qualifying interest of Reefs (1170). The extent of the SAC is shown in Figure 4.1 below.

4.2 QUALIFYING INTERESTS (SAC)

The SAC is designated for the following habitats and species (NPWS 2015a), as listed in Annex I and Annex II of the Habitats Directive (* indicates a priority habitat under the Habitats Directive):

- 1150 Coastal lagoons*
- 1170 Reefs
- 1220 Perennial vegetation of stony banks
- 1395 Petalwort *Petalophyllum ralfsii*
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)

[3] DAFM Aquaculture Database version Aquaculture: May, 2015
[4] NPWS Geodatabase Ver: June 2015 - http://www.npws.ie/mapsanddata/habitatspeciesdata/

- 1833 Slender Naiad *Najas flexilis*
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophilia arenaria* (white dunes)
- 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)
- 2140 Decalcified fixed dunes with *Empetrum nigrum**
- 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)*
- 2170 Dunes with *Salix repen* ssp. *argentea* (*Salicion arenariae*)
- 2190 Humid dune slacks
- 21A0 Machairs (* in Ireland)
- 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
- 4030 European dry heaths
- 4060 Alpine and Boreal heaths
- 5130 *Juniperus communis* formations on heaths or calcareous grasslands
- 1355 Otter *Lutra lutra*

Constituent communities and community complexes recorded within the qualifying interest Annex 1 marine habitats (i.e. 1170 – Reefs) are listed in NPWS (2014c) and illustrated in Figure 4.2 and consist of:

- Reef community complex
- *Laminaria*-dominated community complex

The Gweedore Bay & Islands SAC is designated for the Otter, *Lutra lutra*. The species is listed in Annex IV(a) of the habitats directive and is afforded strict protection. According to the NPWS (2009) although otter numbers have declined from 88% in 1980/81 to 70% in 2004/05, otters remain widespread in Ireland.

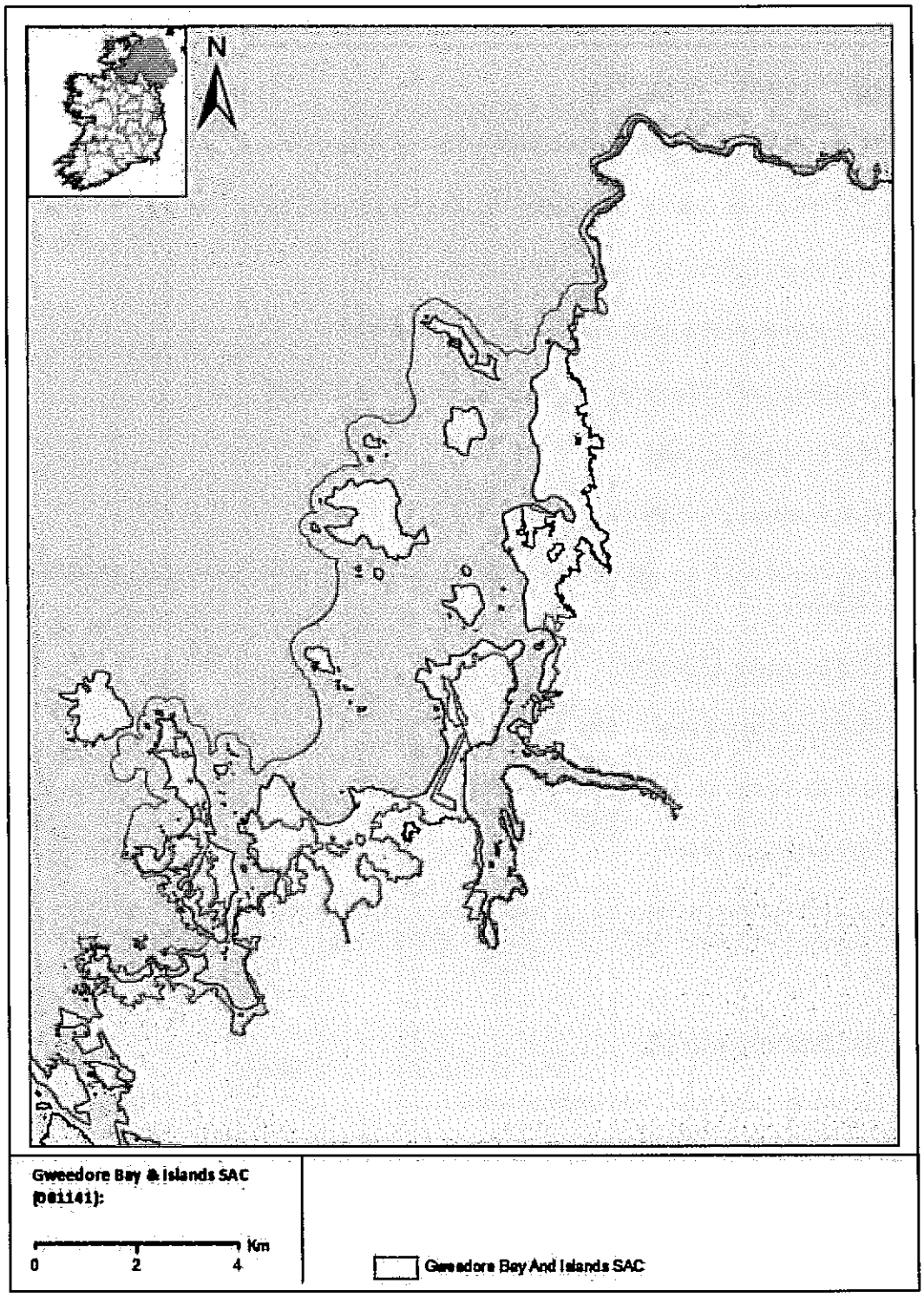

Figure 4.1 - The extent of Gweedore Bay & Islands SAC and the marine Annex I qualifying interest of Reefs (1170) (NPWS 2015c).

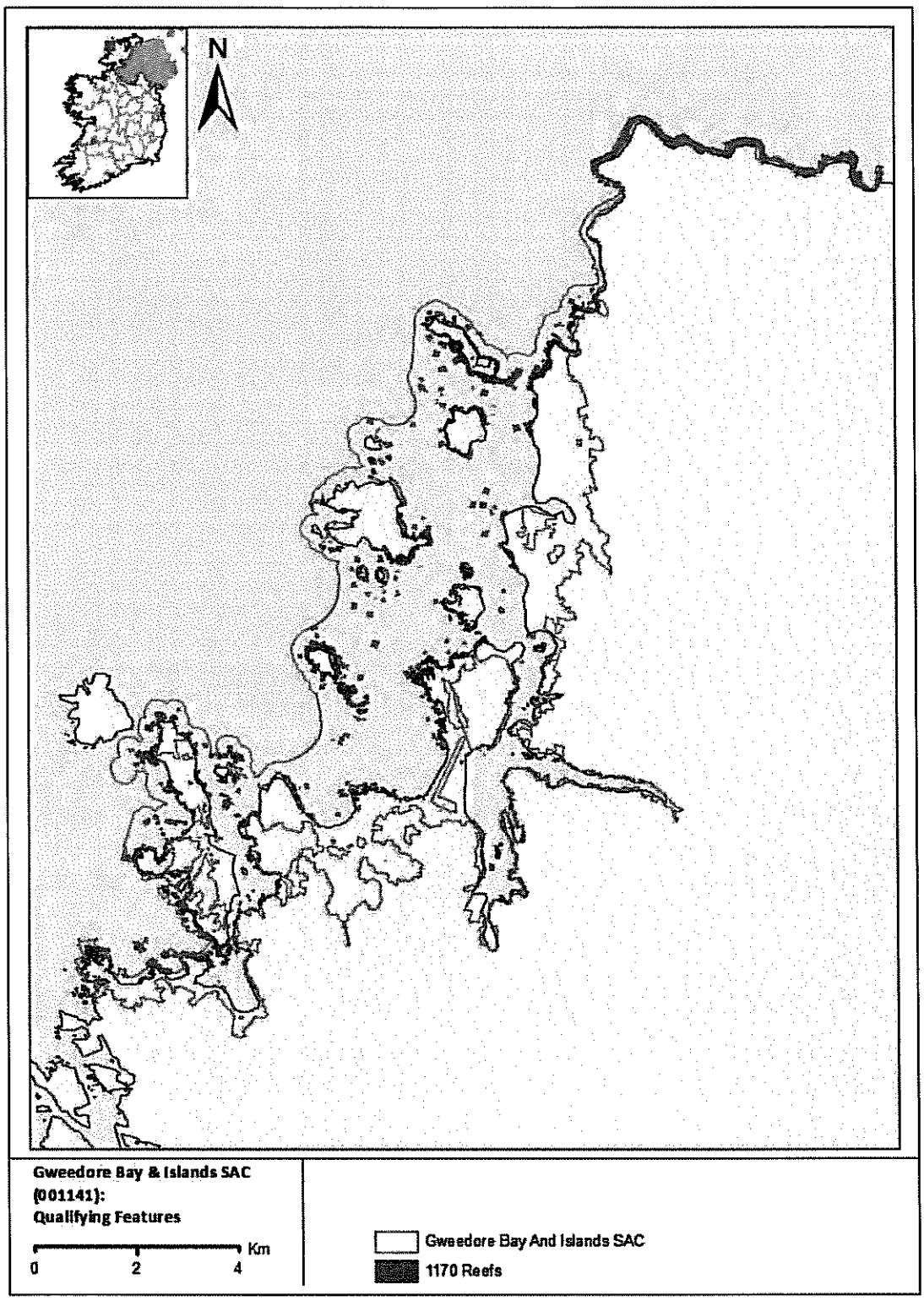

Figure 4.2 - Marine Annex I qualifying interest of Reefs (1170) within the Gweedore Bay & Islands SAC (NPWS 2015c).

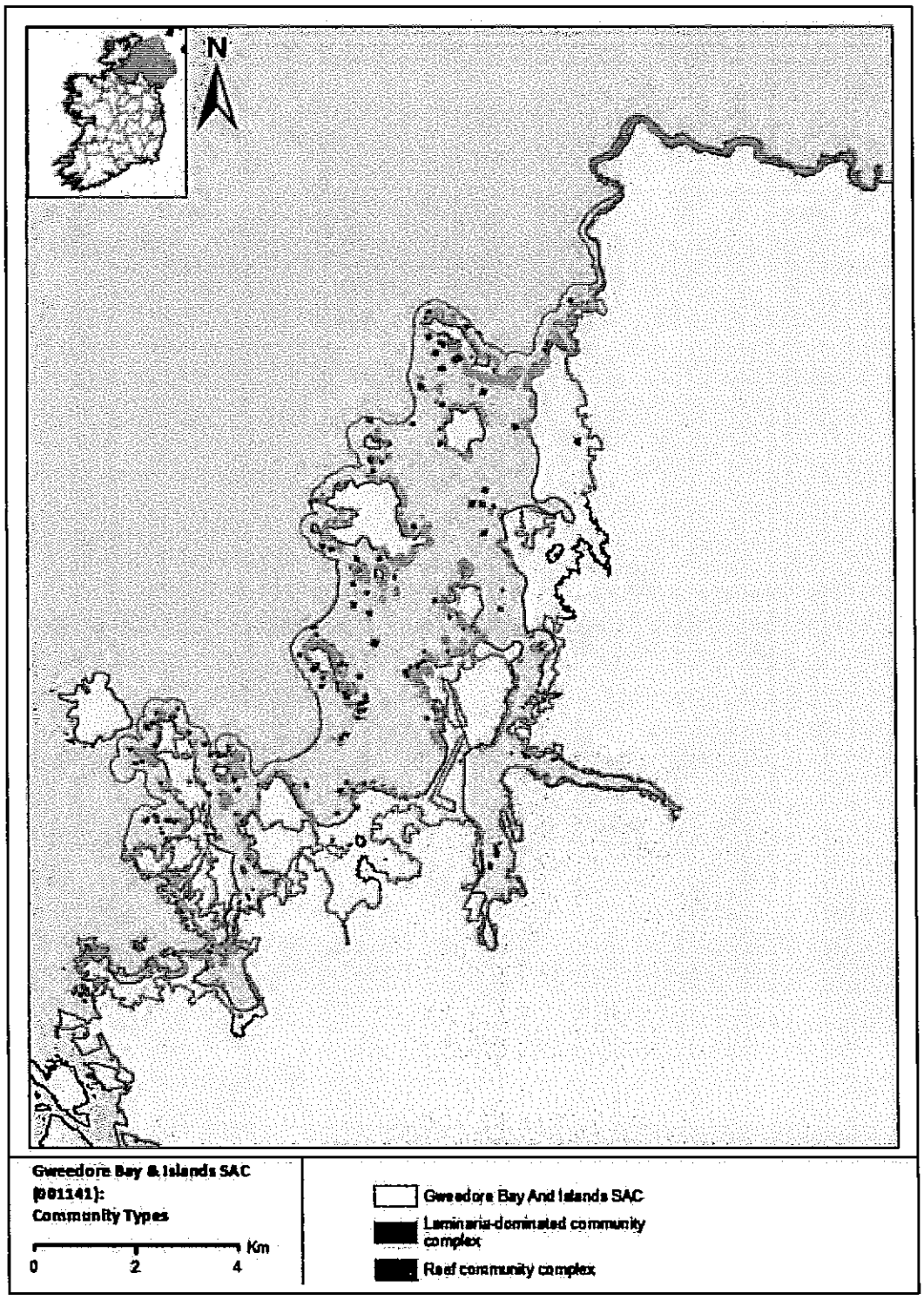

Figure 4.3 - Principal communities recorded within the marine Annex I qualifying interest of Reefs (1170) within Gweedore Bay & Islands SAC (Site Code 001141) (NPWS 2015c).

4.3 CONSERVATION OBJECTIVES FOR GWEEDORE BAY & ISLANDS SAC

The conservation objectives for the qualifying interests (SAC) were identified in NPWS (2015a). The natural condition of the designated features should be preserved with respect to their area, distribution, extent and community distribution. Habitat availability should be maintained for designated species and human disturbance should not adversely affect such species. The features, objectives and targets of each of the qualifying interests within the SAC are listed in Table 4.1 below.

Table 4.1 - Conservation objectives and targets for marine habitats and species in Gweedore Bay & Islands SAC (Site Code 001141) (NPWS 2015a, 2015b, 2015c, 2015d). Annex I and II features listed in **bold**.

Feature (Community Type)	Objective	Target(s)
Reefs (1170)	Maintain favourable conservation condition	369.01ha; Targets focussed on maintaining habitat area and distribution and the natural condition of constituent community complexes.
(Reef community complex)	Maintain favourable conservation condition	308.44ha; Maintain in a natural condition
(*Laminaria*-dominated community)	Maintain favourable conservation condition	60.66ha; Maintain in a natural condition
Coastal lagoons (1150)	Restore favourable conservation condition	10.0ha (it must be noted that further unsurveyed areas may be present within the SAC); Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species, managing levels of negative species and maintaining water quality
Perennial vegetation of stony banks (1220)	Maintain favourable conservation condition	Area unknown; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
***Petalophyllum ralfsii* (Petalwort) (1395)**	Maintain favourable conservation condition	There are three known sites for this species and targets relate to maintaining population densities and overall habitat quality (e.g. hydrological conditions), and managing levels of negative species.
Mediterranean salt meadows (*Juncetalia maritimi*) (1410)	Maintain favourable conservation condition	One subsite mapped (0.09ha), additional areas of potential MSM habitat (9.66ha) identified from (n.b. further unsurveyed areas maybe present within the SAC); Targets are identified that focus on

Feature (Community Type)	Objective	Target(s)
		a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Slender Naiad *Najas flexilis* (1833)	Maintain favourable conservation condition	Area unknown; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species, managing levels of negative species and maintaining water and substrate quality.
Embryonic shifting dunes (2110)	Maintain favourable conservation condition	Habitat mapped at five sub-sites to give a total estimated area of 3.97ha (n.b. habitat is very difficult to measure in view of its dynamic nature); Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) (2120)	Maintain favourable conservation condition	Habitat mapped at seven sub-sites to give a total estimated area of 14.79ha (n.b. habitat is very difficult to measure in view of its dynamic nature); Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130)	Restore favourable conservation condition	Habitat mapped at seven sub-sites to give a total estimated area of 402.46ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Decalcified fixed dunes with *Empetrum nigrum (2140)**	Maintain favourable conservation condition	Habitat recorded at one sub-site, giving a total estimated area of 0.47ha (n.b. habitat is difficult to map as it occurs in a mosaic with fixed dunes, and is likely to be more widespread); Targets are identified that focus on a wide range of attributes with the ultimate goal of

Feature (Community Type)	Objective	Target(s)
		maintaining function and diversity of favourable species and managing levels of negative species.
Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)* (2150)	Maintain favourable conservation condition	Habitat recorded at one sub-site, giving a total estimated area of 3.57ha (n.b. habitat is difficult to map as it occurs in a mosaic with fixed dunes, and is likely to be more widespread); Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Dunes with *Salix repen* ssp. *argentea* (*Salicion arenariae*) (2170)	Maintain favourable conservation condition	Habitat recorded at two sub-sites, giving a total estimated area of 0.97ha (n.b. habitat is difficult to map as it can be confused with humid dune slack): Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Humid dune slacks (2190)	Maintain favourable conservation condition	Habitat mapped at six sub-sites to give a total estimated area of 7.69ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species and managing levels of negative species.
Machairs (*priority habitat in Ireland) (21A0)	Restore favourable conservation condition	Habitat mapped at four sub-sites to give a total estimated area of 169.78ha; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species, managing levels of negative species and maintaining soil quality and composition.
Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) (3110)	Maintain favourable conservation condition	The selection of the SAC for this habitat was based on data for Mullaghderg Loughs, however, it is possible that habitat 3110 occurs elsewhere within the SAC; Targets relate to maintaining population densities and overall habitat

Feature (Community Type)	Objective	Target(s)
		quality (e.g. hydrological conditions), and managing levels of negative species.
European dry heaths (4030)	Maintain favourable conservation condition	Total area of this habitat has not been calculated, although it is known to be distributed throughout the SAC, usually occurring in mosaic with other habitats; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species, managing levels of negative species, maintaining soil quality and composition.
Alpine and Boreal heaths (4060)	Maintain favourable conservation condition	Total area of this habitat has not been calculated; habitat usually occurs in mosaic with other habitats; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species, managing levels of negative species and maintaining soil quality and composition.
***Juniperus communis* formations on heaths or calcareous grasslands (5130)**	Restore favourable conservation condition	Total area of this habitat has not been calculated; habitat usually occurs in mosaic with other habitats; Targets are identified that focus on a wide range of attributes with the ultimate goal of maintaining function and diversity of favourable species, managing levels of negative species and maintaining soil quality and composition.
Otter *Lutra lutra* (1355)	Maintain favourable conservation condition	Maintain distribution - 88% positive survey sites. Measure based on standard otter survey technique. FCS target, based on 1980/81 survey findings, is 88% in SACs. Current range is estimated at 93.6% (Reid et al., 2013)

4.4 SCREENING OF ADJACENT SACS OR FOR *EX-SITU* EFFECTS

In addition to the Gweedore Bay & Islands SAC there are three other SAC sites proximate to the existing and proposed aquaculture activities (Figure 4.4). Table 4.2 presents the characteristic features of these adjacent sac sites and details the findings of a preliminary screening on the likely interaction with aquaculture activities based primarily upon the likelihood of spatial overlap. With

the exception of the common seal *Phoca vitulina* (which is a designated species for the Rutland Island & Sound SAC) it was deemed that there are no ex situ effects and no effects on features in adjacent SACs and the qualifying features of the adjacent SACs sites were screened out.

It was concluded that the Common Seal may migrate into the Gweedore Bay & Islands SAC and could interact with aquaculture activities; on this basis common seal is included as a feature in the Appropriate Assessment of aquaculture activities - i.e. carried forward to Section 8.5 and Section 9.1.2.

Table 4.2 - SAC sites adjacent to the Gweedore Bay & Islands SAC and qualifying features with initial screening assessment on likely interactions with aquaculture activities.

Natura site (code)	Qualifying features (habitat/species code)	Aquaculture initial Screening
Aran Island (Donegal) Cliffs SAC (000111)	Vegetated sea cliffs of the Atlantic and Baltic coasts [1230]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	European dry heaths [4030]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Alpine and Boreal heaths [4060]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Calcareous rocky slopes with chasmophytic vegetation [8210]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Siliceous rocky slopes with chasmophytic vegetation [8220]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
Rutland Island & Sound SAC (002283)	Coastal lagoons [1150]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Large shallow inlets and bays [1160]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Reefs [1170]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Annual vegetation of drift lines [1210]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Embryonic shifting dunes [2110]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.

Natura site (code)	Qualifying features (habitat/species code)	Aquaculture initial Screening
	Humid dune slacks [2190]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Phoca vitulina (Common Seal) [1365]	**Common Seal may migrate into the Gweedore Bay & Islands SAC and could interact with aquaculture activities – carry forward to Section 8.5 and Section 9.1.2.**
Ballyness Bay SAC (001090)	Estuaries [1130]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Mudflats and sandflats not covered by seawater at low tide [1140]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Embryonic shifting dunes [2110]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Shifting dunes along the shoreline with *Ammophila arenaria* (white dunes) [2120]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Fixed coastal dunes with herbaceous vegetation (grey dunes) [2130]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Humid dune slacks [2190]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
	Vertigo geyeri (Geyer's Whorl Snail) [1013]	No spatial overlap with aquaculture activities within Gweedore Bay & Islands SAC – excluded from further analysis.
West Donegal SPA (004150)	Fulmar *(Fulmarus glacialis)* Cormorant *(Phalacrocorax carbo)* Shag *(Phalacrocorax aristotelis* Peregrine *(Falco peregrinus)* Herring Gull *(Larus argentatus)* Kittiwake *(Rissa tridactyla)* Razorbill *(Alca torda)* Chough *(Pyrrhocorax pyrrhocorax)*	No spatial overlap with aquaculture activities (including access routes). The foraging range of the species identified in the COs is extensive and while some may utilise the aquaculture areas for feeding (which are proximate to a small portion of the SPA), it is unlikely the activities or structures used will impact on the conservation objectives and targets. For the most part the bird species will range beyond the scope or influence of the shellfish culture operations. Therefore, shellfish culture and associated activities considered in this report does not pose significant risk to the conservation features found in the West Donegal Coast SPA and is excluded from further analysis.

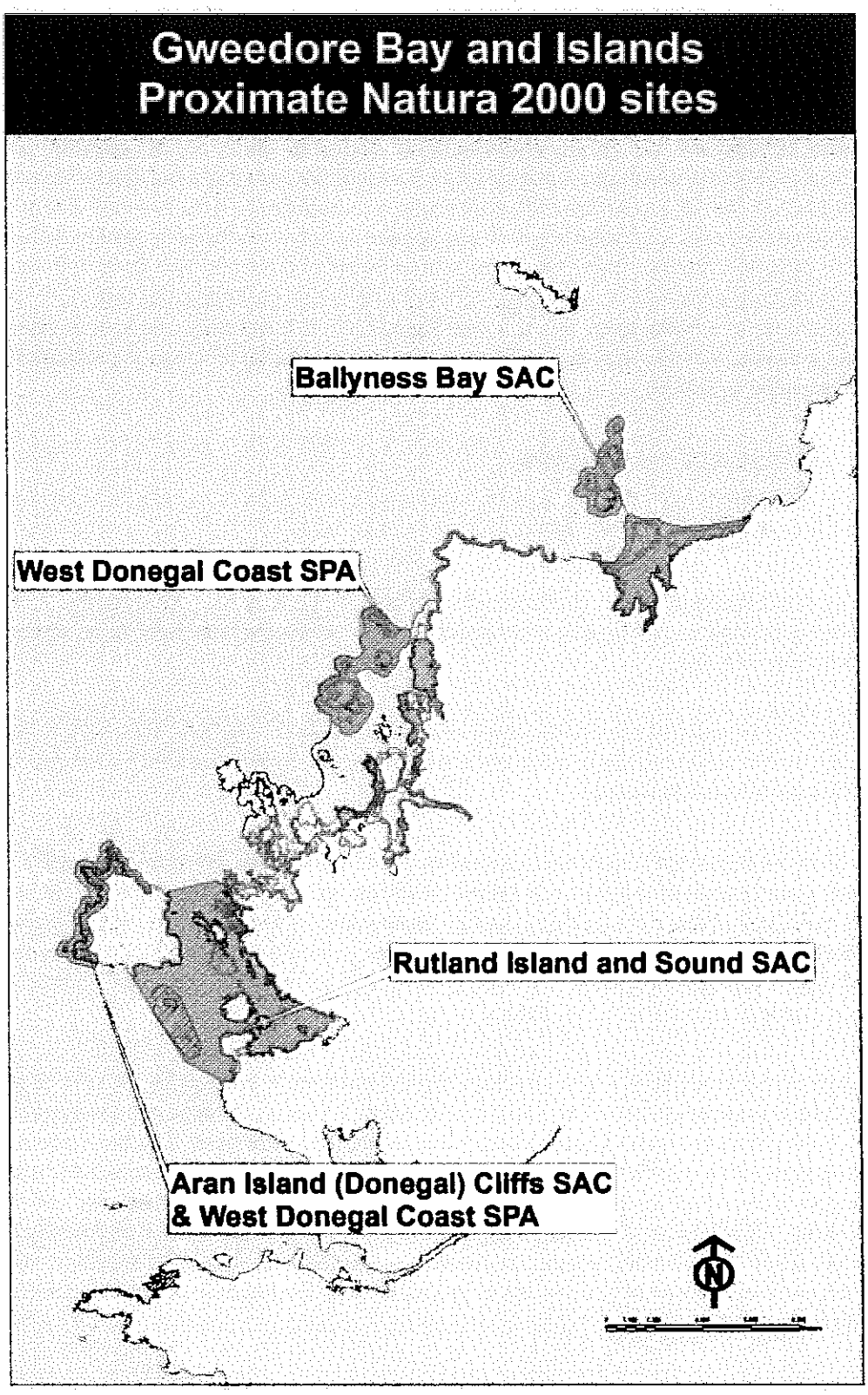

Figure 4.4 – Natura 2000 sites adjacent to the Gweedore Bay & Islands SAC.

5 DETAILS OF THE PROPOSED PLANS AND PROJECTS

5.1 DESCRIPTION OF AQUACULTURE ACTIVITIES

This assessment focuses specifically on aquaculture activities which occur within the qualifying interest Reefs (1170) for which the Gweedore Bay & Islands SAC is designated. In the Gweedore Bay & Islands SAC, of the 25 aquaculture sites (licenced and applications) considered within the SAC, there are 4 licenced sites with a further 5 newly applied for sites that have spatial overlap with the habitat conservation feature. Descriptions of spatial extents of existing and proposed aquaculture activities (including proposed access route activity) within the qualifying interest were calculated using coordinates of activity areas in a GIS (see Figures 5.1, 5.2 and 5.3). The spatial extent of the cultivation activities (current and proposed) overlapping the habitat features is presented in Table 5.1 (data provided by DAFM).

5.1.1 Intertidal Oyster Cultivation

5.1.1.1 Current Activity

Current oyster cultivation within Gweedore Bay & Islands SAC is a form of intensive culture with oyster seed cultivated using the bag and trestle method within the intertidal zone, either to half-grown or fully-grown size.

The bag and trestle method uses steel table-like structures which rise from the shore to just above knee height on the middle to lower intertidal zone, arrayed in double rows with wide gaps between the paired rows to allow for access.

Trestles used are made from steel and typically between 3 in length, are approximately 1 metre in width and stand between 0.5 and 0.7 metre in height. In general, oyster farms are positioned between mean Low Water Spring and mean Low Water Neap, allowing on average between 2 and 5 hours exposure depending on location, tidal and weather conditions. The trestles hold typically hold six HDPE mesh bags approximately 1m by 0.5m by 10cm, using rubber and wire clips to close the mesh bags and to fasten them to the trestles.

The production cycle begins in Gweedore Bay when oyster seed is brought to the service site either in spring or late summer of each year. The majority of oyster seed is bought in from oyster nurseries in France, most notably France Nissian. Oysters are thinned out and graded as the oysters grow. As the oysters grow, they will be taken to the handling / sorting facility twice per year for grading and re-packing, and returned to the trestles. In the final stage they will be 'hardened' in the upper intertidal area, before removal, grading, bagging and delivery. Time to harvest, depending on intake size, ranges from 2 to 3 years, where they will have reached 60 – 70g. At reaching market size oysters are in bags of about 120. In 2015, the combined production at the licenced sites was estimated to be 100 tonnes.

Farms on the intertidal area are typically accessed during spring tides (at low tide) using vans or tractors. Preparatory work is always conducted in the service areas in the intervening periods, including grading and packing, preparation of bags and trestles and general maintenance work which includes shaking and turning of bags, and hand removal of fouling and seaweed to ensure maintenance of water flow through the bags when submerged.

In the Gweedore Bay, existing producers observe three main access routes from the shore to farm areas (Figures 5.2) used by tractors to access each of the main growing areas.

Calculation of area of access routes in the SAC is generated by assigning a putative route width of 10m, which is considered a sufficiently precautionary estimate. The resulting estimates represent the maximium length of travel route to/from and between the culture locations. The spatial coverage of access routes is presented in Tables 5.1, 7.1 and 8.4.

5.1.1.2 Proposed Cultivation Activity

New (oyster) applicants at Gweedore and Kincasslagh Bay have indicated that the source of seed will be from hatcheries currently used by existing farms within the SAC. All new applicants are to use bag and trestles as the method of cultivating their oysters.

New applications for Gweedore Bay are located to the north and south of bay and will be serviced by two main access routes, while applicants at Kincasslagh will observe three main access routes (see Figure 5.3).

The spatial coverage of proposed access routes within the SAC is presented in Tables 5.1, 7.1 and 8.4.

5.1.2 Intertidal Clam Cultivation

One application in Kincasslagh Bay is for the culture of clams and cockles. Clams are typically cultured under netting on sea floor in sedimentary habitat. The duration of culture is 2-3 years and net cleaning will be carried out periodically, as required. The applicants have indicated that seed will be sourced from a hatchery in County Sligo.

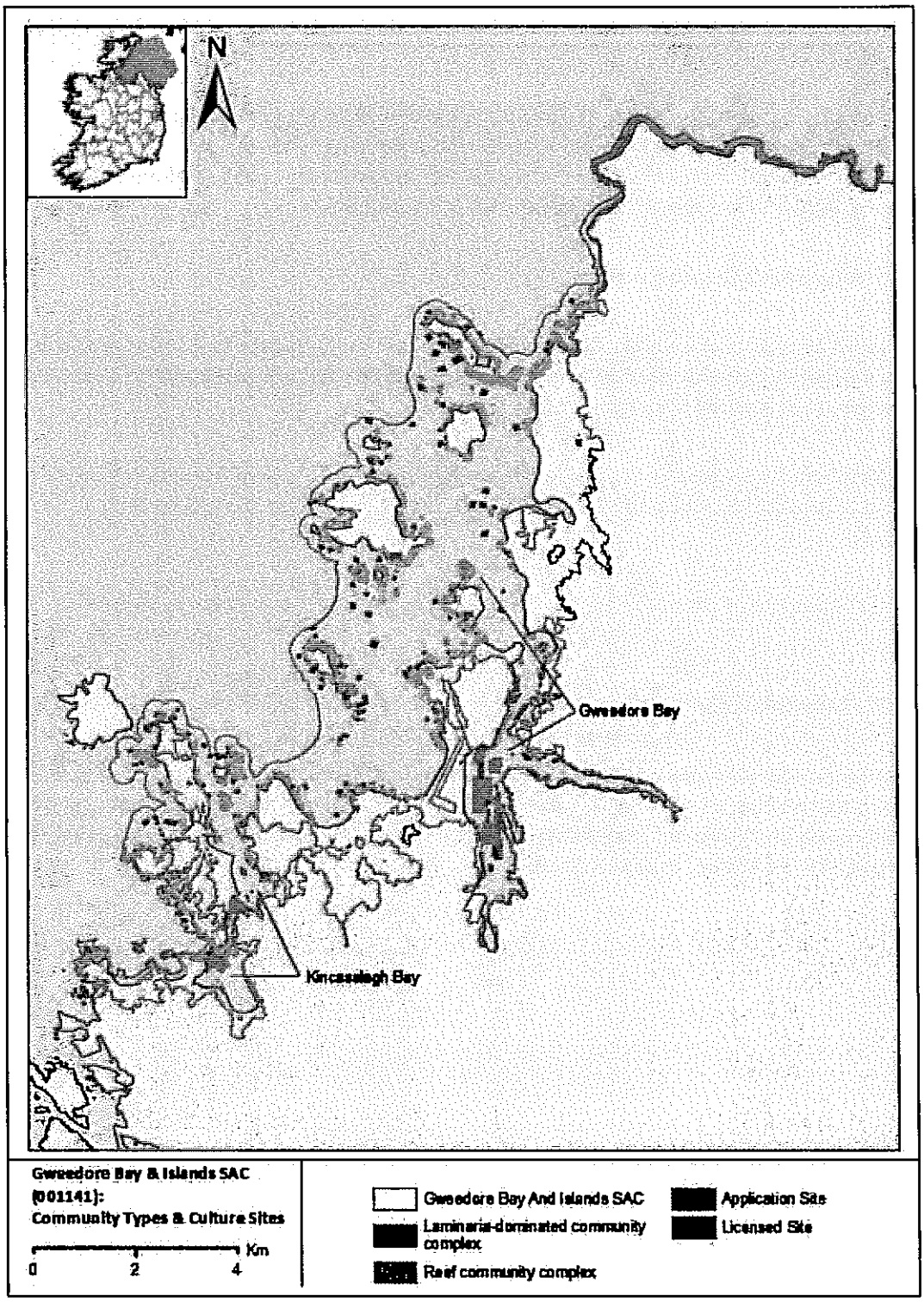

Figure 5.1 - Aquaculture sites (licenced and applications) at Gweedore Bay and Kincasslagh Bay relative to principal benthic communities recorded within the marine Annex I qualifying interest of Reefs (1170) of Gweedore Bay & Islands SAC (NPWS 2014c).

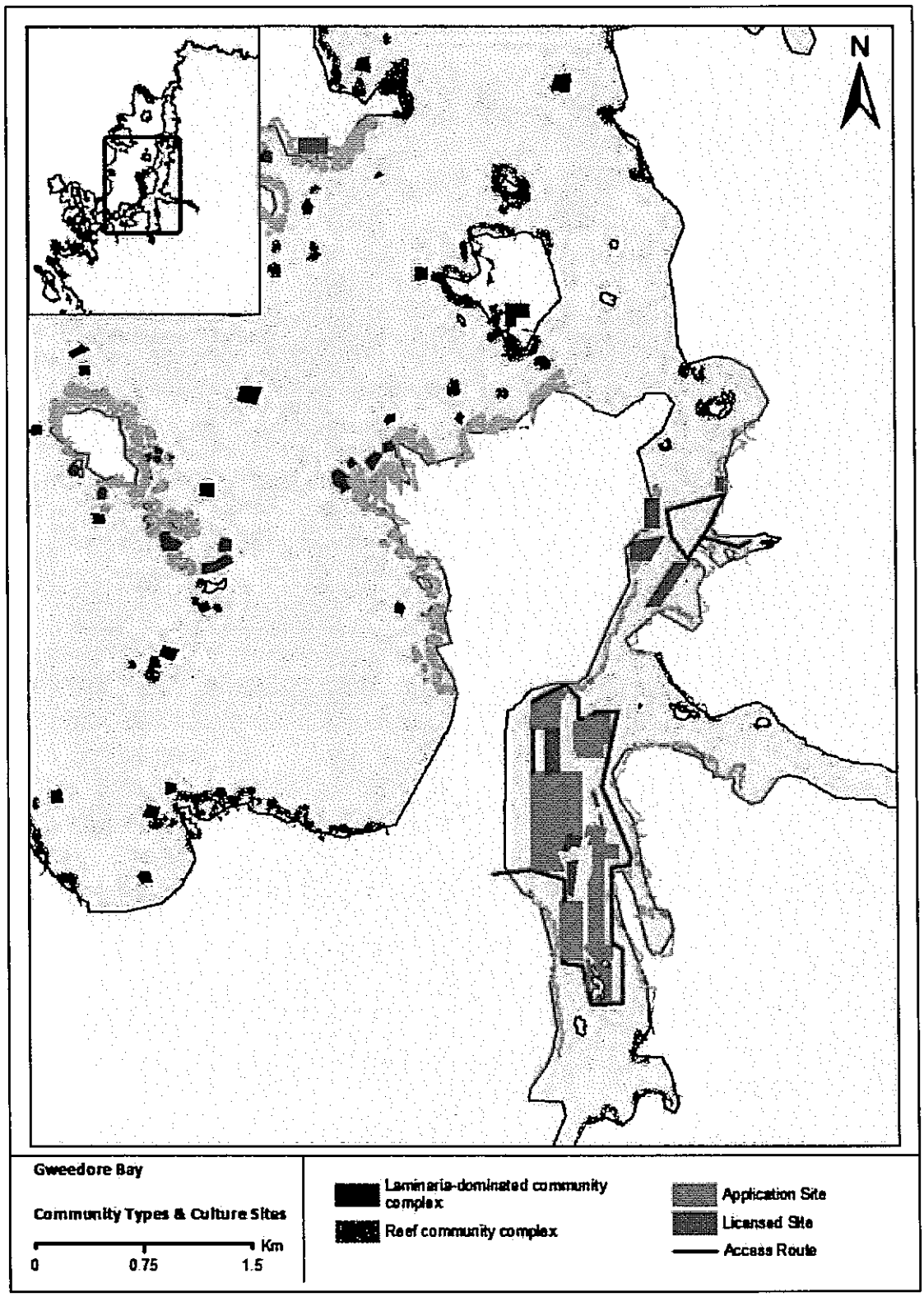

Figure 5.2 - Aquaculture sites (licenced and applications) and access routes at Gweedore Bay relative to principal benthic communities recorded within the marine Annex I qualifying interest of Reefs (1170) of Gweedore Bay & Islands SAC (NPWS 2014c).

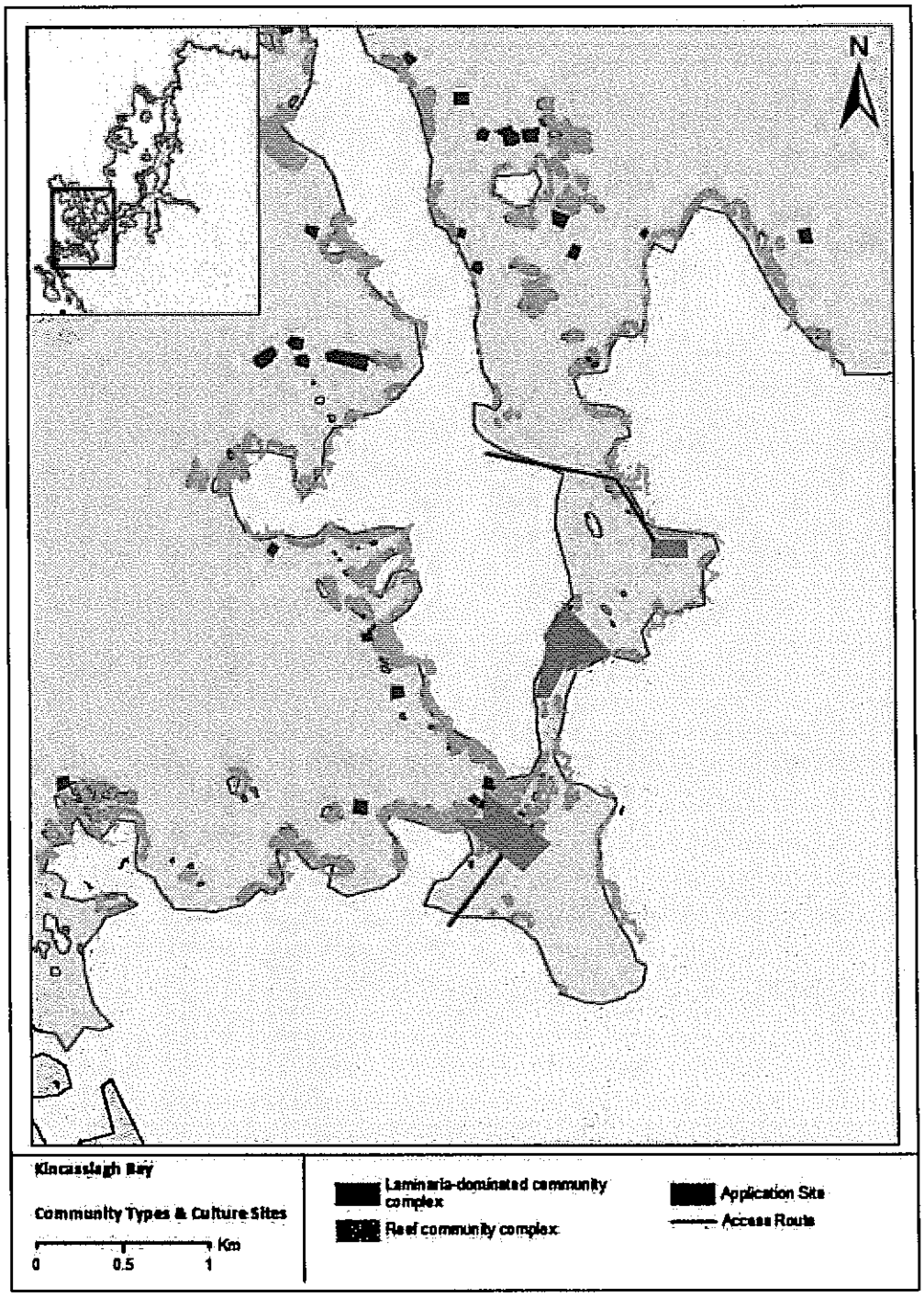

Figure 5.3 - Aquaculture sites (licenced and applications) and access routes at Kincasslagh Bay relative to principal benthic communities recorded within the marine Annex I qualifying interest of Reefs (1170) of Gweedore Bay & Islands SAC (NPWS 2014c).

Table 5.1 - Spatial extent of aquaculture activities overlapping with the qualifying interest of Reefs (1170) within Gweedore Bay & Islands SAC (Site Code 001141), presented according to culture activity and license status.

Culture Activity	Status	Area (ha)	% Feature
Oysters	Licensed	0.35	0.09
Access Routes	In use	0.22	0.06
Sub-total		**0.57**	**0.15**
Oysters	Application	1.95	0.53
Clams/Cockles	Application	0.00	0.00-
Access Routes	Proposed	0.10	0.03
Sub-total		**2.05**	**0.56**
Grand Total		**2.62**	**0.71**

6 NATURA IMPACT STATEMENT FOR THE PROPOSED ACTIVITIES

The potential ecological effects of activities on the conservation objectives for the site relate to the physical and biological effects aquaculture cultivation structures and activities and human activities on designated species, intertidal habitats and invertebrate communities and biotopes within those broad habitat types. The overall effect on the conservation status will depend on the spatial and temporal extent of aquaculture activities during the lifetime of the proposed plans and projects and the nature of each of these activities in conjunction with the sensitivity of the receiving environment.

6.1 AQUACULTURE

Within the qualifying interest of Gweedore Bay & Islands SAC the species cultured is the Pacific oyster *C. gigas* in bags & trestles in the intertidal area.

Details of the potential biological and physical effects of these aquaculture activities on the habitat features, their sources and the mechanism by which the impact may occur are summarised in Table 6.1 below. The impact summaries identified in the table are derived from published primary literature and review documents that have specifically focused upon the environmental interactions of mariculture (e.g. Black 2001; McKindsey et al 2007; NRC 2010; O'Beirn et al 2012; Cranford et al 2012; ABPMer 2013a-h).

Filter feeding organisms, for the most part, feed at the lowest trophic level, usually relying primarily on ingestion of phytoplankton. The process is extractive in that it does not rely on the input of feedstuffs in order to produce growth. Suspension feeding bivalves such as oysters and mussels can modify their filtration to account for increasing loads of suspended matter in the water and can increase the production of faeces and pseudofaeces (non-ingested material) which result in the transfer of both organic and inorganic particles to the seafloor. This process is a component of benthic-pelagic coupling. The degree of deposition and accumulation of biologically derived material on the seafloor is a function of a number of factors discussed below.

One aspect to consider in relation to the culture of shellfish is the potential risk of alien species arriving into an area among consignments of seed or stock sourced from outside of the area under consideration. When the seed is sourced locally (e.g. mussel culture) the risk is likely zero. When seed is sourced at a small size from hatcheries in Ireland the risk is also small. When seed is sourced from hatcheries outside of Ireland (this represents the majority of cases particularly for oyster culture operations) the risk is also considered small, especially if the nursery phase has been short. When ½-grown stock (oysters and mussels) is introduced from another area (e.g. France, UK) the risk of introducing alien species (hitchhikers) is considered greater given that the stock will have been grown in the wild (open water) for a prolonged period (i.e. ½-grown stock). Furthermore, the culture of a non-native species (e.g. the Pacific Oyster – *C. gigas*) may also presents a risk of establishment of this species in the SAC. Recruitment of *C. gigas* has been documented in a number of bays in Ireland and appears to have become naturalised (i.e. establishment of a breeding population) in two locations (Kochmann et al 2012; 2013) and may compete with the native species for space and food.

Intertidal shellfish culture: Oysters are typically cultured in the intertidal zone using a combination of plastic mesh bags and trestles. Their specific location in the intertidal is dependent upon the level

of exposure of the site, the stage of culture and the accessibility of the site. Any habitat impact from oyster trestle culture is typically localised to areas directly beneath the culture systems. The physical presence of the trestles and bags may reduce water flow and allowing suspended material (silt, clay as well as faeces and pseudo-faeces) to fall out of suspension to the seafloor. The build-up of material will typically occur directly beneath the trestle structures and can result in accumulation of fine, organically rich sediments. These sediments may result in the development of infaunal communities distinct from the surrounding areas. Similar to suspended culture above, whether material accumulates beneath oyster trestles is dictated by a number of factors, including:

- Hydrography – low current speeds (or small tidal range) may result in material being deposited directly beneath the trestles. If tidal height is high and large volumes of water moved through the culture area an acceleration of water flow can occur beneath the trestles and bags, resulting in a scouring effect or erosion and no accumulation of material.

- Turbidity of water – as with suspended mussel culture, oysters have very plastic response to increasing suspended matter in the water column with a consequent increase in faecal or pseudo-faecal production. Oysters can be cultured in estuarine areas (given their polyhaline tolerance) and as a consequence can be exposed to elevated levels of suspended matter. If currents in the vicinity are generally low, elevated suspended matter can result in increased build-up of material beneath culture structures.

- Density of culture – the density of oysters in a bag and consequently the density of bags on a trestle will increase the likelihood of accumulation on the seafloor. In addition, if the trestles are located in close proximity a greater dampening effect can be realised with resultant accumulations. Close proximity may also result in impact on shellfish performance due to competitive interactions for food.

- Exposure of sites - the degree to which the aquaculture sites are exposed to prevailing weather conditions will also dictate the level of accumulated organic material in the area. As fronts move through culture areas increased wave action will resuspend and disperse material away from the trestles.

Shading may be an issue as a consequence of the structures associated with intertidal oyster culture. The racks and bags are held relatively close to the seabed and as a consequence may shade sensitive species (e.g. seagrasses) found underneath.

Physical disturbance caused by compaction of sediment from foot traffic and vehicular traffic. Activities associated with the culture of intertidal shellfish include the travel to and from the culture sites and within the culture sites using tractors and trailers as well as the activities of workers within the site boundaries.

Intertidal culture of clam species is typically carried out in the sediment covered with netting to protect the stock from predators. The high density of the culture organisms can lead to exclusion of native biota and the ground preparation and harvest methods (by mechanical means or by hand) can lead to considerable disturbance of biota characterising the habitat.

Other considerations: Due to the nature of the (high density) of shellfish culture methods the risk of transmission of disease within cultured stock is high. However, given that *C. gigas* does not appear to occur in the wild the risk of disease transmission to 'wild' stock is considered low. The risk of disease transmission from cultured oysters to other species is unknown.

Oyster culture poses a risk in terms of the introduction of non-native species as the Pacific oyster (*C. gigas*) is a non-native species. Recruitment of *C.* gigas has been documented in a number of Bays in Ireland and appears to have become naturalised (i.e. establishment of a breeding population) in two locations (Kochmann et al 2012; 2013) and may compete with the native species for space and food. The culture of large volumes of Pacific oysters may increase the risk of successful reproduction in Gweedore Bay & Islands SAC. The use of triploid (non-reproducing) stock is the main method employed to manage this risk. Furthermore, the introduction of non-native species as 'hitchhikers' on and among culture stock is also considered a risk, the extent of which is dependent upon the duration the stock has spent 'in the wild' outside of Gweedore Bay & Islands SAC. Half-grown stock (15 - 30g oysters) which would have been grown for extended periods in places (in particular outside of Ireland) present a higher risk. Oysters grown in other bays in Ireland and 'finished' in Gweedore Bay & Islands SAC, would not appear to present a risk of introduction of non-native species assuming best practice is applied (e.g. http://invasivespeciesireland.com/cops/aquaculture/).

The Manila clam (*Ruditapes philippinarum*), is a non-native species and has been in culture in Ireland since 1984. This species may present a risk of successfully spawning and establishing reproducing populations. The factors likely to govern successful recruitment are; suitable water temperatures, sufficient spawning stock and availability of suitable habitat.

Table 6.1 - Potential indicative environmental pressures of aquaculture activities within the qualifying interest of Reefs (1170) within the Gweedore & Islands SAC.

Activity	Pressure category	Pressure	Potential effects	Equipment / Gear	Duration (days)	Time of year	Factors constraining the activity
Intertidal shellfish Culture	Physical	Current alteration	Structures may alter the current regime and resulting increased deposition of fines or scouring.	Trestles and bags and service equipment, dredging equipment.	365	All year	At low tide only
		Surface disturbance	Ancillary activities at sites, e.g. servicing, transport increase the risk of sediment compaction resulting in sediment changes and associated community changes. Disturbance to sedimentary communities due to harvest and planting of infaunal clams.				
		Shading	Prevention of light penetration to seabed potentially impacting light sensitive species				
	Biological	Non-native species introduction	Potential for non-native species to reproduce and proliferate in SAC. Potential for alien species to be included with culture stock (hitch-hikers).				
		Disease risk	In event of epizootic the ability to manage disease in uncontained subtidal oyster populations is compromised.				
		Organic enrichment	Faecal and pseudofaecal deposition on seabed potentially altering community composition				

7 SCREENING OF AQUACULTURE ACTIVITIES

A screening assessment is an initial evaluation of the possible impacts that activities may have on the qualifying interests. The screening process, is a filter, which may lead to exclusion of certain activities or qualifying interests from appropriate assessment proper, thereby simplifying the assessments, if this can be justified unambiguously using limited and clear cut criteria. Screening is a conservative filter that minimises the risk of false negatives.

In this assessment screening of the qualifying interests against the proposed activities is based primarily on spatial overlap i.e. if the qualifying interests overlap spatially with the proposed activities then significant impacts due to these activities on the conservation objectives for the qualifying interests is not discounted (not screened out) except where there is absolute and clear rationale for doing so. Where there is relevant spatial overlap full assessment is warranted. Likewise if there is no spatial overlap and no obvious interaction is likely to occur, then the possibility of significant impact is discounted and further assessment of possible effects is deemed not to be necessary.

7.1 SCREENING OF GWEEDORE BAY & ISLANDS SAC

Where the overlap between an aquaculture activity and community habitat type and/or a feature of interest is zero it is screened out and not considered further. Therefore, the following habitats and species are also excluded from further consideration of aquaculture interactions:

- 1150 Coastal lagoons*
- 1220 Perennial vegetation of stony banks
- 1395 Petalwort *Petalophyllum ralfsii*
- 1410 Mediterranean salt meadows (*Juncetalia maritimi*)
- 1833 Slender Naiad *Najas flexilis*
- 2110 Embryonic shifting dunes
- 2120 Shifting dunes along the shoreline with *Ammophilia arenaria* (white dunes)
- 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes)
- 2140 Decalcified fixed dunes with *Empetrum nigrum**
- 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*)*
- 2170 Dunes with *Salix repen* ssp. *argentea* (*Salicion arenariae*)
- 2190 Humid dune slacks
- 21A0 Machairs (* in Ireland)

- 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*)
- 4030 European dry heaths
- 4060 Alpine and Boreal heaths
- 5130 *Juniperus communis* formations on heaths or calcareous grasslands

Furthermore, of the two community types (see Table 4.1) listed under the habitat features (1170), one (i.e. *Laminaria*-dominated community complex) had no spatial overlap between with any aquaculture activities. On this basis, the community type was excluded from further analysis of aquaculture interactions.

When overlap between aquaculture activity and a community habitat type and/or a feature of interest was observed it was quantified in a GIS application and presented on the basis of coverage of specific activity (representing different pressure types), licence status (licenced or application) intersecting with designated conservation features and/or sub-features (community types). Table 5.1 highlights the spatial overlap between (existing and proposed) aquaculture activities and qualifying habitat feature of Reefs (1170) while Table 7.1 below provides an overview of overlap of aquaculture activities and specific marine community type of Reef community complex (identified from Conservation Objectives (i.e. NPWS 2014a)) within the broad habitat feature 1170. A full assessment (see Section 8) was carried out on the likely interactions of aquaculture activities with the community type presented in (Table 7.1).

Table 7.1 - Habitat utilisation i.e. spatial overlap in hectares and percentage (given in parentheses) of aquaculture activity over Reef community complex within the qualifying interest 1170 (i.e. Reefs) in Gweedore Bay & Islands SAC. Spatial data based on licence database provided by DAFM. Habitat data provided in NPWS 2015c.

			1170 - Reefs; 369.01ha			
Culture Type	**Method**	**Status**	**Reef community complex; 308.44 ha**		***Laminaria*-dominated community complex; 60.66 ha**	
			Area (ha)	**% Feature**	**Area (ha)**	**% Feature**
Oysters	Intensive	Licensed	0.35	0.11	-	-
Access Routes	In use		0.22	0.07	-	-
Sub-total			**0.57**	**0.18**	-	-
Oysters	Intensive	Application	1.95	0.63	-	-
Clam/Cockle	Intensive	Application	-	-	-	-
Access Routes	Proposed		0.10	0.03	-	-
Sub-total			**2.05**	**0.66**	-	-
Grand total			**2.62**	**0.84**	-	-

8 ASSESSMENT OF AQUACULTURE ACTIVITIES

8.1 DETERMINING SIGNIFICANCE

The significance of the possible effects of the proposed activities on habitats, as outlined in the Natura Impact Statement (Section 6) and subsequent screening exercise (Section 7), is determined here in the assessment. The significance of effects is determined on the basis of Conservation Objective guidance for constituent habitats and species (Figures 4.2, 4.3 and NPWS 2015a, 2015b, 2015c, 2015d).

Within the Gweedore Bay & Island SAC the qualifying habitat/species considered subject to potential disturbance and therefore, carried further in this assessment is:

- 1170 Reefs
- 1355 Otter - *Lutra lutra*

For broad habitats and community types (Figures 4.2, 4.3) significance of impact is determined in relation to, first and foremost, spatial overlap (see Section 7; Tables 7.1). Subsequent disturbance and the persistence of disturbance are considered as follows:

1. The degree to which the activity will disturb the qualifying interest. By disturb is meant change in the characterising species, as listed in the Conservation Objective guidance (NPWS 2015c) for constituent communities. The likelihood of change depends on the sensitivity of the characterising species to the activities in question. Sensitivity results from a combination of intolerance to the activity and/or recoverability from the effects of the activity (see Section 8.2 below).

2. The persistence of the disturbance in relation to the intolerance of the community. If the activities are persistent (high frequency, high intensity) and the receiving community has a high intolerance to the activity (i.e. the characterising species of the communities are sensitive and consequently impacted) then such communities could be said to be persistently disturbed.

3. The area of communities or proportion of populations disturbed. In the case of community disturbance (continuous or ongoing) of more than 15% of the community area it is deemed to be significant. This threshold does not apply to the sensitive habitat *Zostera* where any spatial overlap of activities should generally be avoided.

Effects will be deemed to be significant when cumulatively they lead to long term change (persistent disturbance) in broad habitat/features (or constituent communities) resulting in an impact greater than 15% of the area.

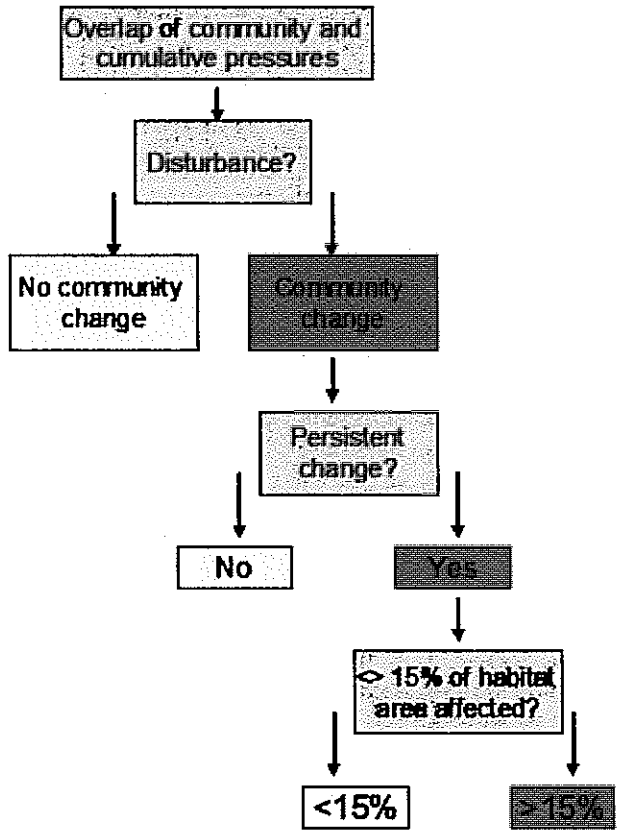

Figure 8.1 - Determination of significant effects on community distribution, structure and function for sedimentary habitats (following NPWS 2014c).

In relation to the designated species Otter *Lutra lutra* the capacity of the population to maintain itself in the face of anthropogenic induced disturbance or mortality at the site will need to be taken into account in relation to the Conservation Objectives (COs) on a case by case basis.

8.2 SENSITIVITY AND ASSESSMENT RATIONALE

This assessment used a number of sources of information in assessing the sensitivity of the species of characterising Reef community complex within the Gweedore Bay & Islands SAC. One source of information is a series of commissioned reviews by the Marine Institute which identify habitat and species sensitivity to a range of pressures likely to result from aquaculture and fishery activities (ABPMer 2013a-h). These reviews draw from the broader literature, including the MarLIN Sensitivity Assessment (Marlin.ac.uk) and the AMBI Sensitivity Scale (Borja et al 2000) and other primary literature. It must be noted that NPWS have acknowledged that given the wide range of community types that can be found in marine environments, the application of conservation targets to these would be difficult (NPWS 2015c). On this basis, they have proposed broad community complexes as management units. These complexes (for the most part) are very broad in their description and do not have clear surrogates which might have been considered in targeted studies and thus reported in the scientific literature. On this basis, the confidence assigned to likely interactions of the community types with anthropogenic activities are by necessity relatively low, with the exception of community types dominated by sensitive taxa, e.g. Mearl and *Zostera*. Other literature cited in the assessment does provide a greater degree of confidence in the conclusions. For example, the output of a recent study has provided greater confidence in terms of assessing likely interactions between intertidal oyster culture and marine habitats (Forde et al 2015). Sensitivity of a species to a given

pressure is the product of the intolerance (the susceptibility of the species to damage, or death, from an external factor) of the species to the particular pressure and the time taken for its subsequent recovery (recoverability is the ability to return to a state close to that which existed before the activity or event caused change). Life history and biological traits are important determinants of sensitivity of species to pressures from aquaculture.

In the case of species, communities and habitats of conservation interest, the separate components of sensitivity (intolerance, recoverability) are relevant in relation to the persistence of the pressure:

- For persistent pressures i.e. activities that occur frequently and throughout the year recovery capacity may be of little relevance except for species/habitats that may have extremely rapid (days/weeks) recovery capacity or whose populations can reproduce and recruit in balance with population damage caused by aquaculture. In all but these cases and if sensitivity is moderate or high then the species/habitats may be negatively affected and will exist in a modified state. Such interactions between aquaculture and species/habitat/community represent persistent disturbance. They become significantly disturbing if more than 15% of the community is thus exposed (NPWS 2015c).

- In the case of episodic pressures i.e. activities that are seasonal or discrete in time both the intolerance and recovery components of sensitivity are relevant. If sensitivity is high but recoverability is also high relative to the frequency of application of the pressure then the species/habitat/community will be in favourable conservation status for at least a proportion of time.

The sensitivities of the community types (or surrogates) found within the Gweedore Bay & Islands SAC to pressures similar to those caused by aquaculture (e.g. smothering, organic enrichment and physical disturbance) are identified in Table 8.1. The sensitivities of species which are characteristic (as listed in the Conservation Objective supporting document) of benthic communities to pressures similar to those caused by aquaculture (e.g. smothering, organic enrichment and physical disturbance) are identified, where available, in Table 8.2. The following guidelines broadly underpin the analysis and conclusions of the species and habitat sensitivity assessment:

- Sensitivity of certain taxonomic groups such as emergent sessile epifauna to physical pressures is expected to be generally high or moderate because of their form and structure (Roberts et al 2010). Also high for those with large bodies and with fragile shells/structures, but low for those with smaller body size. Body size (Bergman and van Santbrink 2000) and fragility are regarded as indicative of a high intolerance to physical abrasion caused by fishing gears (i.e. dredges). However, even species with a high intolerance may not be sensitive to the disturbance if their recovery is rapid once the pressure has ceased.

- Sensitivity of certain taxonomic groups to increased sedimentation is expected to be low for species which live within the sediment, deposit and suspension feeders; and high for those sensitive to clogging of respiratory or feeding apparatus by silt or fine material.

- Recoverability of species depends on biological traits (Tillin et al 2006) such as reproductive capacity, recruitment rates and generation times. Species with high reproductive capacity, short generation times, high mobility or dispersal capacity may maintain their populations even when faced with persistent pressures; but such environments may become dominated by these (r-selected) species. Slow recovery is correlated with slow growth rates, low fecundity, low and/or irregular recruitment, limited dispersal capacity and long generation

times. Recoverability, as listed by MarLIN, assumes that the impacting factor has been removed or stopped and the habitat returned to a state capable of supporting the species or community in question. The recovery process is complex and therefore the recovery of one species does not signify that the associated biomass and functioning of the full ecosystem has recovered (Anand and Desrocher, 2004 - cited in Hall et al 2008).

8.3 ASSESSMENT OF THE EFFECTS OF AQUACULTURE PRODUCTION ON THE CONSERVATION OBJECTIVES FOR HABITAT FEATURES IN THE GWEEDORE BAY & ISLANDS SAC.

Aquaculture pressures on a given habitat are related to vulnerability (spatial overlap or exposure of the habitat to the equipment/culture organism combined with the sensitivity of the habitat) to the pressures induced by culture activities. 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 habitats and species.

NPWS (2015c) provide lists of species characteristic of **Reef community complex** that are defined in the Conservation Objectives (NPWS 2015a).

The constituent communities identified in the broad Annex 1 feature **1170 - Reefs** are:

- Reef community complex
- *Laminaria*-dominated community complex

For **Reefs (1170)** there are a number of attributes (with associated targets) relating to the following broad habitat features as well as constituent community types;

1. **Habitat Area** - it is unlikely that the activities proposed will reduce the overall extent of permanent habitat within the feature Reefs (1170). The habitat area is likely to remain stable.

2. **Community Distribution - (conserve a range of community types in a natural condition)** - this attribute considered interactions with the two constituent community types listed found within the qualifying interest of Reefs (1170) of the SAC only one of which was shown to have overlap with aquaculture activities (i.e. Reef community complex) (Table 7.1).

   Table 8.1 lists the habitats (or surrogates) and Table 8.2 lists the constituent taxa and both provide a commentary of sensitivity to a range of pressures. The risk scores are derived from a range of sources identified above. The pressures are listed as those likely to result from intertidal oyster culture (bags and trestle) within the SAC.

   Table 8.4 below identifies the likely interactions between the existing and proposed aquaculture activities and the broad habitat feature of Reef (1170) and its constituent community type Reef community complex, with a broad conclusion and justification on whether the activity is considered disturbing to the feature in question. It must be noted that the sequence of distinguishing disturbance is as highlighted above, whereby

activities with spatial overlap on habitat features are assessed further for their ability to cause persistence disturbance on the habitat. If persistent disturbance is likely then the spatial extent of the overlap is considered further. If the proportion of the overlap exceeds a threshold of 15% disturbance of the habitat then any further licencing should be informed by interdepartmental review and consultation (NPWS 2015c).

While intertidal oyster culture might result in long-term change to the community type listed above, existing and/or proposed activity including access route activity (individually or combined) does not extend beyond 15% of the community type. Spatial analysis indicates that combined existing and proposed cultivation activity overlap with approximately 0.71% of the habitat feature (1170) Reefs (see Table 5.1) and 0.84% of the constituent community type Reef community complex (Table 7.1 and Table 8.4). Furthermore, given the nature of the habitat, i.e., reef the activities are unlikely to occur on them and that the overlap is an artefact of the mapping. Consequently, adverse impacts of existing and proposed aquaculture activities on the habitat feature Reef 1170 and component community types **can be discounted.**

Introduction of non-native species: As already outlined oyster culture may present a risk in terms of the introduction of non-native species as the Pacific oyster (*Crassostrea gigas*) itself is a non-native species. Recruitment of *C. gigas* has been documented in a number of Bays in Ireland and appears to have become naturalised (i.e. establishment of a breeding population) in two locations (Kochmann et al 2012; 2013) and may compete with the native species for space and food. In addition to having large number of oysters in culture, Kochmann et al (2013) identified long residence times and large intertidal areas as factors likely contributing to the successful recruitment of oysters in Irish bays. In addition, a recent study (Kochmann and Crowe, 2014) has identified heavy macroalgal cover as a potential factor governing successful recruitment, with higher cover resulting in lower recruitment. Furthermore, MagAoidh (2011) demostrated that oysters grown subtidally have been shown to mature earlier and have higher condition. Oyster production in the Gweedore Bay & Islands SAC does not fulfil these criteria, i.e., high algal cover allied with a short residence time (i.e. approx 8 days – Dabrowski 2011). Therefore the risk of successful establishment of the Pacific oyster in Gweedore Bay & Islands SAC is considered low.

Clam culture: The proposal to culture clams and cockles does not spatially overlap any feature of interest in Gweedore Bay and Islands SAC. Specifically, in relation to the Manila clam (*Ruditapes philippinarum*), this species is exempt under Annex IV of the aforementioned Alien species in aquaculture regulations. However, this species has been in culture in Ireland since 1984 and, to the best of our knowledge, no recruitment in the wild has been recorded. The risk of establishment of the clams is also considered low in this area give the short residence time in the bay. Furthermore, the operations are totally reliant on hatchery seed and are fully contained at all stages of the production cycle. The risk of naturalisation of this species is considered low, but should be kept under surveillance.

8.3.1 Conclusion Summary

In summary, based upon the spatial overlap and sensitivity analysis it is concluded that existing and proposed aquaculture culture activities (including access route activity) individually and/or in-combination do not pose a risk of significant disturbance to the conservation of the habitat feature of Reefs or the constituent community types of Reef community complex and *Laminaria*-dominated community complex (Table 8.4).

Table 8.1 - Matrix showing the characterising habitats sensitivity scores x pressure categories for habitats (or surrogates) in Gweedore Bay & Islands SAC (ABPMer 2013a-h) (Table 8.3 provides the code for the various categorisation of sensitivity and confidence.)

Community Type (EUNIS code)	Surface Disturbance	Shallow Disturbance	Deep Disturbance	Trampling – access by foot	Trampling – access by vehicle	Extraction	Siltation (addition of fine sediments, pseudofaeces, fish food)	Smothering (addition of materials biological or non biological to the surface)	Changes to sediment composition - increased coarseness	Changes to sediment composition - increased fine sediment proportion	Changes to water flow	Increase in turbidity/suspended sediment	Decrease in turbidity/suspended sediment	Organic enrichment - water column	Organic enrichment of sediments-sedimentation	Increased removal of primary production-phytoplankton	Decrease in oxygen levels - sediment	Decrease in oxygen levels - water column	Introduction of non-native species	Removal of Target Species	Removal of Non-target species	Introduction of antifoulants	Introduction of medicines	Introduction of hydrocarbons	Prevention of light reaching seabed/features
Reef community complex (A1.21 - Barnacles and fucoids on moderately exposed shores)	NS (*)	NA	NA	NS (*)	NE	NE	NS (*)	M-VH (*)	NA	NA	NS (*)	NS (*)	NS (*)	NS (*)	NE	NS (*)	NE	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)
Reef community complex (A1.31 - Fucoids on sheltered marine shores)	NS (*)	NA	NA	NS (*)	NE	NE	NS (*)	M-VH (*)	NA	NA	NS (*)	NS (*)	NS (*)	NS (*)	NE	NS (*)	NE	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)
Reef community complex (A3.22 - Kelp and seaweed communities in tide-swept sheltered conditions)	NS (*)	NA	NA	NE	NE	NE	NS (*)	M-VH (*)	NA	NA	NS (*)	NS (*)	NS (*)	NS (*)	NE	NS (*)	NE	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)
Reef community complex (A4.1 - Atlantic & Mediterranean high energy circalittoral rock / A4.2 - Atlantic & Mediterranean moderate energy circalittoral rock)	NS (*)	NA	NA	NE	NE	NE	NS (*)	M-VH (*)	NA	NA	NS (*)	NS (*)	NS (*)	NS (*)	NE	NS (*)	NE	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)

Table 8.2 - Matrix showing the characterising species sensitivity scores x pressure categories for taxa (or surrogates) in Gweedore Bay & Islands SAC (ABPMer 2013a-h) (Table 8.3 provides the code for the various categorisation of sensitivity and confidence.)

Community Type (EUNIS code)	Surface Disturbance	Shallow Disturbance	Deep Disturbance	Trampling – access by foot	Trampling – access by vehicle	Extraction	Siltation (addition of fine sediments, pseudofaeces, fish food)	Smothering (addition of materials biological or non biological to the surface)	Changes to sediment composition- increased coarseness	Changes to sediment composition- increased fine sediment proportion	Changes to water flow	Increase in turbidity/suspended sediment	Decrease in turbidity/suspended sediment	Organic enrichment-water column	Organic enrichment of sediments-sedimentation	Increased removal of primary production-phytoplankton	Decrease in oxygen levels- sediment	Decrease in oxygen levels-water column	Introduction of non-native species	Removal of Target Species	Removal of Non-target species	Introduction of antifoulants	Introduction of medicines	Introduction of hydrocarbons	Prevention of light reaching seabed/features
Fucus spp.	L (*)	NA	NA	L (***)	NE	NE	M (***)	H (*)	NA	NA	NS (*)	L-NS (***)	NS (**)	NS (***)	NE	NS (*)	NE	NS (*)	M (***)	M (***)	NS (*)	NS (*)	NEv	NS (***)	M (***)
Halydrys siliquosa	L (*)	NA	NA	L (*)	NE	NE	NS (*)	H (*)	NA	NA	NS (***)	L-NS (***)	NS (***)	NS (***)	NE	NS (*)	NE	NEv	M (***)	NS (*)	NS (*)	NS (*)	NEv	NS (*)	M (***)
Laminaria digitata	NS (*)	NA	NA	NE	NE	NE	NS (***)	H (*)	NA	NA	NS (***)	M (***)	NS (*)	NS (*)	NE	NS (*)	NE	NEv	M (***)	H (***)	NS (*)	NS (*)	NEv	NS (***)	M (*)
Lichens	H (***)	NA	NA	H (***)	H (***)	VH (*)	H (***)	H (*)	NA	NA	NA	NA	NA	NA	NE	NA	NE	NEv	NS (*)	NS (*)	NS (*)	NE	NEv	L-H (***)	NE
Littorina littorea	L (*)	NA	NA	L (***)	NE	NE	L (***)	M (*)	NA	NA	NS (*)	NS (*)	NS (*)	NS (***)	NE	NS (*)	NE	NS (***)	L-NS (***)	L (***)	NS (*)	NS (***)	NEv	M (*)	NS (*)

Community Type (EUNIS code)	Surface Disturbance	Shallow Disturbance	Deep Disturbance	Trampling – access by foot	Trampling – access by vehicle	Extraction	Siltation (addition of fine sediments, pseudofaeces, fish food)	Smothering (addition of materials biological or non biological to the surface)	Changes to sediment composition- increased coarseness	Changes to sediment composition- increased fine sediment proportion	Changes to water flow	Increase in turbidity/suspended sediment	Decrease in turbidity/suspended sediment	Organic enrichment-water column	Organic enrichment of sediments-sedimentation	Increased removal of primary production-phytoplankton	Decrease in oxygen levels- sediment	Decrease in oxygen levels-water column	Introduction of non-native species	Removal of Target Species	Removal of Non-target species	Introduction of antifoulants	Introduction of medicines	Introduction of hydrocarbons	Prevention of light reaching seabed/features
Patella vulgata	M (**)	NA	NA	L (***)	NE	NE	M (***)	H (*)	NA	NA	NS (***)	NS (**)	NS (*)	NS (**)	NE	NS (*)	NE	NS (***)	NEv	NS (*)	NS (*)	NS (***)	NEv	M (***)	NS (*)
Pelvetia canaliculata	L (***)	NA	NA	L (***)	NE	NE	M (*)	M (*)	NA	NA	NS (**)	NS (*)	NS (*)	NS (*)	NE	NS (*)	NE	NS (*)	NS (*)	NS (*)	NS (*)	NS (*)	NEv	NS (*)	M (*)
Semibalanus balanoides	NS (*)	NA	NA	L (***)	NE	NE	H (*)	H (*)	NA	NA	L-M (***)	NEv	NEv	NS (***)	NE	L (*)	NE	NS (***)	NEv	NS (*)	NS (*)	NS (*)	NEv	NS (***)	NS (***)

Table 8.3 - Codes of sensitivity and confidence applying to species and pressure interactions presented in Tables 8.1 and 8.2.

Pressure interaction codes for Table 8.1 and 8.2	
NA	Not Assessed
Nev	No Evidence
NE	Not Exposed
NS	Not Sensitive
L	Low
M	Medium
H	High
VH	Very High
*	Low confidence
**	Medium confidence
***	High Confidence

Table 8.4 - Interactions between the relevant aquaculture activities and the habitat feature Reef (1170) constituent communities with a broad conclusion on the nature of the interactions. L= Licenced; A=Application; I=Intensive.

			1170 - Reef	
Culture Type	Status	Method	Reef community complex	*Laminaria*-dominated community complex
Oysters	L	I	**Disturbing: No** **Justification:** The habitat is considered tolerant to pressure from activity. However, some component species are sensitive to smothering and siltation (faeces and pseudofaeces). The risk posed by NIS is minimal as culture stocks are confined in bags, is sourced from hatcheries, is typically diploid/triploid and residence time is short. The greatest spatial extent of exiting aquaculture activities on this constituent habitat type is 0.11% (<15% threshold).	**Disturbing: No** **Justification:** No spatial overlap
Oysters	A	I	**Disturbing: No** **Justification:** The habitat is considered tolerant to pressure from activity. However, some component species are sensitive to smothering and siltation (faeces and pseudofaeces). The risk posed by NIS is minimal as culture stocks are confined in bags, is sourced from hatcheries, is typically diploid/triploid and residence time is short. The greatest spatial extent of exiting aquaculture activities on this constituent habitat type is 0.63% (<15% threshold).	**Disturbing: No** **Justification:** No spatial overlap
Clams/ Cockle	A	I	**Disturbing: No** **Justification:** No spatial overlap. The risk posed by NIS is minimal as culture stocks are confined under nets, is sourced from hatcheries and residence time is short.	**Disturbing: No** **Justification:** No spatial overlap
Access Routes	L	-	**Disturbing: No** **Justification:** While heavy vehicle traffic on access routes can remove and damage of sedentary or encrusting invertebrates long-term disturbance the greatest spatial extent of this activity on the community type is 0.07 % (<15% threshold).	**Disturbing: No** **Justification:** No spatial overlap
Access Routes	A	-	**Disturbing: No** **Justification:** While heavy vehicle traffic on access routes can remove and damage of sedentary or encrusting invertebrates long-term disturbance the greatest spatial extent of this activity on the community type is 0.03% (<15% threshold).	**Disturbing: No** **Justification:** No spatial overlap
Cumulative impact of existing and proposed aquaculture activity			**Disturbing: No** **Justification: Spatial overlap of existing and proposed oyster and mussel cultivation sites extends over 0.74% of this community; less than the 15% threshold.** **The pressure of access route activity) on this habitat is 0.10%, less than the 15% threshold.**	**Disturbing: No** **Justification: No spatial overlap**

8.4 ASSESSMENT OF THE EFFECTS OF AQUACULTURE PRODUCTION ON THE CONSERVATION OBJECTIVES FOR OTTER *LUTRA LUTRA* IN THE GWEEDORE BAY & ISLANDS SAC.

As the aquaculture production activities within the SAC spatially overlap with otter (*Lutra lutra*) territory, these activities may have negative effects on the abundance and distribution of populations of the species.

The Gweedore Bay & Islands SAC is designated for the otter (*Lutra lutra*); the conservation objectives for such are listed in Table 4.1. The risk of negative interactions between aquaculture operations and aquatic mammal species is a function of:

1. The location and type of structures used in the culture operations- is there a risk of entanglement or physical harm to the animals from the structures?

2. The schedule of operations on the site – is the frequency such that they can cause disturbance to the animals?

Shellfish Culture: Shellfish culture operations are likely to be carried out in daylight hours. The interaction with the otter is likely to be minimal given that otter foraging is primarily crepuscular. It is unlikely that these culture types pose a risk to otter populations in the Gweedore Bay & Islands SAC. Impacts can be discounted on the basis of the points below:

The proposed activities will not lead to any modification of the following attributes for otter:

- Extent of terrestrial habitat,
- Extent of marine habitat or
- Extent of freshwater habitat.
- The activity involves net input rather than extraction of fish biomass so that no negative impact on the essential food base (fish biomass) is expected
- The number of couching sites and holts or, therefore, the distribution, will not be directly affected by aquaculture and fisheries activities.
- Shellfish production activities are unlikely to pose any risk to otter populations through entrapment or direct physical injury.
- The structures and activities associated this form of oyster culture structures are raised from the seabed (0.5m -1m) and are oriented in rows, thus allowing free movement through and within the site.
- Disturbance associated with vessel and foot traffic could potentially affect the distribution of otters at the site. However, the level of disturbance is likely to be very low given the likely encounter rates will be low dictated primarily by tidal state and in daylight hours.

8.4.1 Conclusion Summary

The current levels of licenced shellfish culture and applications are considered **non-disturbing** to otter conservation features.

8.5 ASSESSMENT OF THE EFFECTS OF AQUACULTURE PRODUCTION ON THE CONSERVATION OBJECTIVES FOR HARBOUR SEAL *PHOCA VITULINA* MIGRATING IN GWEEDORE BAY & ISLANDS SAC

The Rutland Island & Sound SAC (002283), located to the south of the Gweedore Bay & Islands SAC, is designated for the Habitats Directive Annex II Species Harbour seal (*Phoca vitulina*). Site specific Conservation Objectives for the species within the Rutland Island & Sound SAC were identified by NPWS (2013a) (see Table 8.5) and relate primarily to the requirement to maintain various attributes of the populations including population size and the distribution of the species. It is acknowledged in this assessment that the favourable conservation status of the Harbour Seal has been achieved (NPWS 2013b, 2013c) given current levels of aquaculture production within both the Gweedore Bay & Islands SAC and Rutland Island & Sound SAC.

Table 8.5 - Conservation objectives and targets for the Harbour Seal *Phoca vitulina* in Rutland Island & Sound SAC (Site code 002283) (NPWS 2013a).

Species (Species code)	Objective	Target(s)
Harbour Seal *Phoca vitulina* (1365)	Maintain favourable conservation condition	The range of use within the site should not be restricted by artificial barriers; all sites (i.e. breeding, moulting and resting haul-outs sites) should be maintained in a natural condition; human activities should occur at levels that do not adversely affect harbour seal population at the site.

8.5.1 Conclusion Summary

The current levels of licenced shellfish culture and applications within Gweedore Bay & Islands SAC are considered **non-disturbing** to the site specific Conservation Objectives for the Harbour seal (*Phoca vitulina*) within the Rutland Island & Sound SAC

9 IN-COMBINATION EFFECTS OF AQUACULTURE, FISHERIES AND OTHER ACTIVITIES

9.1 FISHERIES

9.1.1 Habitat Interactions

Fisheries activities occurring in the SAC include pot fishing for crustaceans (lobster and crab). Table 9.1 presents the spatial extent of these fishing activities overlapping the habitat feature Reefs (1170) and the constituent marine community types of Reef community complex and *Laminaria* dominated community complex.

- Fishery overlaps with 5.56% of QI habitat 1170 and with 3.89% and 14.05% of the constituent marine community type Reef community complex and *Laminaria* dominated community complex respectively (see Table 9.1).

- The actual footprint of static gear such as creel and pot is expected to be much lower than the percentage of the area over which the fishery might occur.

- Pot fisheries and static net fisheries may cause localized abrasion and disturbance to habitats which may be significant for habitats that are highly sensitive to such pressures (e.g. maërl and seagrass meadows). However, the risk posed by the crustacean pot fishery to reef habitats is deemed to be low and insignificant. The habits and associated species are not sensitive to surface disturbance (ABPMer 2013e).

Table 9.1 - Spatial extent of fisheries activities overlapping within the broad habitat qualifying of 1170 (Reefs) and constituent community types in the Gweedore Bay & Islands SAC. Spatial overlap presented according to equipment used. Annex I feature in **bold**.

Feature (Community Type)	Area (ha) overlap	% Overlap with Feature/ Community Type
Reefs [369.1 ha]	20.51	5.56
(Reef community complex [308.44ha])	11.99	3.89
(*Laminaria*-dominated community [60.66ha])	8.52	14.05

9.1.2 Species Interactions

All fisheries extract target and, to varying extent, non-target species biomass which may reduce habitat quality for the designated species otter. Otters may be caught as by-catch in certain gears such as trammel nets set for bait in shallow water.

Harbour seals are a designated feature of the Rutland Island & Sound SAC which adjoins the Gweedore Bay & Islands SAC. Seals migrating from Rutland Island & Sound SAC into Gweedore Bay may interact with fishing pots and creels.

9.1.3 Conclusion Habitats and Species Interactions

Crustacean potting was shown to occur on the community type of Reef community complex and *Laminaria*-dominated community. Significant interaction between this community type and crustacean potting activity could be discounted based on low level of spatial overlap and the relative resilience of the community type to disturbances emanating from the fishery. Furthermore, it is likely that pot fishing activities will not occur in the aquaculture plots if they are actively maintained. Consequently, in-combination effects with intertidal trestle aquaculture activities on designated habitats (and constituent community types) can be **discounted.**

With respect to the designated species *Lutra lutra* it was concluded that significant negative interactions were unlikely to occur due to fishing gear being deployed outside preferred dive range of otters. Consequently, in-combination effects with intertidal trestle aquaculture activities on the species can be **discounted**

Moore (2003) reported that seals may damage creels to steal bait but are unlikely to be caught in soft-eye creels used in the Irish industry. Consequently, the risk of significant effects of potting on migrating harbours seal can be **discounted.**

9.2 INTERTIDAL SEAWEED HARVESTING

Other activities within the Gweedore Bay & Islands SAC include intertidal harvesting of seaweed. Direct impacts of seaweed harvesting on intertidal habitats and communities can include the removal and damage of sedentary or encrusting invertebrates (Kelly et al. 2001). Direct impacts upon intertidal habitats may also occur as a consequence of travel across the shore to harvest sites. Removal of seaweed cover can alter local hydrodynamic conditions and change wave exposure regimes which, in turn, can modify sedimentation rates.

9.2.1 Conclusion Summary

While intertidal seaweed harvesting generally occurs in reef areas it is not likely that harvesting will occur in the aquaculture plots if they are actively maintained. Consequently, the likely spatial overlap of seaweed harvesting activities and, existing and proposed intertidal shellfish culture (which is limited to 0.74% the QI habitat 1170 constituent community type of Reef community complex (see Table 7.1)) is low. Consequently, significant in-combination effects of seaweed harvesting with intertidal trestle aquaculture can be **discounted.**

It should be noted that there may be overlap between intertidal aquaculture and seaweed harvesting activities in terms of access routes used to service the sites. However, given current levels of seaweed extraction and, existing and proposed aquaculture access routes (which overlap (which is limited to 0.1% the QI habitat 1170 constituent community type of Reef community complex (see Table 7.1) in potential significant in-combination effects can be **discounted.**

9.3 POLLUTION PRESSURES

There are a number of activities which are terrestrial in origin that might result in impacts on the conservation features of the Gweedore Bay & Islands SAC. Primary among these are point source

discharges from domestic sewage outfalls and on-site-wastewater-treatment systems distributed along the harbour and a single municipal urban waste water treatment plant at Gweedore. The pressure derived from these point sources may impact upon levels of dissolved nutrients, suspended solids and some elemental components e.g. aluminium in the case of water treatment facilities.

9.3.1 Conclusion Summary

Pressures resulting from aquaculture activities are primarily confined to sedimentary habitats; in particular, along access routes where removal and damage can occur to both sedentary and/or encrusting invertebrates. It was, therefore, concluded that given the pressure resulting from point discharge location such as the urban waste-water treatment and/or combined sewer outfalls would likely impact on physico-chemical parameters in the water column, any in-combination effects with aquaculture activities are considered to be **minimal or negligible**. It should be noted however the results of Shellfish Water monitoring[5] do not indicate any water quality issues within/ in the vicinity of this shellfish area.

[5] Revised / Updated Gweedore Bay Pollution Reduction Programme http://www.environ.ie/en/Publications/Environment/Water/PublicConsultations-ShellfishWatersDirective/FileDownLoad,33460,en.pdf

10 SAC AQUACULTURE APPROPRIATE ASSESSMENT CONCLUDING STATEMENT AND RECOMMENDATIONS

Current and proposed aquaculture activity occurring in the Gweedore Bay & Islands SAC is limited to oyster cultivation (using bags and trestles) and a single licence to culture clams intertidally on the seabed. Based upon this and the information provided in the aquaculture profiling carried out (Section 5), the likely interaction between these culture methods and conservation features (habitats and species) of the site were considered.

10.1 HABITATS

An initial screening exercise resulted in five features and one species being excluded from further consideration by virtue of the fact that no spatial overlap of the culture activities was expected to occur. The habitats and species excluded from further consideration included 1150 Coastal lagoons, 1220 Perennial vegetation of stony banks, 1395 Petalwort *Petalophyllum ralfsii,* 1410 Mediterranean salt meadows (*Juncetalia maritimi*), 1833 Slender Naiad *Najas flexilis,* 2110 Embryonic shifting dunes, 2120 Shifting dunes along the shoreline with *Ammophilia arenaria* (white dunes), 2130 Fixed coastal dunes with herbaceous vegetation (grey dunes), 2140 Decalcified fixed dunes with *Empetrum nigrum*, 2150 Atlantic decalcified fixed dunes (*Calluno-Ulicetea*), 2170 Dunes with *Salix repen* ssp. *argentea* (*Salicion arenariae*), 2190 Humid dune slacks, 21A0 Machairs, 3110 Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*), 4030 European dry heaths, 4060 Alpine and Boreal heaths, 5130 *Juniperus communis* formations on heaths or calcareous grasslands.

A full assessment was carried out on the likely interactions between existing and proposed culture operations and the feature of the Annex 1 habitat 1170 (Reefs). The likely effects of the aquaculture activities (species, structures, access routes) were considered in light of the sensitivity of two constituent habitats and species of the Annex 1 habitat Reefs, i.e. Reef community complex and *Laminaria* dominated community complex.

Based upon the scale of spatial overlap of current and proposed oyster culture aquaculture activities and the relatively high tolerance levels of the community types and associated species, the general conclusions is that current activities are non-disturbing to feature (Reef - 1170) and it constituent communities. Furthermore, the existing and proposed clam/cockle and oyster culture operations are also considered a low risk for the establishment of non-native species. However, their recruitment status should be kept under surveillance.

It is recommended that there be strict adherence to any agreed access routes and that density of culture structures within the sites be maintained at current levels. The movement of stock in and out of the Gweedore Bay & Islands SAC should adhere to relevant fish health legislation and follow best practice guidelines (e.g. http://invasivespeciesireland.com/cops/aquaculture/).

10.2 SPECIES

The likely interactions between the proposed aquaculture activities and the Annex II Species Otter were also assessed. The objectives for this species in the SAC focus upon maintaining the good conservation status of the population. The proposed activities will not lead to any modification of the conservation attributes for otter. The current levels of licenced shellfish culture and applications are considered non-disturbing to otter conservation features.

The current levels of licenced shellfish culture and applications within Gweedore Bay & Islands SAC are considered non-disturbing to the site specific Conservation Objectives for the Harbour seal (*Phoca vitulina*) within the Rutland Island & Sound SAC

10.3 IN–COMBINATION EFFECTS

A number of in-combination effects resulting from a range of activities (i.e., fisheries, seaweed harvest and pollution) were considered in this report. The conclusions is that none, when considered in conjunction with shellfish culture activities will result in a significant disturbance to the conservation features of the Gweedore Bay & Islands SAC.

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